Figures and plates

Figures

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(Figure 75). —Section across Bail Hill Volcanic Area, from Guffock Hill to Sanquhar Coalfield. (Length, one mile.) 1B, Diabase lavas. 1Ts. Agglomerate (Arenig). 2I. Glenkiln Shales. 2. Greywacke and shales (Llandeilo). 3. Conglomerate, &c. (Caradoc). d. Carboniferous series. f. Faults.

(Figure 76) Plan of the Strata in Spotfore Burn (at foot of Penfraw Burn). 1B. Diabase lavas. 1Ts. Agglomerate (Arenig). C. Radiolarian chert. 2I. Glenkiln shales. 3II. Lower Harden. Shales. 3. Greywacke, &c. (Caradoc). f. Faults.

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(Figure 79) Section, tributary of Burnsands Burn, 400 yards east of Fardingmullach, Nithsdale. (Explanation as in (Figure 78).)

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(Figure 83). Plan of Strata in Whing Burn, near Shieling Knowe, S.W. of Sanquhar. 1. Red mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Faults, T. Thrust-faults.

(Figure 84). Section in Whing Burn along the line shown in (Figure 83).

(Figure 85) Plan of the Strata near the Head of Glenlarie Burn, 4½ miles S.W. from Sanquhar. 1B. Diabase-lavas. 1Ts. Tuff. 1. Red mudstones. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke.

(Figure 86) Section near the head of Glenlarie Burn along the line marked in (Figure 85).

(Figure 87) Plan of Strata in Streamlet near Polgown, Scar Water. 1B. Arenig lavas. 1B■ Intrusive dolerite (Arenig). C. Radiolarian chest. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3. Greywake and shale (Caradoc). F. Felsite dyke. f. Fault.

(Figure 88) Section along the streamlet shown in (Figure 87).

(Figure 89) Ground Plan of Strata in Lorg Burn and Rough Craig, Water of Ken, Kirkcudbightshire. 1B. Arenig lavas. C. Radiolarian chert. 2I. Glenkiln shales. 3II. Lower Harden Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault. Dotted lines, contour lines. Interrupted lines, upper limit of glacial deposits.

(Figure 90) Section along the Rough Craig, as in (Figure 89). S.L. Stream level.

(Figure 91) Section in Lorg Burn, above Lorg Shepherd's House, Water of Ken, Kirkcudbrightshire. (Explanation as in (Figure 89).)

(Figure 92) Plan of Strata in Crag, Cairnsgarroch, Carsphairn. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). [Boulder-clay symbol] Boulder clay. [Moraines symbol] Moraines. f. Fault.

(Figure 93) Section of Crag, Cairnsgarroch, Carsphairn, along the line marked in (Figure 92).

(Figure 94) Plan of the Strata in part of Lagbaes Burn, Cardorkin, Kirkcudbrightshire.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault.

(Figure 95) Section across Lagbaes Burn, Cardorkin. (Explanation as in (Figure 94).)

(Figure 96) Plan of the Glenkiln Strata and Radiolarian Cherts with Interbedded Grits, in Knoll near Shepherd's Cairn, about 350 yards S.W. of Tannylaggie House, Wigtownshire (Sheet 8 of Survey Map). C. Radiolarian cherts. Gw. Greywacke. 2I. Glenkiln Shales. + + Localities where Glenkiln graptolites were obtained.

(Figure 97) Plan of Strata in Morroch Bay, Wigtownshire. 1. Volcanic mudstone and tuff (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke, mudstone, and shale (Caradoc). F. Porphyrite dykes. f. Fault. [Symbol Fifty-foot raised beach] Fifty-foot raised beach.

(Figure 98) Section across the Strata in Morroch Bay. (For explanation, see (Figure 97).)

(Figure 99) Section of Strata at Portandear South of River Stinchar. 1B. Diabase lava. 1Ts. Agglomerate (Arenig). 1 &2C. Radiolarian chert. 2a. Dark shale with Glenkiln graptolites. 2. "Tappin's Group". B. Dolerite dyke (Tertiary). [symbol]

Beach deposits. [symbol] Boulder clay.

(Figure 100) Section at Knockgown, North of Currarie, Ballantrae, Ayrshire.

1B. Diabase lava.

1Ts. Agglomerate.

2. Dark shale with Glenkiln graptolites.

a. Porphyritic lava with pillow-structure, 37 ft.

b. Agglomerate with blocks of black chert, 29 ft.

c. Lenticular pillowy porphritic lava, 17 ft. greatest breadth.

d Red radiolarian cherts, 5½ ft. above, a few inches below.

e. Red mudstones, 3 ft.

f. Pillowy lava, 13 ft.

g. Mudstone, 10 in.

h. Ash and calcareous agglomerate, 3½ ft.

i. Fossiliferous mudstones and thin lenticular bed of calcareous agglomerate.

j. Fossiliferous mudstones, 5½ ft.

k. Agglomerate (calcareous), 7 ft.

l. Green and grey mudstones, 10 ft.

m. Agglomerate with lenticular bed of lava, 26 ft.

n. Green and red mudstones and cherts, 7 ft.

o. Ash or agglomerate, 9 ft.

p. Green and red mudstone, ashy, 5 ft.

q. Agglomerate, 23 ft.

r. Feletone dyke, pink.

s. Agglomerate.

t. Radiolarian chert.

u. Agglomerate.

x. Felsite dyke.

f. to i. Below. At top of cliff represented by green muds, with a few large scattered blocks of lava and fragments of red a green chert with splendid radiolaria.

(Figure 101) Section in Wilson's Burn, between Currarie and Downan, Ballantrae. 1B. Arenig volcanic rocks. 1&2 C. Radiolarian chert. 2. "Tappins Group" (Llandeilo). [symbol] Boulder clay. [symbol] 100 Feet Beach. [symbol] 25 Feet Beach.

(Figure 102) Plan of Strata on the Shore, Bennane Head, Ballantrae. 1 Ts. Volcanic agglomerate. 1. Arenig black shale. C. Radiolarian chert (Arenig). Σ. Serpentine. 1U. Intrusive basic rock. e. Permian. [symbol] Raised beach.

(Figure 103) Section on the shore, Benane Head, Ballantrae. (See (Figure 102) for explanation.)

(Figure 104) Plan of Strata on the Shore, Pinbain, one mile north of Lendalfoot, Ayrshire. 1. Arenig black shale. 1B. Diabase lava. 1 Ts. Agglomerate. Σ. Serpentine. 1U. Intrusive basic rock (Silurian). B B. Dolerite dykes (Tertiary). f. Fault.

(Figure 105) Section of strata on shore, Pinbain, one mile north of Lendalfoot. See (Figure 104) for explanation.)

(Figure 106) Generalised Section from Ballantrae to Glen App, Ayrshire, to show the relation of the Volcanic Rocks to the overlying sediments south of River Stinchar. (Length, six miles.) 1B. Arenig lava. 1 Ts. Arenig tuff. 1&20. Radiolarian chert. 2. "Tapping Group" (Llandeilo). 2I. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 1U. Intrusive basic rock. e. Permian. ff. Faults. [symbol] Alluvium.

(Figure 107) Section across Knockdolian from Bougang to Knockdhu, Stinchar Valley, Ayrshire. (Length, two and a half miles.) 1B. Diabase-lavas. 1T s. Volcanic agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. 2. Serpentine. 1U. Intrusive basic rock. 2. Tappins group. 2e. Stinchar limestone and conglomerate. f. Faults.

(Figure 108) Generalised Section from Water of Assel across Daldowie Hill to Pinmore Mains (South Ayrshire), to show relation of Inliers of Arenig Volcanic Rocks to overlying Sediments. (Length, three miles.) 1B. Lavas. 1Ts. Agglomerate. 1&2C. Radiolarian chert. Σ. Serpentine. 1U. Intrusive basic rock. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. f. Fault.

(Figure 109) Section across Craighead Inlier. 1B. Arenig lavas. 1&2C. Radiolarian cherts. 2. "Tappins group". 2b. Kirkland conglomerate. 3c. Stinchar limestone. 2d. Graptolitic mudstone. 2e. Benan conglomerate. CI. Lower old red sandstone.

(Figure 110) Generalised Section across the Ballantrae Volcanic Area from Bennane Head to Beneraird. (Length, six miles.) 1B. Lavas. lTs. Agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. Serpentine. 1U. Intrusive basic rocks (Silurian). 2. "Tapping" group. 2I. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 2e. Stinchar limestone group. [symbol] Alluvium. f. Faults.

(Figure 111) Generalised Section across Benan Hill from Tramitchell Limestone Quarry to River Stinchar. (Length, two miles.) 2a. Kirkland conglomerate. 2b. *Orthis* confinis-beds. 2c. Stinchar limestone. 2d. Graptolitic mudstones. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. Cl. Lower Old Red Sandstone. Poc1. Andesitic lavas of Lower Old Red Sandstone age. f. Faults. Boulder Clay. [symbol] Alluvium.

(Figure 112) Generalised Section across Byne Hill from Craig Skelly to Millenderdale (Length, four miles).1B. Arenig lavas. 1. Arenig black shale. Σ. Serpentine. U. Intrusive basic rocks. G. Granite. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstones. 4b. Craig Skelly conglomerate.

(Figure 113) Section of the Strata on Ardmillan Shore, Ayrshire (after Lapworth).

4b Woodland Beds, Llandovery: 3. Grits and conglomerates. 2. Carbonaceous shales with Climacograptus rectangularis &c. 1. Lower Pentamerus limestone;

3d. Barren flagstones: 2. Flagstones and shales, non-fossiliferous. 1. Shales with Nematolites;

3c. Whitehouse beds: 2 Mudstones and flags with *Dicellograptus complanatus.* 1. Shales and calcareous grits with *Leptaena sericea and L. transversalis.*

3b. Ardwell Beds: 6. Flaggy shales with *Climacograptus caudatus*. 5. Flaggy beds with *Dicranograptus ramosus*. 3 & 4. Splintery iron-stained shales with *Corynoides calycularis. 2. Hard grey flags and shales with Diplograptus rugosus.* 1. Iron-stained dark shales with few fossils.

3a. Balclatchie beds.

2e. Benan conglomerate.

(Figure 114) Section of the Strata exposed in Penwhapple Glen, Ayrshire (after Lapworth).

4e. Bargany group.

4d. Penkill group: 3. *Cyrtograptus Grayi* mudstones. 2. *Protovirgularia*-flags with *Monograptus exiguus. 1. Crossopodia*-shales.

4c. Camregan group: 4. Thick-bedded grits. 3. *Bastrites maximus*-shales. 2. Camregan, or Upper *Pentamerus,* limestone. 1. Grit and sandstone with *Rhynchonella cuneata.*

4b. Saugh Hill group: 9. Dark shales with *Monograptus Sedgwicki,* cf.c. 8. Grey and green mudstones. 7. Thick-bedded grits. 6. Flaggy shales. 5. Grits and flagstones. 4. Grey and green shales. 3. Striped shales. 2. Dark shales with *Diplograptus confertus.* 1. Mudstones and shales with *Pentameri* 1, 2, 3 previous *Diplograptus modestus* shales

3d. Barren flagstones: 3. Thick-bedded flags and shales with *Diplograptus truncatus.* 2. Flagstones and shales. 1. Flags, shales, and mudstones with *Nematolites Grayi.*

3c. Whitehouse beds: 2. Green and purple mudstone. 1. Shales and mudstones with *Diplograptus guattrimucronatus.*

3b. Ardwell shales: 4. Cascade grits. 3. Shales with *Dicellograpti.* 2. Grey flagstones. Shales with *Climacograptus coelatus* and *Diplograptus rugosus.*

3a. Balclatchie beds: 2. Conglomerate. 1. Mudstones, highly fossiliferous.

2e. Benan conglomerate.

B. Dolerite dykes.

f. Faults.

(Figure 115) Section across Quarrel Hill and Rough Neuk from Thunderton Hall to Glenshalloch.

4b. Saugh Hill Group: 3. Glenshalloch shales (*Monograptus gregartus*-zone). 2. *Pentamerus* grits. 1. Pale shale with *Diplograptus acuminates.*

4a. Mulloch Hill Group: 3. *Ptilograptus* shales. 2. Mulloch Hill sandstone. 1. Mulloch Hill conglomerate.

3f. Starfish bed.

3e. Drummuck mudstones.

3d. Barren flagstones.

(Figure 116) Generalised section across the Girvan area from Drummuck to River Stinchar, near Daljarrock. (Length, 11 miles,) 1B. Arenig lava. 1 Ts. Arenig agglomerate. 1. Arenig black shales. Σ. Serpentine. 1 B[arrow]. Intrusive basic

rocks. 2 & 3 C. Radiolarian chert. 2. "Tappins beds". 2&3. Llandeilo–Caradoc. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie group. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstone group. 3e. Drummuck group. 4. Upper Silurian (Llandovery Rocks). 4a. Mulloch Hill group. 4b. Saugh Hill group. 4c. Camregan group. C1. Lower Old Red Sandstone. B. Dolerite dyke. f. Faults. [symbol] Boulder clay. [symbol] Alluvium.

(Figure 117) Section across the Lesmahagow Upper Silurian Inlier from Seggholm to Yondertown. (Distance, about nine miles.)

d2. Lower Carboniferous formations. c1. Lower Old Red Sandstone.

Downtonian

6e. Chocolate-coloured sandstones (No. 11 of Table, p. 569). 6d. Quartzite conglomerate (No. 10). 6c. Fish-beds (No. 9). 6b. Red and yellow sandstones (No. 8). The Glenbuck conglomerate band (6a) is not here present (see (Figure 118)).

Ludlow

5f. Greywackes and mudstones (No. 6). 5e. Trochus-beds (No. 5). 5d. *Pterygotus-beds* (No. 4). 5c. *Ceratiocaris*-beds (No. 3). 5b. Shales and greywackes (No. 2).

5a. Wenlock (?). B. Dolerite dykes (Tertiary). f. Faults.

(Figure 118) Section across the Hagshaw Upper Silurian Inlier through Parishhohn, Douglas Water, Lanarkshire. (Length, three miles.) d2. Lower Carboniferous. C1. Lower Old Red Sandstone and conglomerate. PoC1. Volcanic rocks of Lower Old Red Sandstone age.

Downtonian: 6e. Chocholate -coloured sandstone. 6d. Quartzite conglomerate. 6c1 Fish-band. 6c. Red and green mudstones (Fish-beds). 6b. Red and yellow sandstones. 6a. Conglomerate with igneous pebbles.

5 Ludlow. f. faults.

(Figure 119) Generalised Section across the Upper Silurian InHers of Lesmahagow and the Hagshaw Hills, from the Avon Water near Drumclog to the edge of the Lower Silurian Area South of Cairn Kinny. (Length, 15 miles.)

d1. Lower Carboniferous. Pod1. Lower Carboniferous volcanic rocks.

C1. Lower Old Red Sandstone: C1c. Conglomerate, mudstones, etc., above volcanic platform. P C1. Rocks of the volcanic platform. C1a. Conglomerate, sandstone, etc., below the volcanic platform.

6. Downtonian

6e. Chocolate-coloured sandstones. 6d. Quartzite-conglomerate. 6c. Fish-beds. 6b. Red and yellow sandstones. 6a. Conglomerate, with igneous pebbles.

5. Wenlock-Ludlow. 1 & 2C. Radiolarian chert (Arenig).

G. Granite. B. Dolerite dykes (Tertiary). f. Faults.

(Figure 120) Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the North Esk and its tributaries. (Length, two miles and a half.)

d2. Lower Carboniferous. C3. Upper Old Red Sandstone.

Lower Old Red Sandstone.

PoC 1. Andesites, etc.

C1. Conglomerates, sandstones, etc

6. Downtonian: 6e. Chocolate-coloured sandstone. 6d. Red sandstone, with large pebbles of quartzite. 6c. Red and green mudstones (Fish-bands). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles.

5. Wenlock and Ludlow: 5H *Platyschisma (Trochus)* beds. 5G. Dark-brown sandy shales. 5F. Concretionary sandstone and shale, with *O. Maclareni.* 5E. Mudstones, etc., crowded with fossils. 5D. Greenish-grey shale and sandy bands. 5C. Conglomerate, grit, and sandstone. 5B. Sandstone and grit. 5A. Greywacke and shales.

(Figure 121) Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the Lyne Water. (Length, four miles and a half.)

Upper Old Red Sandstone: C3. Conglomerates and Sandstones.

Lower Old Red Sandstone. : C1. Conglomerate and sandstone. PoC1. Volcanic rocks.

6. Downtonian. : 6e. Chocolate-coloured sandstone. 6d. Quartzite conglomerate. 6c. Red and green shales (fish beds). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles.

5. Ludlow. :5 H. *Trochus*- (*Platyschisma*-) beds.

B. Intrusive dolerite. f. Faults.

Tables

(Table 1) [unnumbered p.79]. Table showing relative thicknesses of Silurian strata in the south of Scotland.

(Table 2) Upper Silurian — general description

(Table 3) Lower Silurian — general description

Plates

(Plate 1) Sack-like pillow-form structure in Diabase Lava on shore ¾-mile south of Downan Point 2½ miles south of Balantrae.

(Plate 2) Limestone filling spaces between pillow-form masses of lava exposed near beach near Downan, 1½ miles south of Ballantrae.

(Plate 3) Isoclinal folds in green greywackes, mudstones and shales (Tappins series), Currarie Port, 3 miles south of Ballantrae.

(Plate 4) Limestone filling spaces between pillow-form masses of lava, on shore near Downan, 1½ miles south of Ballantrae.

(Plate 5) Vesicular structure in pillow-form mass of lava, on beach near Downan, one mile south of Ballantrae.

(Plate 6) Radiolarian chert filling spaces between pillow-form masses of lava, on shore at Portandea, five miles south-west of Ballantrae.

(Plate 7) Folds in Radiolarian chert, stack on shore at Benanne Cave, two miles north of Ballantrae.

(Plate 8) Alternation of tuff (lighter bands) and Radiolarian chert (darker bands), on shore at Bennane Cave, two miles north of Ballantrae.

(Plate 9) Folded Radiolarian chert and tuff, cliff south of Bennane Cave, two miles north of Ballantrae.

(Plate 10) Volcanic agglomerate in vertical beds, Bennane Head, 2½ miles north of Ballantrae.

(Plate 11) Ashy mudstone and chert with graptolites, adhering to pillow-form surface of lava, shore near Balcreuchan Port, 3½ miles north of Ballantrae.

(Plate 12) Volcanic agglomerate, Stockenray Bay, 1¼ miles north of Lendalfoot.

(Plate 13) Porphyritic lava, "Diabase porphyrite," Stockenray Bay, 1■ miles N of Lendalfoot.

(Plate 14) Junction of Dolerite dyke (light coloured mass) with Serpentine (darker mass), stack on shore 300 yards north of Lendalfoot.

(Plate 15) Benan conglomerate; shore at Kennedy's Pass, four miles south of Girvan.

(Plate 16) Benan conglomerate, shore four miles south of Girvan.

(Plate 17) Folded flagstones and shales (Ardmillan Series), shore 3¾ miles south of Girvan.

8. Description of micro-photographs (Plates 18 to 25).

(Plate 18)

1. (S6415) Basic lava; slaggy margin of pillow-shaped mass. 350 yards N. of Port Vad, Ballantrae. Magnified 14 diameters.

The large amygdaloid is mainly filled with calcite. A little interstitial matter may be seen round the margin. The irregular cavity below contains both calcite and interstitial matter. At the upper left-hand margin is seen a portion of a large amygdaloid entirely filled with interstitial matter. The main mass of the rock is formed of microlitic felspars, augite-granules, chlorite, magnetite, and interstitial matter. The microiltic felspars only can be clearly recognised in the figure.

2. (S6415) Another portion of the same slide. Magnified 27 diameters.

Fig. 1. Basic Lava. x 14.

Fig. 2. Basic Lava. x 27.

(Plate 19)

1. (S6416) Core of one of the pillow-shaped masses. Magnified 27 diameters.

The portion of the slide represented in the figure contains vesicular lapilli; other portions of the same slide are similar to the main mass of the amygdaloidal rocks.

2. (S6419) Porphyritic lava. On shore 400 yards S. of fifth milestone from Girvan. Magnified 14 diameters.

Large phenocrysts of basic plagioclase in a ground-mass of small felspars, chlorite, small augites, and a little interstitial matter.

Fig. 1. Lapilli in Basic Lava. x 27.

Fig. 2. Porphyritic Basalt. x 14.

(Plate 20)

1. (S5927) Littleton Hill, Colmonell. Mass surrounded by serpentine. Magnified 14 diameters.

Portion of a large phenocryst of plagioclase containing inclusions of brown hornblende in a ground-mass of brown hornblende, granulitic plagioclase, and iron ore.

2. (S6495) From boss near sheepfold, half a mile due W. of Balhamie Hill. Magnified 27 diameters.

The dark patches are aggregates of brown hornblende; the white patches are aggregates of granulitic felspar. It will be observed that some of the patches of granulitic felspar show decided traces of a lath-shaped form.

It is probable that the original rock was a dolerite.

Fig. 1. Plagioclase-hornblende-rock. x 4.

Fig. 2. Plagioclase-hornblende-rock. x 27.

(Plate 21)

1. (S7510) Crest of Hamilton Hill, Peeblesshire. Soda-felsite. Magnified 27 diameters. Small phenocrysts of alkali-felspar in a ground-mass mainly composed of microlitic felspars (specimen analysed).

2. (S7152) Winkston Hill. Two miles N. of Peebles. Perlitic felsite. Magnified 27 diameters.

The perlitic cracks are stained with ferric oxide. In the lower part of the figure the dark space represents a portion of a mass of carbonate which appears to replace the felsite, and through which the perlitic cracks pass without interruption.

Fig 1. Soda-felsite. x 27.

Fig. 2. Perlitic Felsite. x 27.

(Plate 22)

1. (S6494) Near old loch, Craig Hill. One mile N.B. of Garnaburn. Magnified 27 diameters.

Banded granulitic rock composed of malacolite, felspar, brown hornblende, and iron ores.

The greater portion of the figure represents a band of malacolite, felspar, and iron ore; at the top and slightly to the left is a small portion of a band formed of hornblende and felspar. This rock is the beer-bachite of Chelius.

2. (S6453). —Dolerite from centre of dyke, Lendalfoot. Magnified 14 diameters.

The minerals represented are augite, more or less altered plagioclase, and magnetite. The augite shows a marked tendency to elongation in the direction of the vertical axis.

Fig. 1. Granulitic Gabbro. x 27.

Fig. 2. Dolerite. x 14.

(Plate 23)

1. (S6432) Hornblende-picrite. Thin dyke-like vein in serpentine, 200 yards west of Balhamie Burn. Magnified 14 diameters.

The dominant mineral is olivine, occurring in large grains, and traversed by the usual anastomosing veins, along which magnetite has been deposited. The spaces between the grains are now occupied by brown hornblende and alteration products after felspar. The amount of felspar originally present must have been very small.

2. (S6470) Coarse-grained ophitic dolerite, east side of Byne Hill, 6 yards from edge of mass. Magnified 14 diameters.

The conspicuous patch near the centre represents an allotriomorphic grain of olivine. The other minerals art augite and more or less turbid plagioclase. A lobe of the olivine grain is seen in contact with augite in the lower or south-east quadrant, and the latter mineral is moulded on the former. As the olivine is clearly allotriomorphic with respect to the felspar, the order of consolidation in this rock has been basic plagioclase, olivine, augite.

Fig. 1. Hornblende-picrite. x 14.

Fig. 2. Ophitic Dolerite. x 14.

(Plate 24)

1. (S6470). Another portion of the same slide. Magnified 14 diameters. The lower half of the figure is occupied by one large ophitic patch of augite, which is prolonged towards the north-west. The lower part of this patch is clear and unaltered, but the peripheral parts, and especially the north-west prolongation, are formed of an intimate inter-growth of augite and hornblende, and appear dark in the figure. It is probable that the whole patch consolidated as augite, and that the hornblende is therefore secondary. The other portions of the figure represent basic plagioclase.

2. (S6571) Gneissose hornblende biotite-granite. North of Kell's Farm, Southwick. Magnified 14 diameters. The minerals present in that portion of the slide which is here represented are quartz, felspar, biotite, and hornblende but the two latter cannot be distinguished in the figure. The interstitial movement which produced the gneissose structure is indicated by the distribution and forms of the opaque streak and patches (biotite and hornblende).

(Plate 25)

1. (S7050) Quartz-biotite-hyperite. Black Laggan, Loch Dee. Magnified 14 diameters.

The minerals represented are hypersthene, biotite, felspar, and quartz. A large crystal of hypersthene occurs in the north-west quadrant, and there are several smaller grains of the same mineral in other parts of the figure. The opaque patches represent biotite, and the colourless portions felspar and quartz.

2. (S7047) Camptonite, Black Gairy Hill. Five miles S.W. of Loch Dee. Magnified 14 diameters.

Idiomorphic pale brown hornblende in a felspathic matrix. Under crossed nicols the matrix breaks up into an aggregate of large grains, which mutually interfere with each other. The felspar belongs to the oligoclase-andesine section.

Fig. 1. Quartz-biotite-hyperite. x 14.

Fig. 2. Camptimite. x 14.

(Plate 26)

A. Arenig and Lower Llandeilo graptolites.

1. Dichograptus octobrachiatus (Halt.) x ½

2. Bryograptus Kjerulfi (Lapw.) x 2.

3. Tetragraptus bryonoides (Hall.)

4. Phyllograptus typus (Hall.) x ½

5. Didymograptus Murchisoni (Barr.)

6. Didymograptus fractus (Salt.)

7. Didymograptus nitidus (Hall).

B Upper Llandeilo (Glenkiln) graptolites.

1. Didymograptus superstes (Lapw.)

2. Caenograptus gracilis (Hall.)

3. Dicellograptus sextans (Hall.)

4. Dicellograptus divaricatus (Hall.)

5. Dicranograptus zic-zac (Lapw.)

6 Dicranograptus formosus (Hopk.)

7 Lasiograptus bimucronatus (Nich.)

8. Diplograptus mucronatus (Hall.)

9. Diplograptus Whitfieldi (Hall.)

10. Diplograptus angustifolius (Hall.)

11. Glossograptus Hincksi (Hopk.)

12. Clathrograptus cuneiformis (Lapw.) x 3

13. Climacograptus Scharenbergi

14. Climacograptus bicornis (Hall.)

Arenig and Llandeilo graptolites (after Lapworth).

(Plate 27)

C. Caradoc (Hartfell) Graptolites.

1. Pleurograptus linearis (Carr.)

2. Leptograptus flaccidus (Hall.)

3. Dicellograptus complanatus (Lapw.)

4. Dicellograptus Morrisi (Hopk.)

5. Dicellograptus caduceus (Lapw.)

6. Dicranograptus Clingani (Hopk.)

7. Dicranograptus Nicholsoni (Hopk.)

8. Dicranograptus ramosus (Hall.)

9. Climacograptus Wilsoni (Lapw.)

10. Diplograptus quadrimucronatus (Hall.)

11. Diplograptus foliaceus (Mwrch.)

12. Diplograptus truncatus (Lapw.)

13. Lasiograptus margaritatus (Lapw.)

14. Neurograptus fibratus (Lapw.)

15. Corynoides calycularis (Nich.)

D. Upper Silurian Graptolites

1. Diplograptus vesiculosus (Nich,.)

2. Diplograptus acuminatus (Nich.)

3. Cephalograptus cometa (Geinitz.)

4. Petalograptus folium (His.)

5. Dimorphograptus Swanstoni (Lapw.)

6. Climacograptus rectangularis (M'Coy.)

7. Climacograptus normalis (Lapw.)

8. Monograptus crispus (Lapw.)

9. Monograptus spiralis (Iteinitz.)

10. Monograptus triangulatus (Harkn.)

11. Monograptus exiguus (Nich.)

12. Monograptus gregarius (Lapw.)

13. Monograptus cyphus (Lapw.)

14. Monograptus lobiferus (M'Coy.)

15. Monograptus colonus (Barr.)

16. Monograptus jaculum (Lapw.)

17. Monograptus Sedgwicki (Portl.)

18. Monograptus priodon (Bronn.)

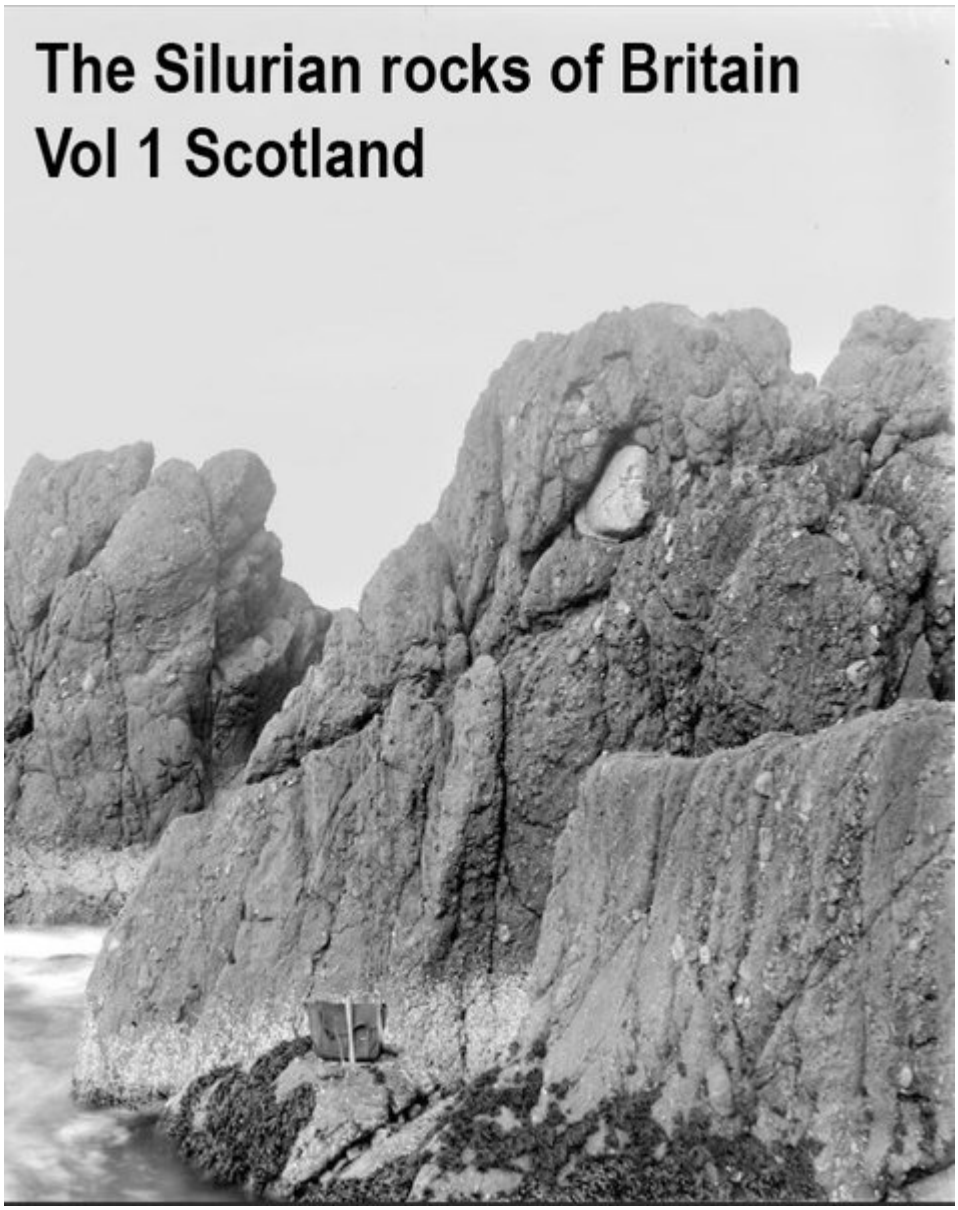
19. Monograptus turriculatus (Barr.)

20. Rastrites perigrinus (Barr.)

21. Rastrites maximus (Carr.)

22. Cyrtograptus Murchisoni (Carr.)

Caradoc and Upper Silurian graptolites (after Lapworth).



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MEMOIRS OF THE GEOLOGICAL SURVEY

OF THE

UNITED KINGDOM.

THE

SILURIAN ROCKS

OF

BRITAIN.

VOL I.

SCOTLAND.

BY

B. N. PEACH, F.R.S., A.R.S.M., F.G.S.,

AND

JOHN HORNE, F.R.S.E., F.G.S.

WITH

PETROLOGICAL CHAPTERS AND NOTES.

BY

J. J. H. TEALL, M.A., F.R.S., F.G.S.

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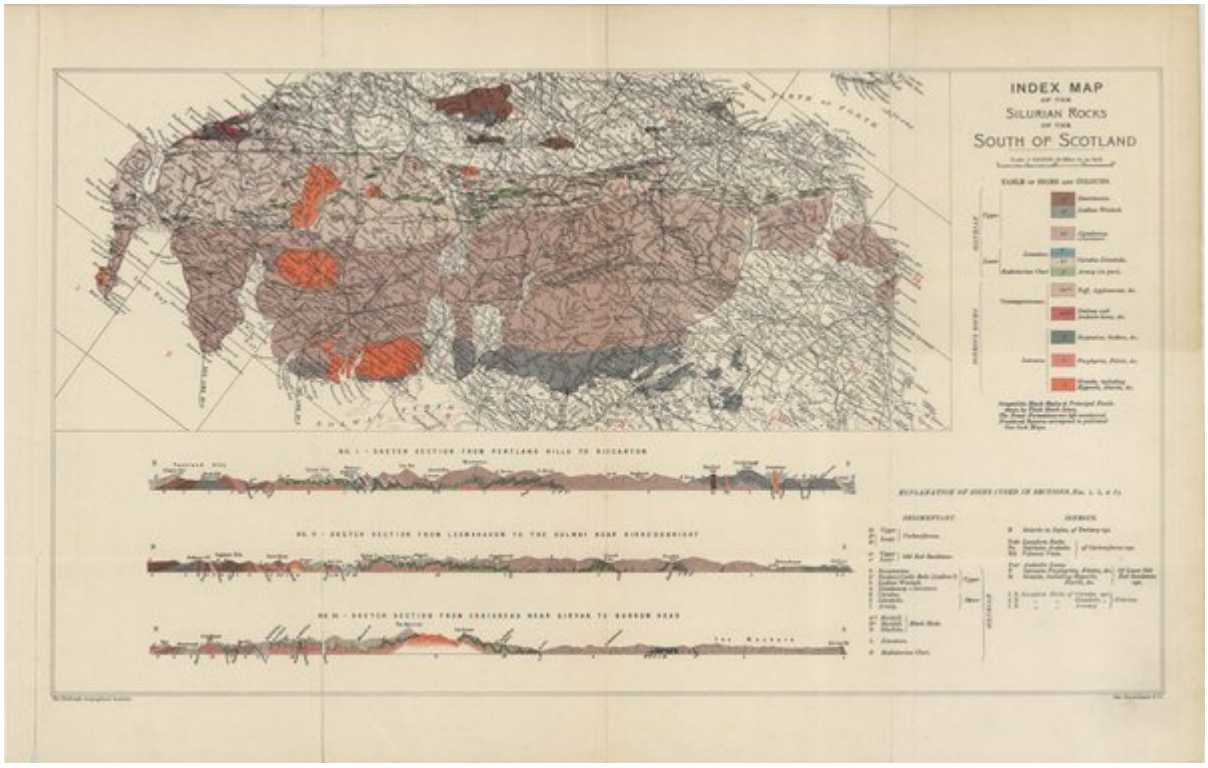

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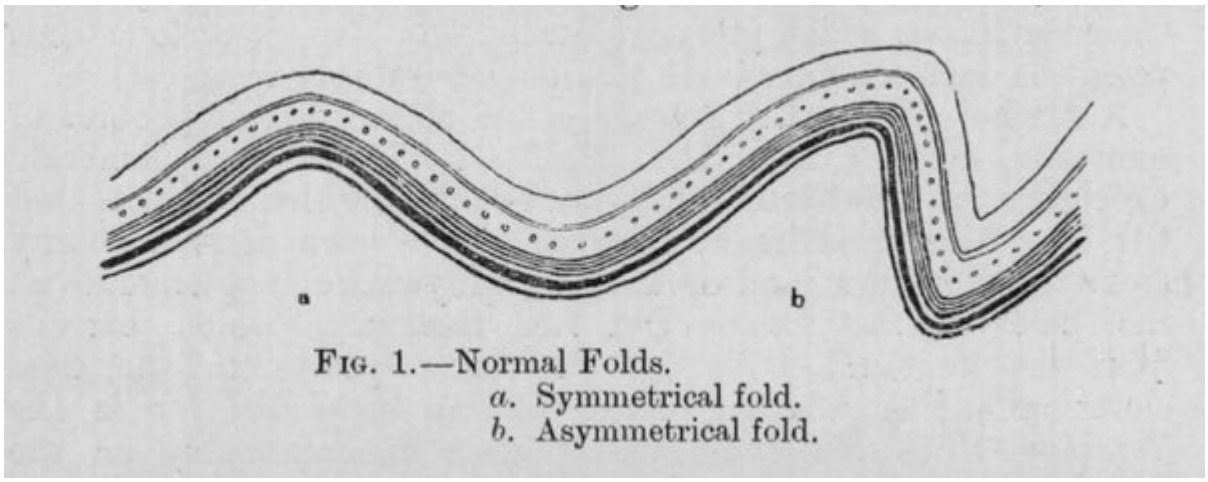


FIG. 1.—Normal Folds.
a. Symmetrical fold.
b. Asymmetrical fold.

(Figure 1) Normal Folds. a. Symmetrical fold. b. Asymmetrical fold.

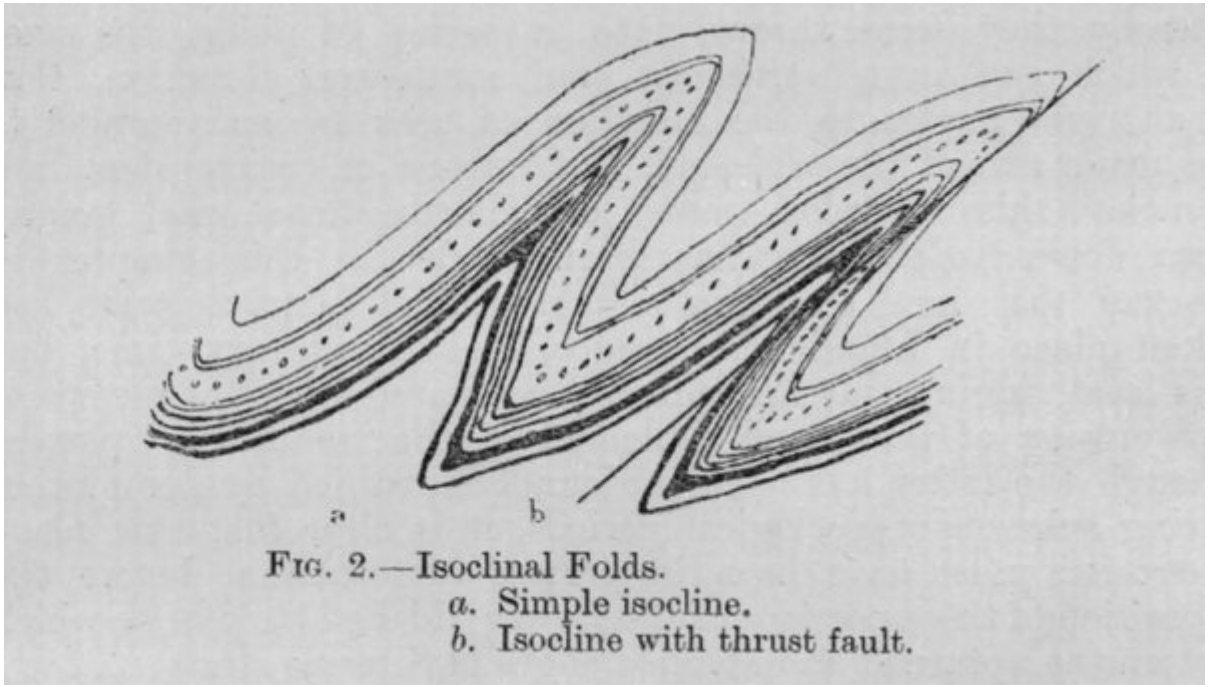


FIG. 2.—Isoclinal Folds.
a. Simple isocline.
b. Isocline with thrust fault.

(Figure 2) Isoclinal Folds. a. Simple isocline. b. Isocline with thrust fault.

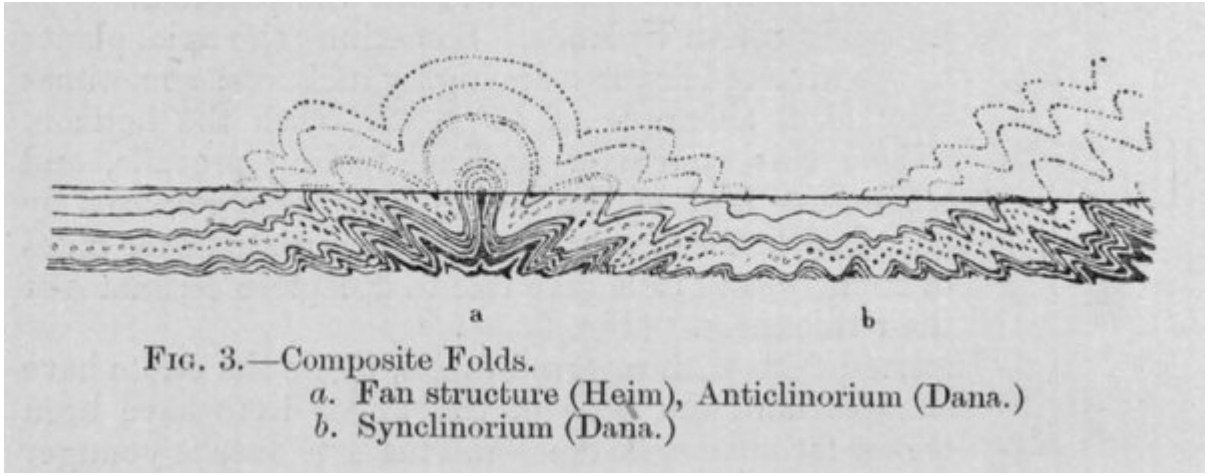


FIG. 3.—Composite Folds.
a. Fan structure (Heim), Anticlinorium (Dana.)
b. Synclinorium (Dana.)

(Figure 3) Composite Folds. a. Fan structure (Heim), Anticlinorium (Dana.) b. Synclinorium (Dana.)

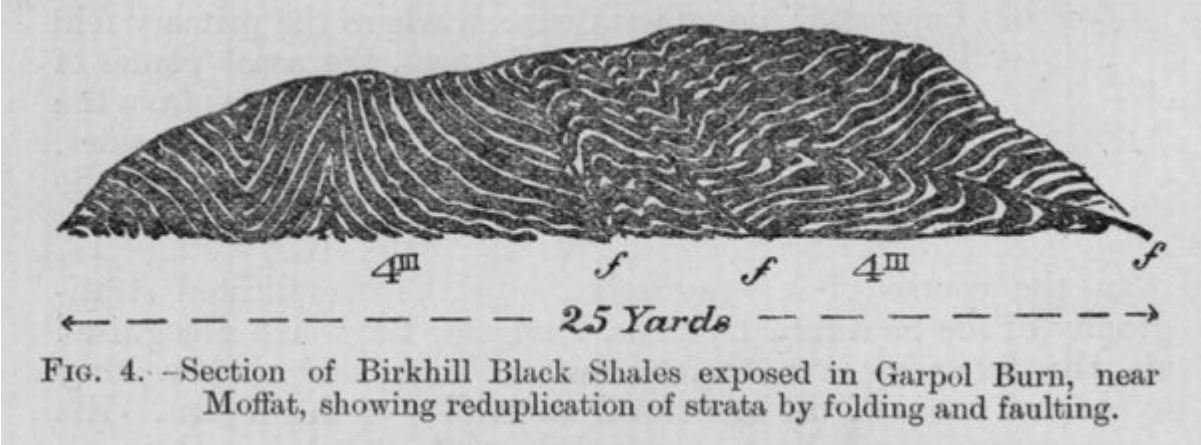


FIG. 4.—Section of Birkhill Black Shales exposed in Garpol Burn, near Moffat, showing reduplication of strata by folding and faulting.

(Figure 4) Section of Birkhill Black Shales exposed in Garpol Burn, near Moffat, showing reduplication of strata by folding and faulting.

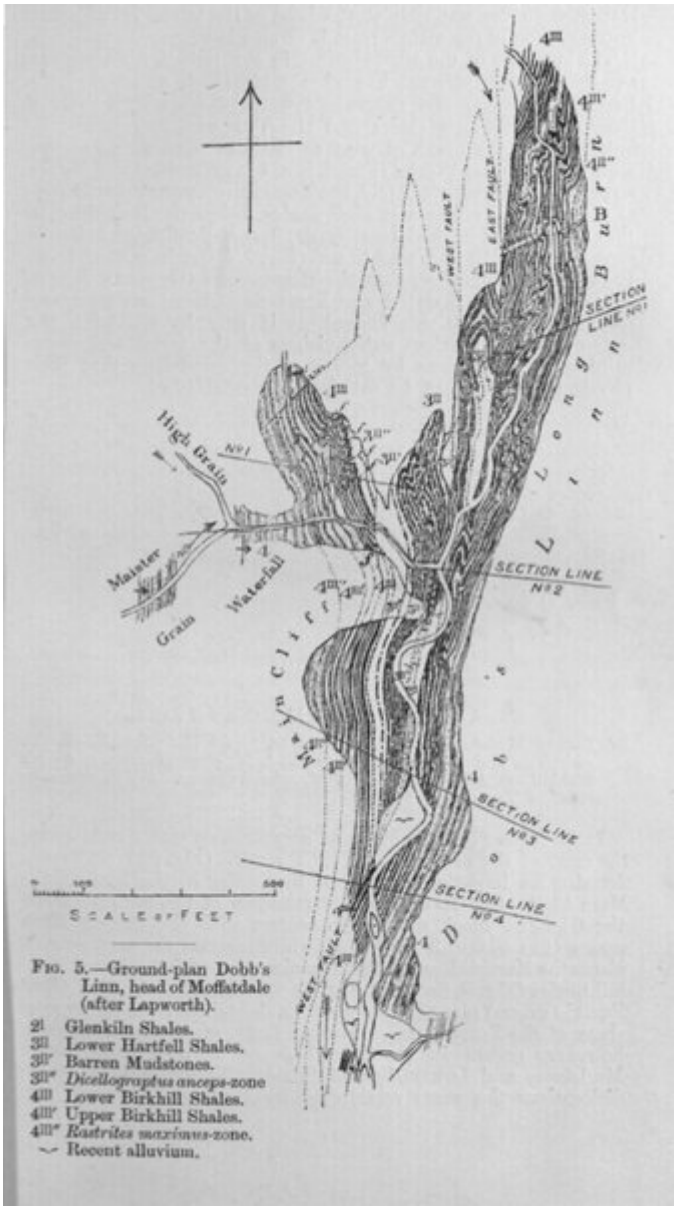


FIG. 5.—Ground-plan Dobb's Linn, head of Moffatdale (after Lapworth).

2I Glenkiln Shales.
3II Lower Hartfell Shales.
3II′ Barren Mudstones.
3II″ *Dicellograptus anceps*-zone
4III Lower Birkhill Shales.
4III′ Upper Birkhill Shales.
4III″ *Rastrites maximus*-zone.
~ Recent alluvium.

(Figure 5) Ground-plan Dobb's Linn, head of Moffatdale (after Lapworth). 2I Glenkiln Shales. 3II Lower Hartfell Shales. 3II′ Barren Mudstones. 3II″ Dicellograptus anceps-zone 4III Lower Birkhill Shales. 4III′ Upper Birkhill Shales. 4III′ Rastrites maximus-zone. [Alluvium symbol] Recent alluvium.

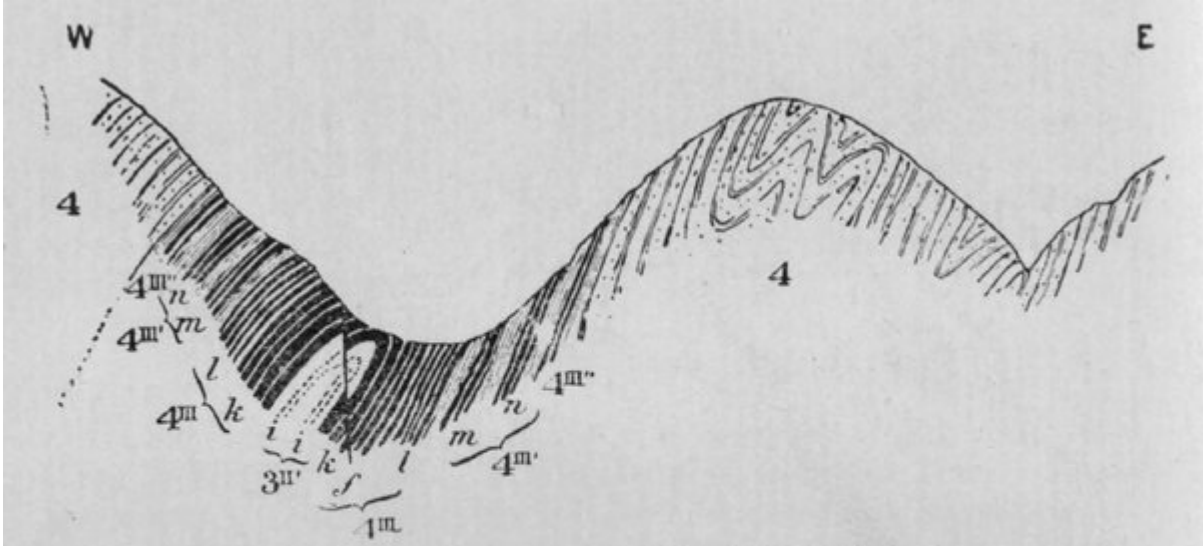


FIG. 6.—Section in Dobb's Linn (No. 4 of Fig. 5).

3II′ Barren Mudstones—i. *D. anceps*-zone. 4III L. Birkhill—k. *D. vesiculosus* and *D. acuminatus* zones—l. *M. gregarius*-zone. 4III′ U. Birkhill—m. *D. cometa*-zone—n. *M. spinigerus*-zone. 4III″ *R. maximus*-zone. 4 Tarannon.

(Figure 6) Section in Dobb's Linn (No. 4 of (Figure 5)). 3II′ Barren Mudstones—i. D. anceps-zone. 4III Lower Birkhill k. D. vesiculosus and D. acuminates zones 1. M. gregarius-zone. 4III′ Upper Birkhill—m. D. cometa-zone n. M. spinigerus-zone. 4III″ B. maximus-zone. 4 Tarannon.

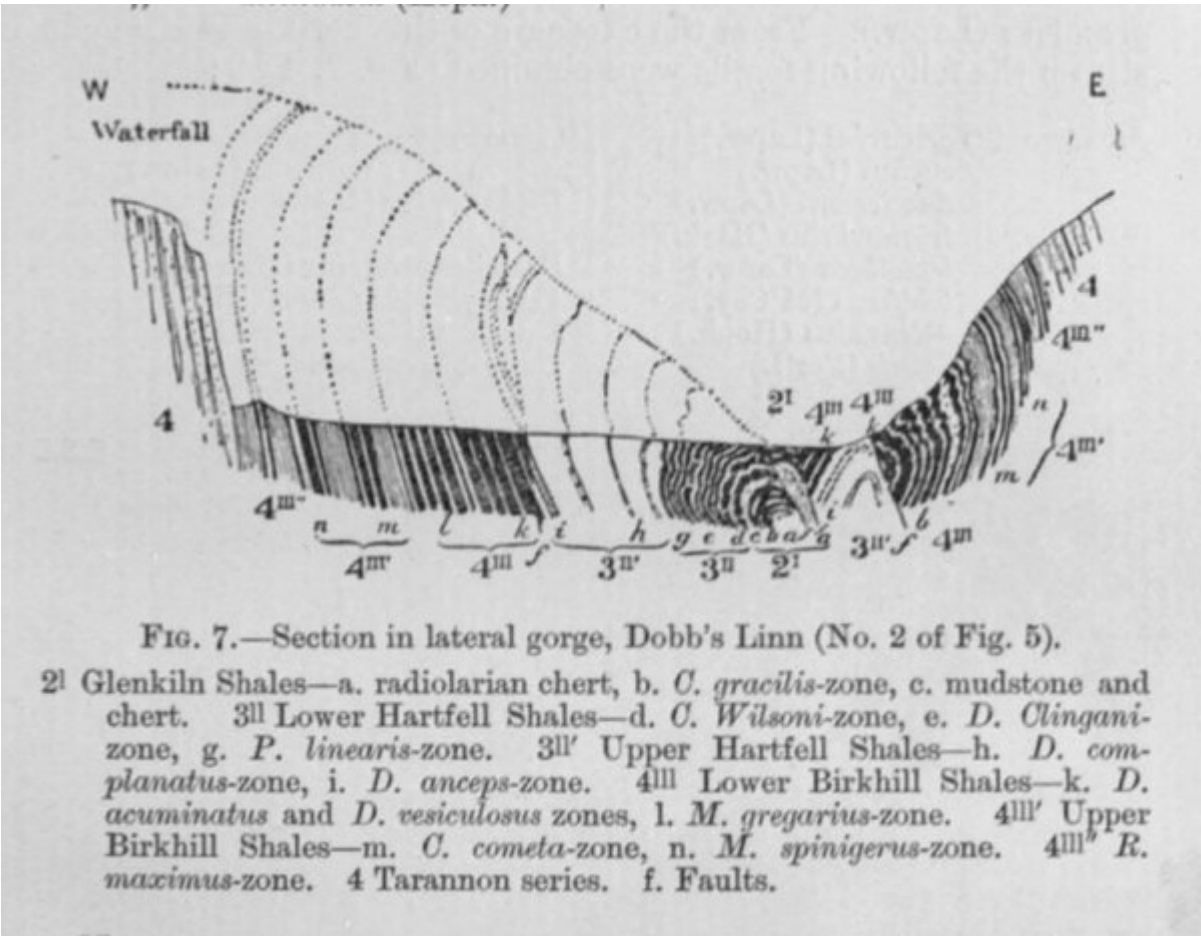


FIG. 7.—Section in lateral gorge, Dobb's Linn (No. 2 of Fig. 5).

2I Glenkiln Shales—a. radiolarian chert, b. *C. gracilis*-zone, c. mudstone and chert. 3II Lower Hartfell Shales—d. *C. Wilsoni*-zone, e. *D. Clingani*-zone, g. *P. linearis*-zone. 3II′ Upper Hartfell Shales—h. *D. complanatus*-zone, i. *D. anceps*-zone. 4III Lower Birkhill Shales—k. *D. acuminatus* and *D. vesiculosus* zones, l. *M. gregarius*-zone. 4III′ Upper Birkhill Shales—m. *C. cometa*-zone, n. *M. spinigerus*-zone. 4III″ *R. maximus*-zone. 4 Tarannon series. f. Faults.

(Figure 7) Section in lateral gorge, Dobb's Linn (No. 2 of (Figure 15)). 2I Glenkiln Shales a. radiolarian chert, b. C. gracilis-zone, c. mudstone and chert. 3II Lower Hartfell Shales d. a Wilsoni-zone, e. D. Clingani-zone, g. P. linearis-zone. 3II′ Upper Harden Shales h. D. complanatus-zone, i. D. anceps-zone. 4III Lower Birkhill Shales k. D. acuminatus and D. vesiculosus zones, 1. M. gregarius-zone. 4III′ Upper Birkhill Shales m. C. cometa-zone, n. M. spinigerus-zone. 4III″ R.

maximus-zone. 4 Tarannon series. f. Faults.

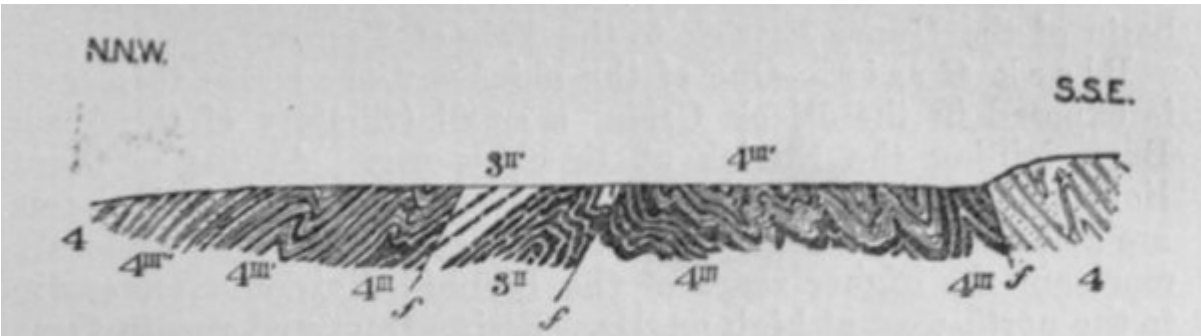


Fig. 15.—Section in Moory Sike, above Loch of the Lowes. (Length, 150 yards.)

3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″. *R. maximus*-zone. 4. Tarannon series. f. Fault.

(Figure 15) Section in Moory Sike, above Loch of the Lowes. (Length, 150 yards.) 3II Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″. R. maximus-zone. 4. Tarannon series. f. Fault.

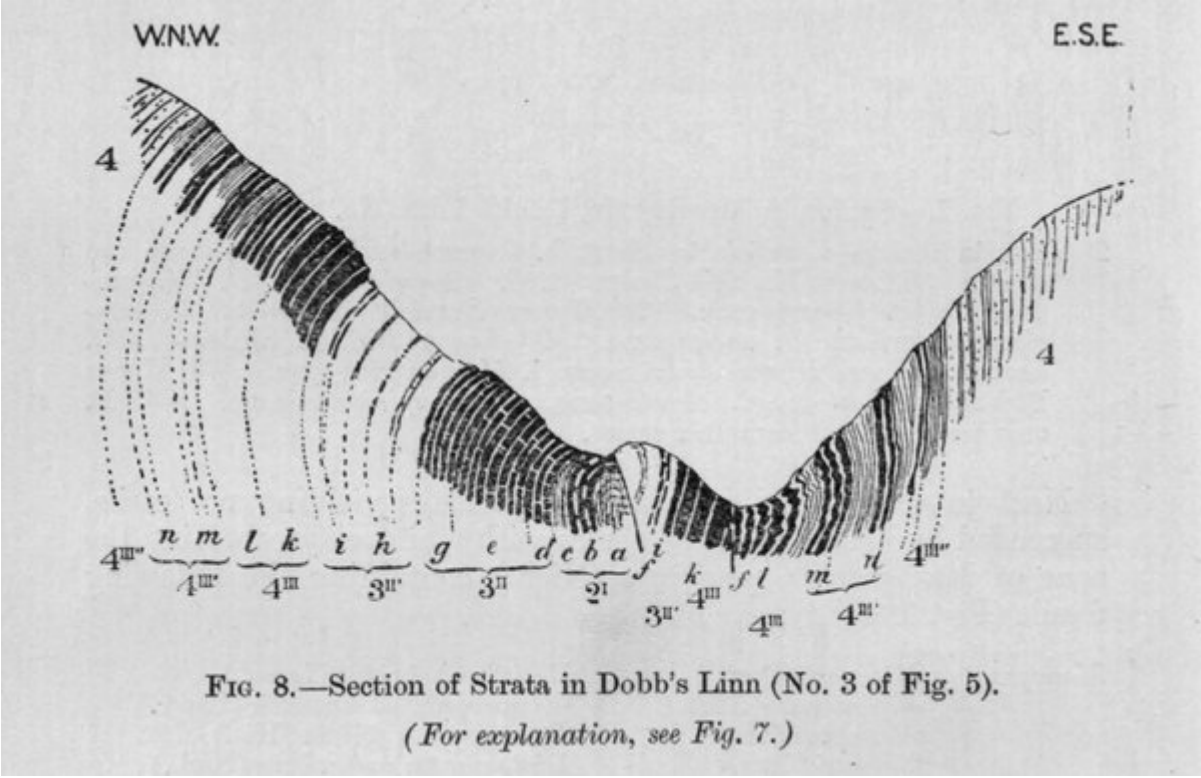


Fig. 8.—Section of Strata in Dobb's Linn (No. 3 of Fig. 5).

(For explanation, see Fig. 7.)

(Figure 8) Section of Strata in Dobb's Linn (No. 3 of (Figure 5)). (For explanation, see (Figure 7))

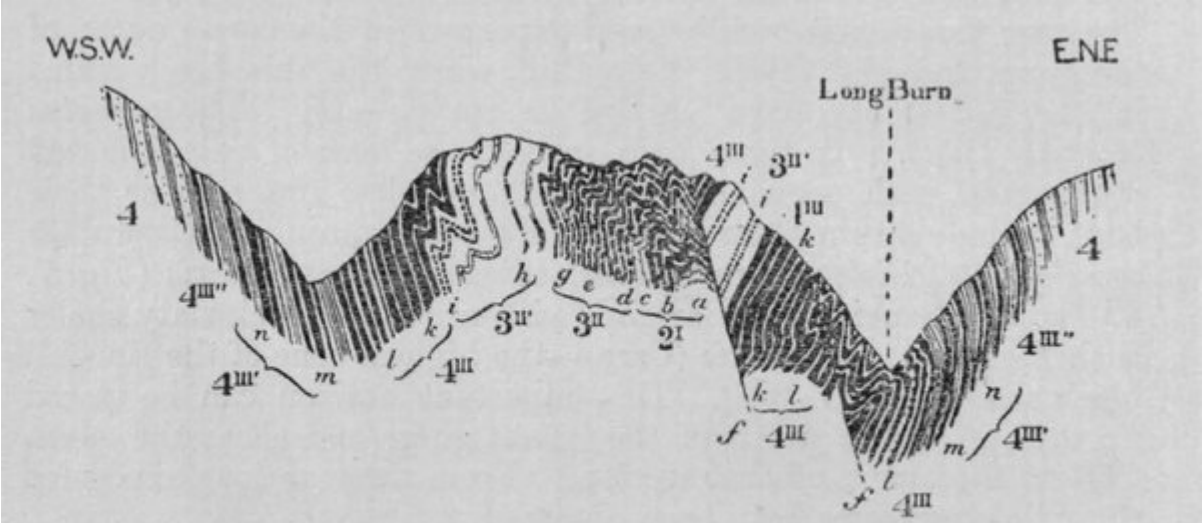


Fig. 9.—Section in Dobb's Linn (No. 1 of Fig. 5).
For explanation, see Fig. 7.

(Figure 9) Section in Dobb's Linn (No. 1 of (Figure 5)). For explanation, see (Figure 7).

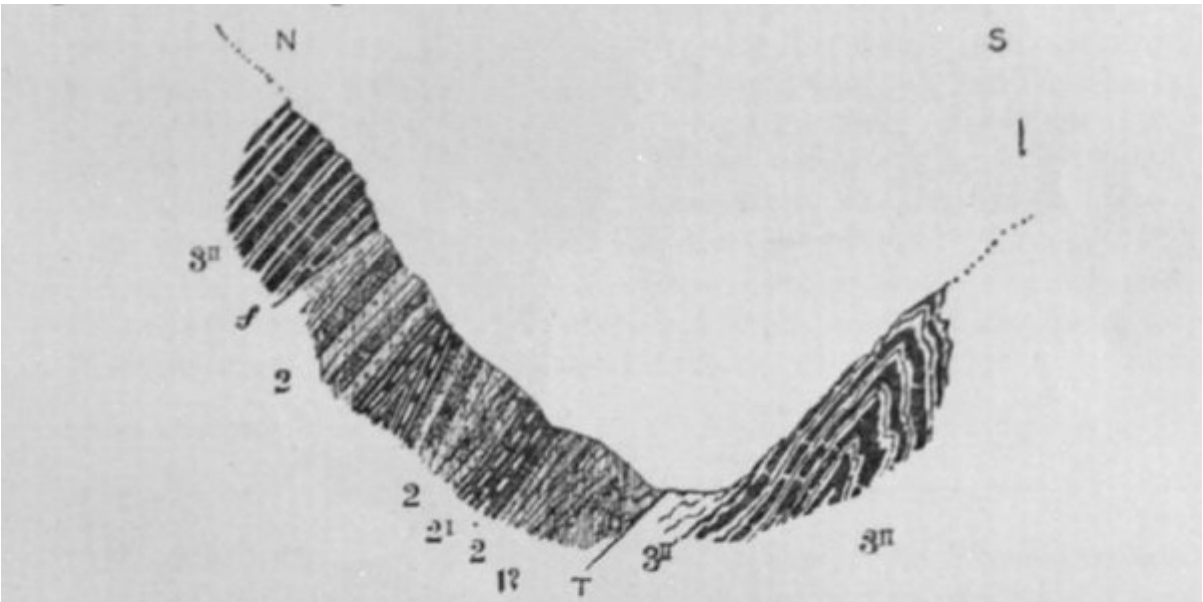


Fig. 10.—Section in Craigmichan Scaurs, Moffatdale.

1. Arenig? 2. Ashy mudstone and radiolarian chert. 2l. Glenkiln Black Shale. 3ll. Lower Hartfell Shale. 3ll′. Barren Mudstones. f Fault. T. Thrust-plane.

(Figure 10) Section in Craiginichan Scaurs, Moffatdale. 1. Arenig ? 2. Ashy mudstone and radiolarian chert. 2l. Glenkiln Black Shale. 3ll. Lower Hartfell Shale. 3ll′. Barren Mudstones. f Fault. T. Thrust-plane.

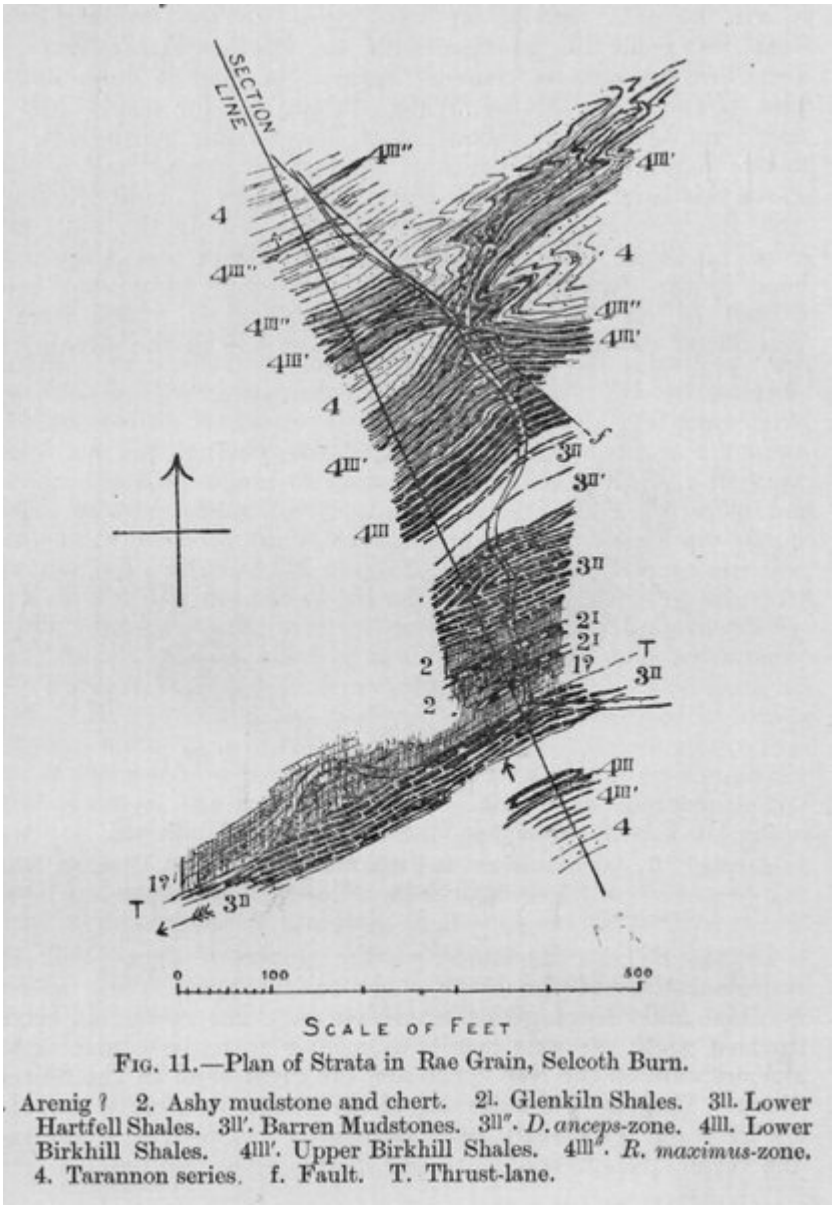


FIG. 11.—Plan of Strata in Rae Grain, Selcoth Burn.

Arenig ? 2. Ashy mudstone and chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 3II''. *D. anceps*-zone. 4III. Lower Birkhill Shales. 4III'. Upper Birkhill Shales. 4III■. *R. maximus*-zone. 4. Tarannon series. f. Fault. T. Thrust-lane.

(Figure 11) Plan of Strata in Rae Grain, Selcoth Burn. 1. Arenig ? 2. Ashy mudstone and chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 3II. D. anceps-zone. 4III. Lower Birkhill Shales. 4III'. Upper Birkhill Shales. 4III■. B. maximus-zone. 4. Tarannon series. f. Fault. T. Thrust-lane.

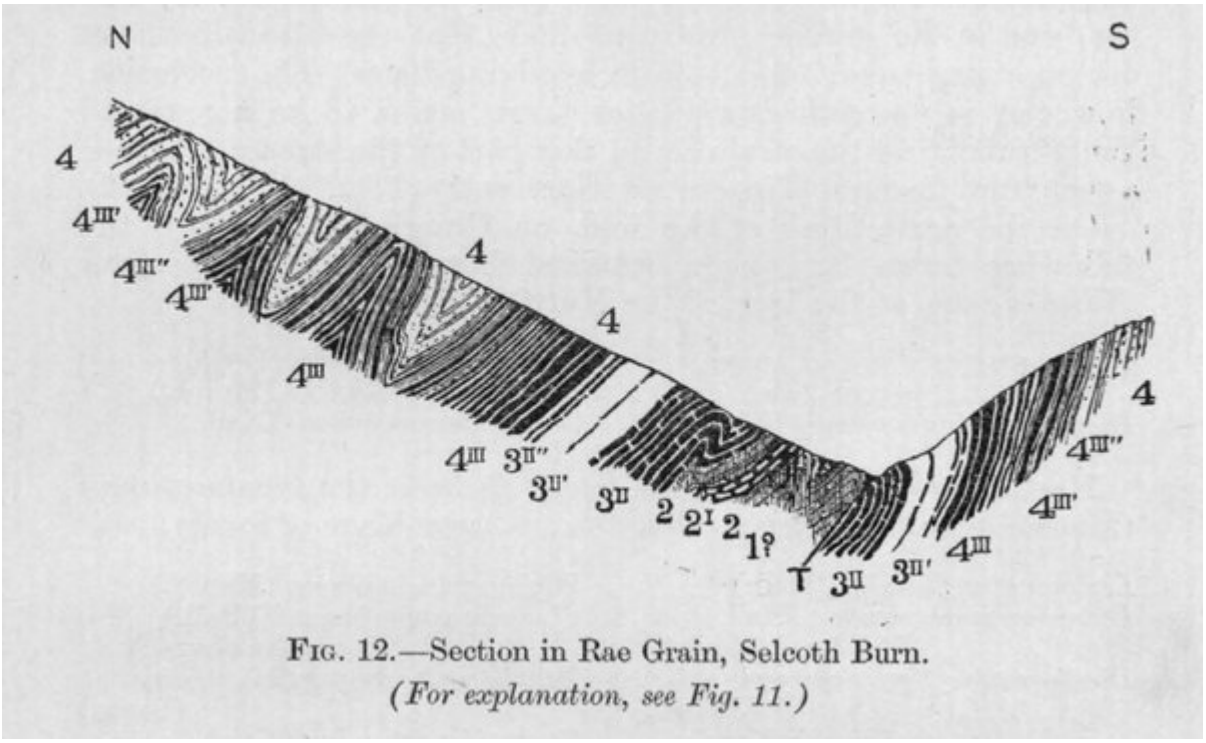


FIG. 12.—Section in Rae Grain, Selcoth Burn.
(For explanation, see Fig. 11.)

(Figure 12) Section in Rae Grain, Selcoth Burn. (For explanation, see (Figure 11).)

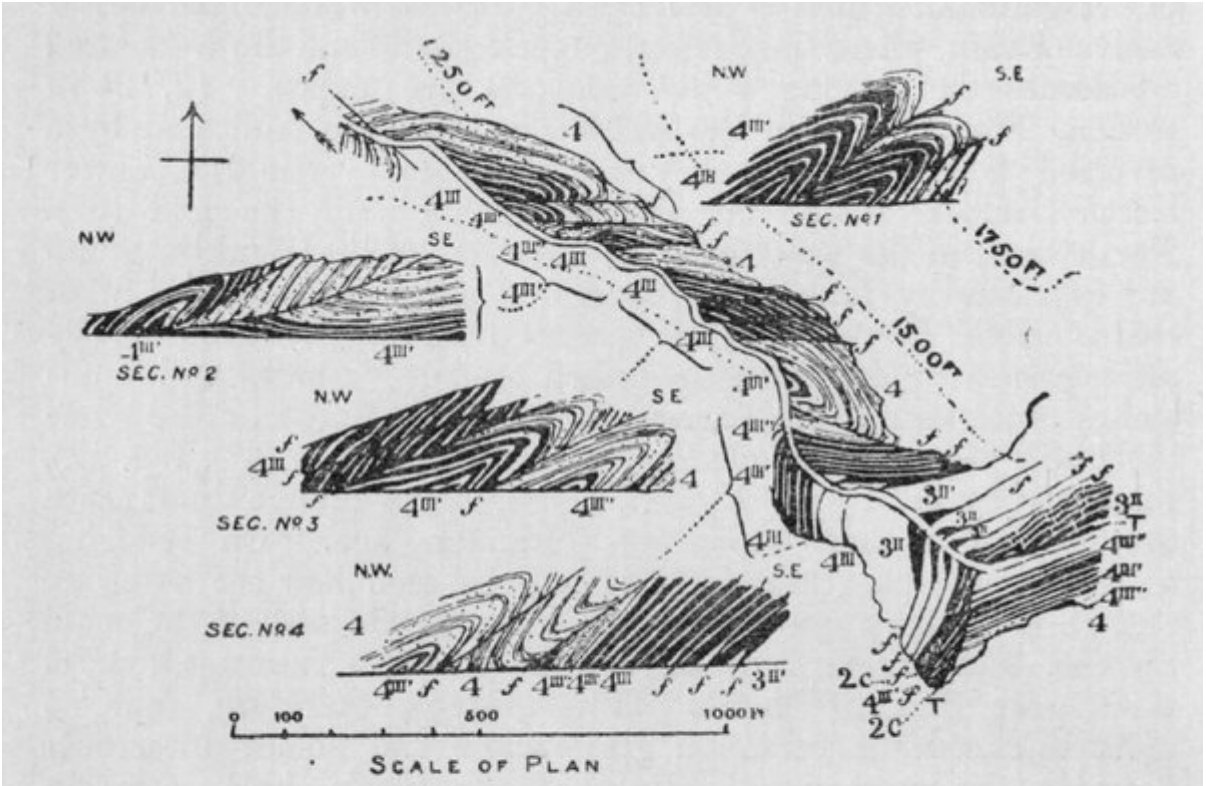


FIG. 13.—Plan and Sections in Selcoth Burn.

2c. Glenkiln chert. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″. *R. maximus*-zone. f. Reversed Faults. T. Thrust-plane.

(Figure 13) Plan and Sections in Selcoth Burn. 2c. Glenkiln chert. 3II. Lower Harden Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″. R. maxi-mus-zone. f. Reversed Faults. T. Thrust-plane.

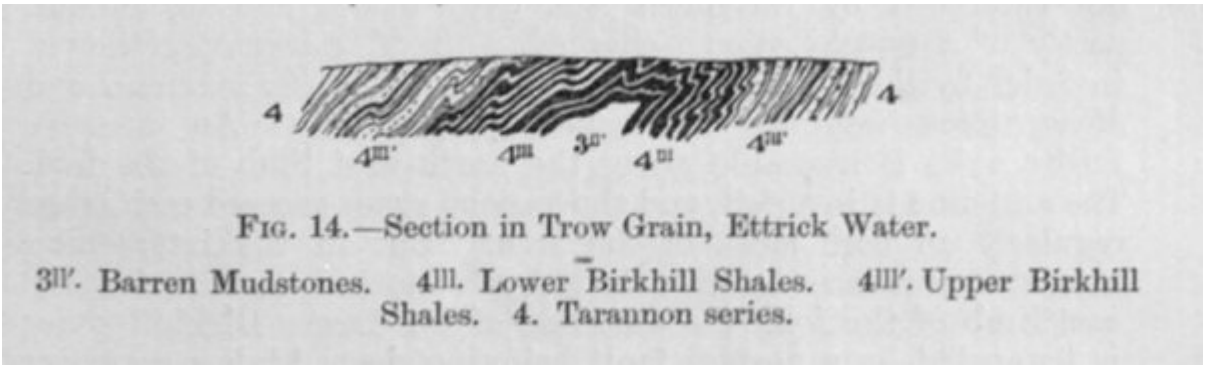


Fig. 14.—Section in Trow Grain, Ettrick Water.

3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4. Tarannon series.

(Figure 14) Section in Trow Grain, Ettrick Water. 3II′. Barren Mudstonce. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4. Tarannon series.

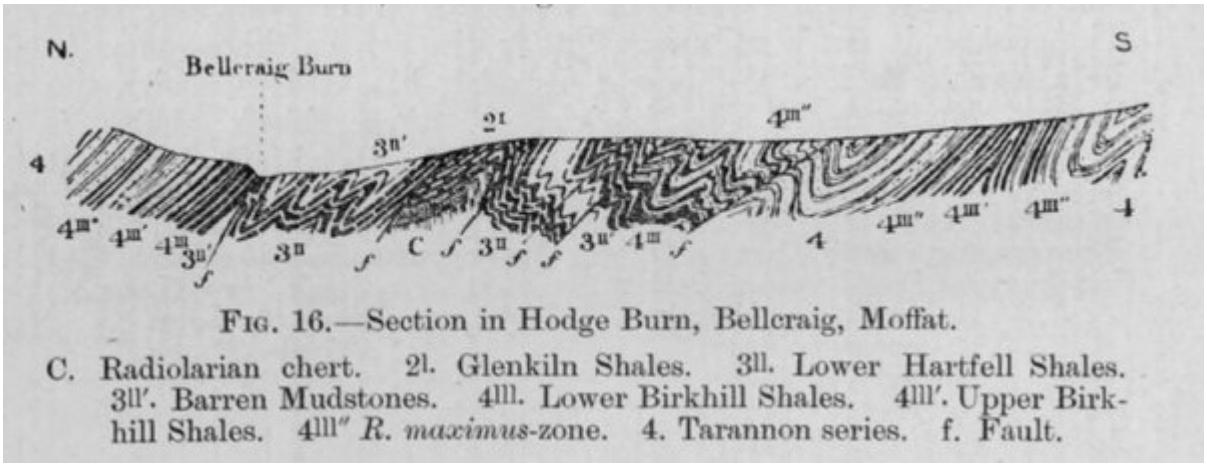


Fig. 16.—Section in Hodge Burn, Bellcraig, Moffat.

C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″ *R. maximus*-zone. 4. Tarannon series. f. Fault.

(Figure 16) Section in Hodge Burn, Bellcraig, Moffat. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′. Upper Birkhill Shales. 4III″ R. maximus-zone. 4. Tarannon series. f. Fault.

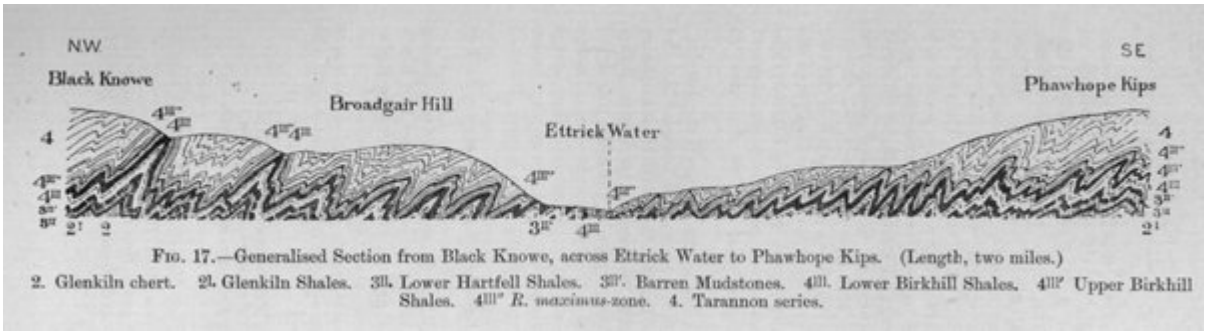


Fig. 17.—Generalised Section from Black Knowe, across Ettrick Water to Phawhope Kips. (Length, two miles.)

2. Glenkiln chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′ Upper Birkhill Shales. 4III″ *R. maximus*-zone. 4. Tarannon series.

(Figure 17) Generalised Section from Black Knowe, across Ettrick Water to Phawhope Kips. (Length, two miles.) 2. Glenkiln chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Lower Birkhill Shales. 4III′ Upper Birkhill Shales. 4III″ R. maximus-zone. 4. Tarannon series.

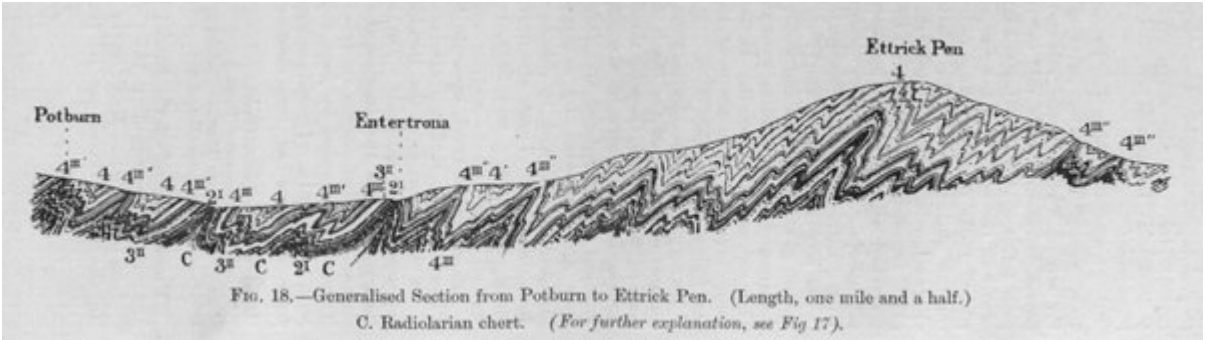


Fig. 18.—Generalised Section from Potburn to Ettrick Pen. (Length, one mile and a half.)

C. Radiolarian chert. *(For further explanation, see Fig 17).*

(Figure 18) Generalised Section from Potburn to Ettrick Pen. (Length, one mile and a half.) C. Radiolarian chart. (For further explanation, see (Figure 17)).

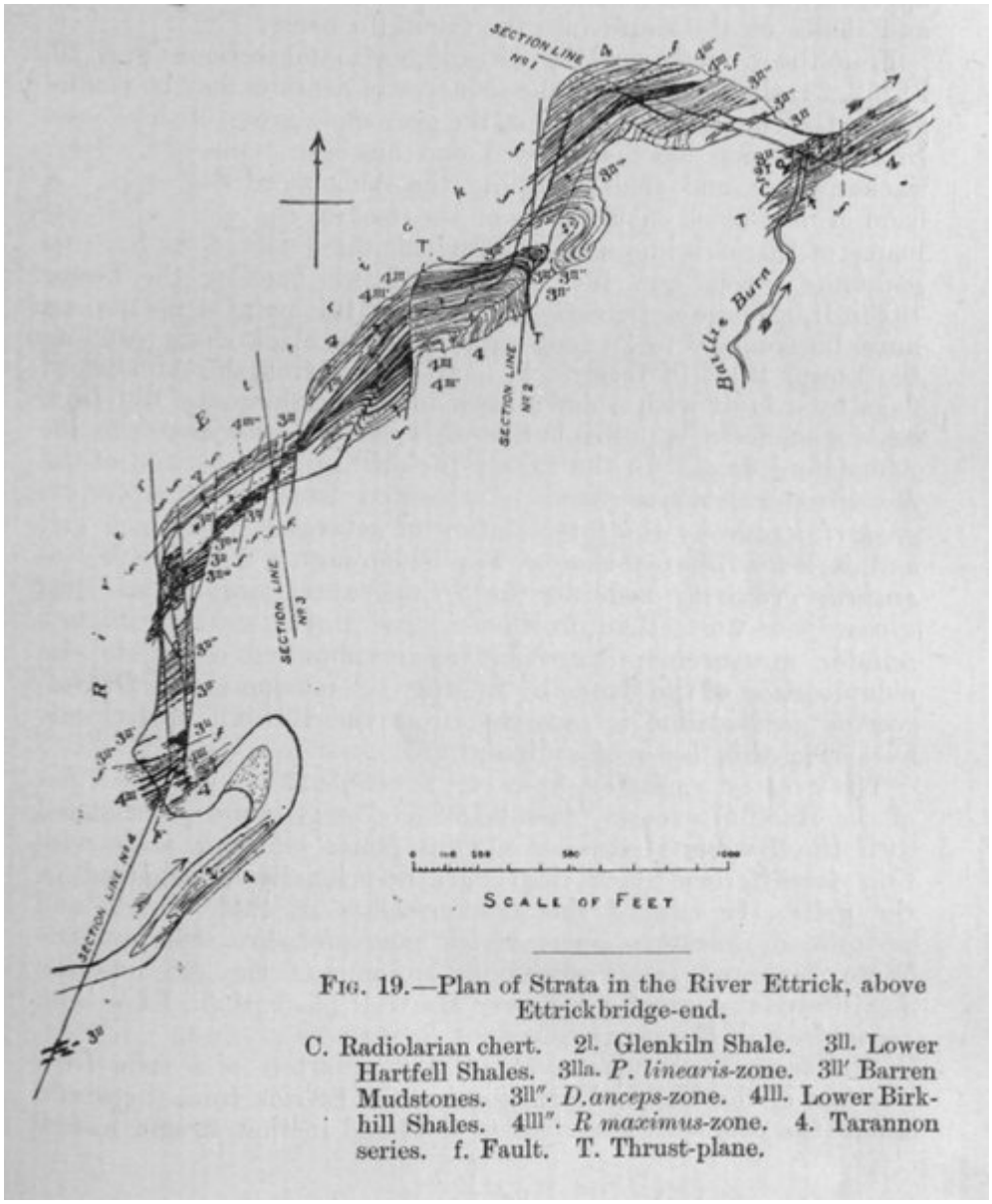


FIG. 19.—Plan of Strata in the River Ettrick, above Ettrickbridge-end.

C. Radiolarian chart. 2l. Glenkiln Shale. 3ll. Lower Hartfell Shales. 3lla. *P. linearis*-zone. 3ll′ Barren Mudstones. 3ll″. *D. anceps*-zone. 4lll. Lower Birkhill Shales. 4lll″. *R maximus*-zone. 4. Tarannon series. f. Fault. T. Thrust-plane.

(Figure 19) Plan of Strata in the River Ettrick, above Ettrickbridge-end. C. Radiolarian chart. 2I. Glenkiln Shale. 3II. Lower Hartfell Shales. 3IIa. P. linearis-zone. 3II′ Barren Mudstones. 3II″. D. anceps-zone. 4III. Lower Birkhill Shales. 4III″. R. maximus-zone. 4. Tarannon series. f. Fault. T. Thrust-plane.

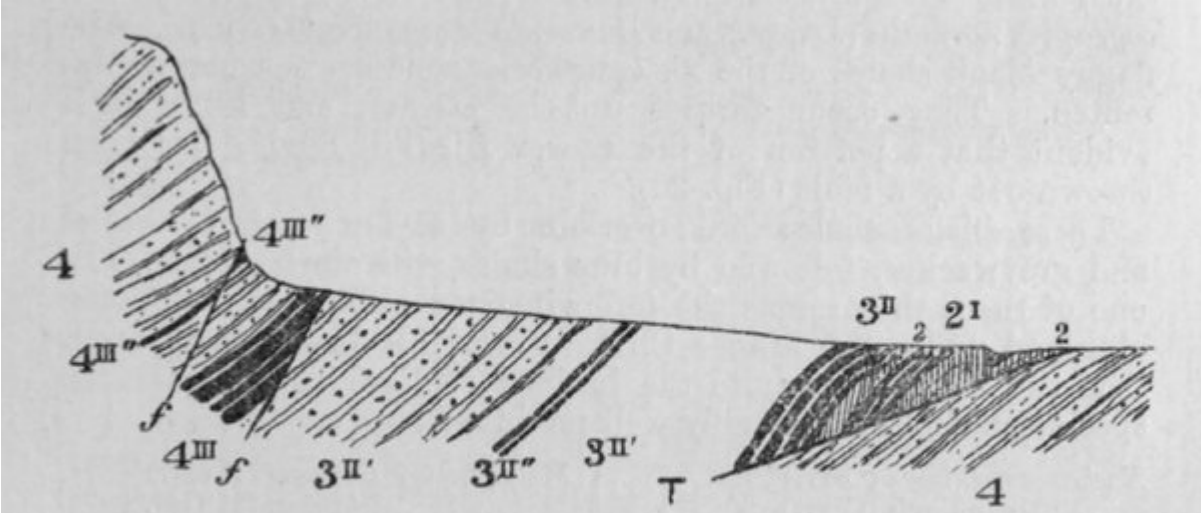


Fig. 20.—Section in River Ettrick from Manse Cliff to foot of Baillie Burn (No. 1 in Fig. 19).

2. Glenkiln chert. *(For further explanation, see Fig. 19.)*

(Figure 20) Section in the River Ettrick from manse Cliff to foot of Baillie Burn (No. 1 in (Figure 19)). 2. Glenkiln chert (For further explanation, see (Figure 19).)

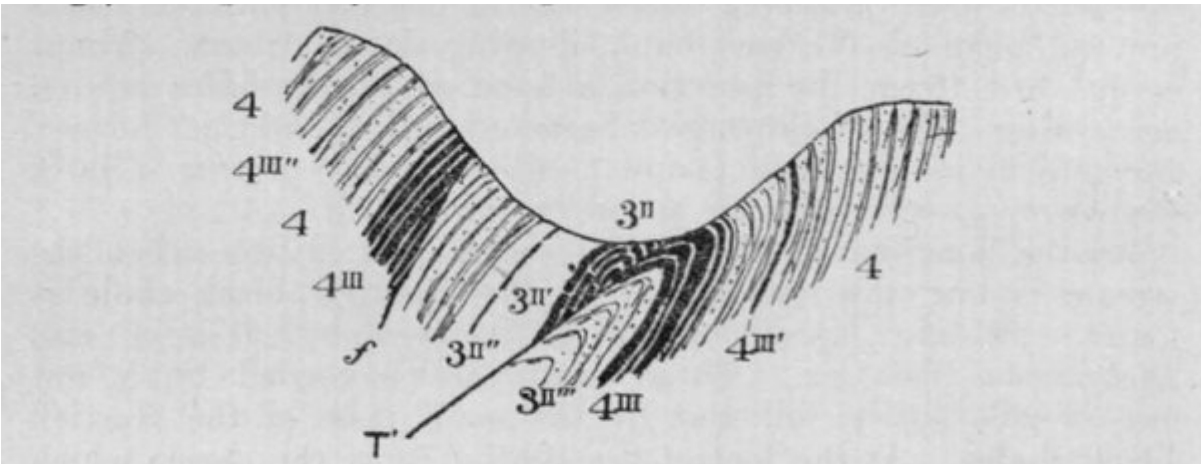


Fig. 21.—Section in River Ettrick at bend above Manse, Ettrickbridge-end. (No. 2 in Fig. 19).

(For further explanation, see Fig. 19.)

(Figure 21) Section in River Ettrick at bend above Manse, Ettrickbridge-end. (No. 2 in (Figure 19)). (For further explanation, see (Figure 19).)

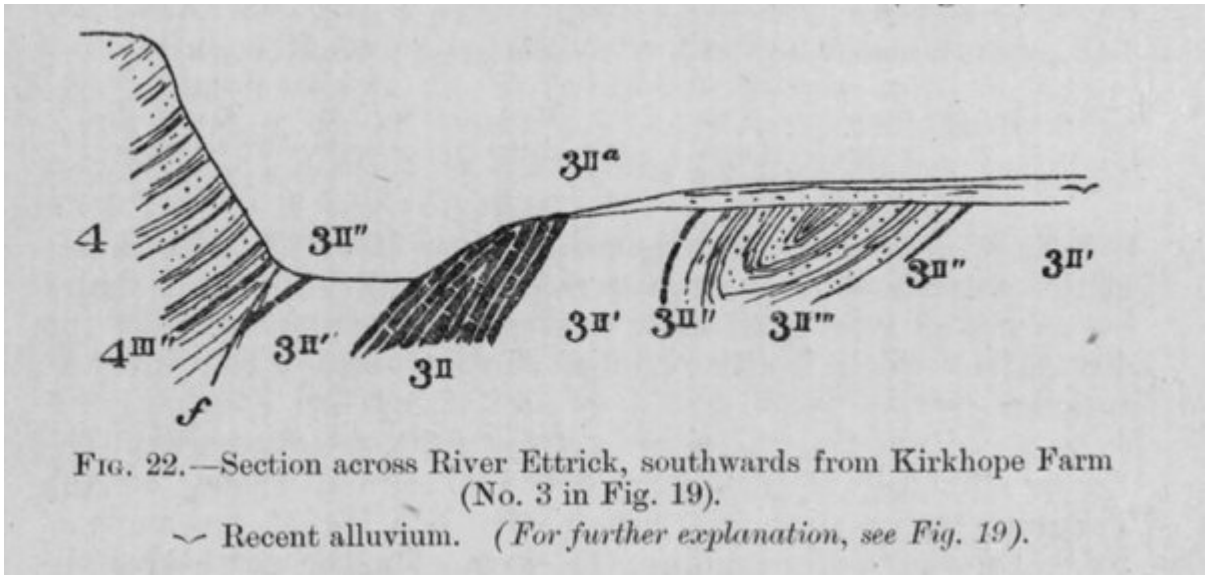


FIG. 22.—Section across River Ettrick, southwards from Kirkhope Farm (No. 3 in Fig. 19).

~ Recent alluvium. *(For further explanation, see Fig. 19).*

(Figure 22) Section across River Ettrick, southwards from Kirkhope Farm (No. 3 in (Figure 19)). [symbol] Recent alluvium. (For further explanation, see (Figure 19)).

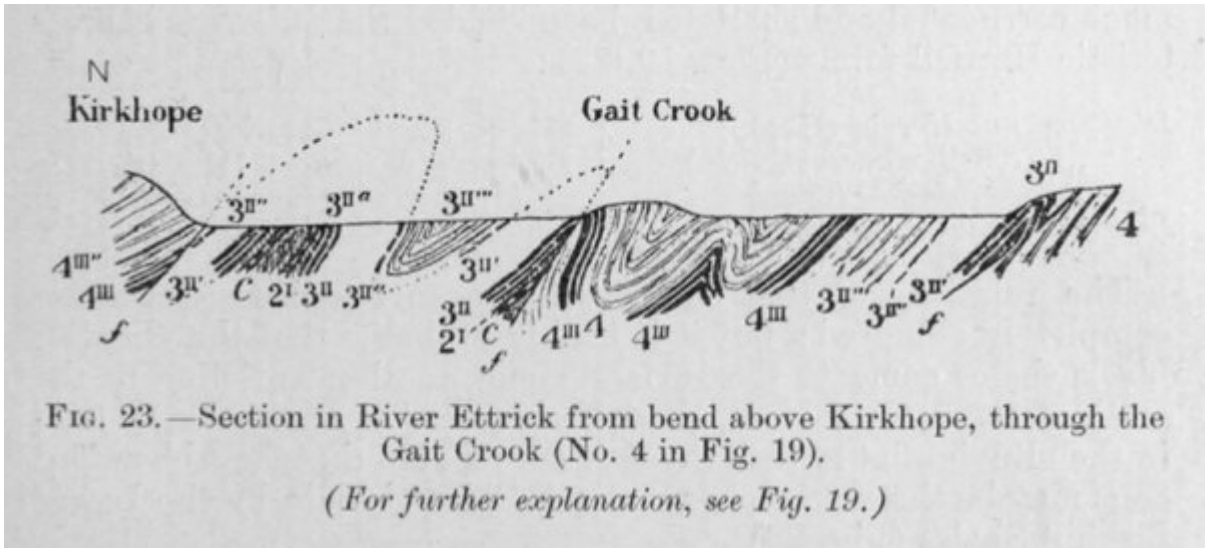


FIG. 23.—Section in River Ettrick from bend above Kirkhope, through the Gait Crook (No. 4 in Fig. 19).

(For further explanation, see Fig. 19.)

(Figure 23) Section in River Ettrick from bend above Kirkhope, through the Gait Crook (No. 4 in (Figure 19)). (For further explanation, see (Figure 19).)

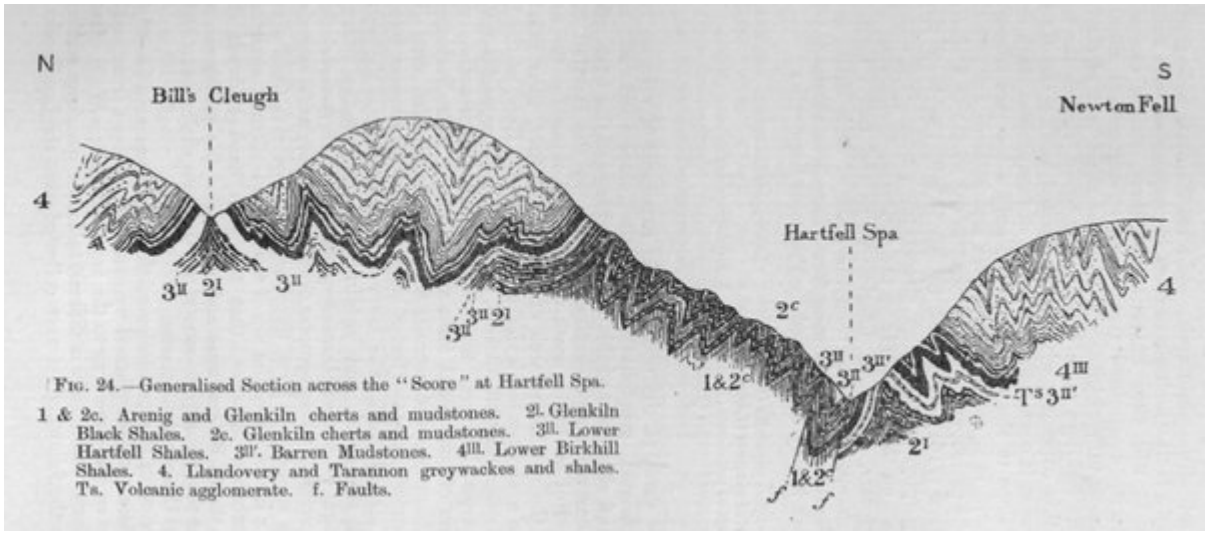


FIG. 24.—Generalised Section across the "Score" at Hartfell Spa.

1 & 2c. Arenig and Glenkiln cherts and mudstones. 2I. Glenkiln Black Shales. 2c. Glenkiln cherts and mudstones. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Llandovery and Tarannon greywackes and shales. Ts. Volcanic agglomerate. f. Faults.

(Figure 24) Generalised Section across the "Score" at Hartfell Spa. 1 & 2c. Arenig and Glenkiln charts and mudstones. 2??? Glenkiln Black Shales. 2c. Glenkiln charts and mudstones. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Llandovery and Tarannon greywackes and shales. Ts. Volcanic agglomerate. f. Faults.

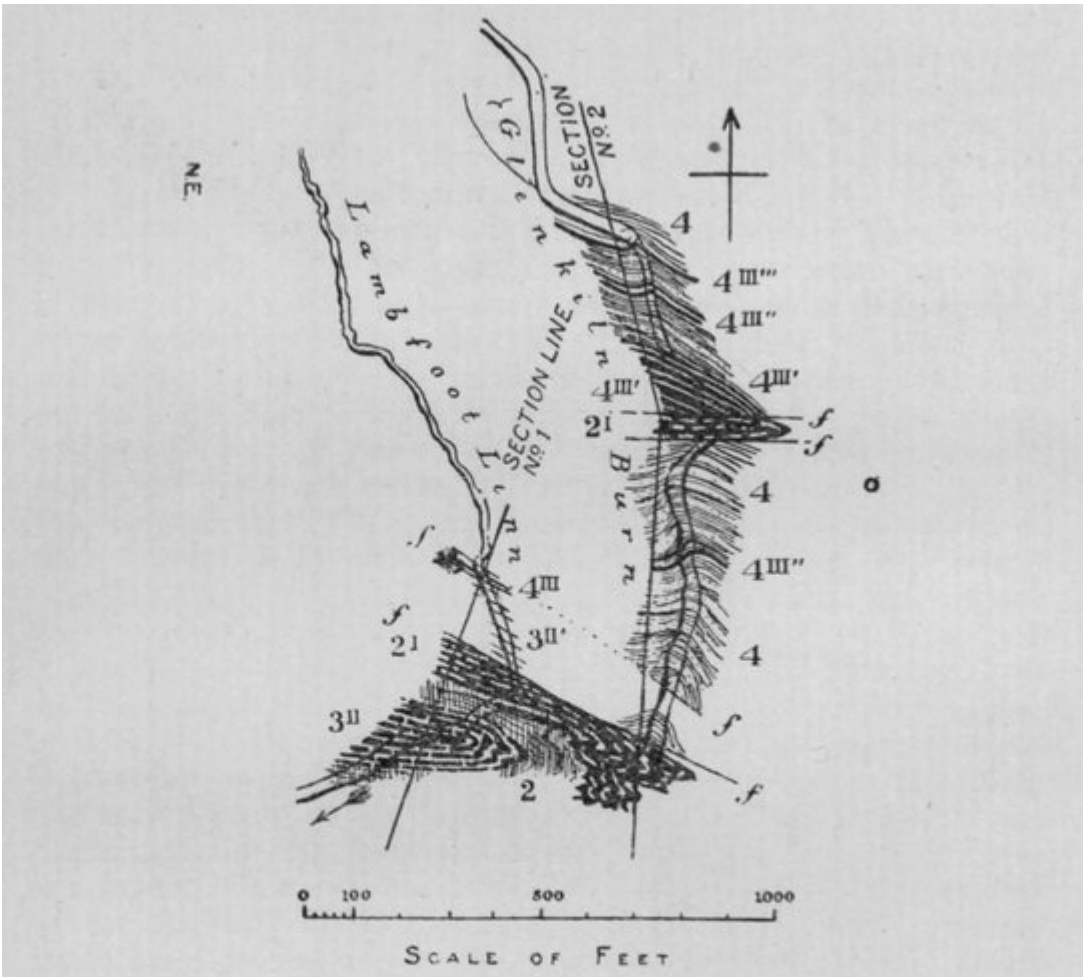


FIG. 25.—Plan of Strata in Glenkiln Burn, Kirkmichael, Dumfriesshire.

2. Glenkiln mudstones and cherts. 2I. Glenkiln black shale. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4III'. Upper Birkhill Shales. 4III''. *Maximus*-zone. 4III'''. *Exiguus*-zone. 4. Tarannon series. f. Faults. ~ Recent alluvium.

(Figure 25) Plan of Strata in Glenkiln Burn, Kirkmichael, Dumfriesshire. 2. Glenkiln mudstones and cherts. 2I. Glenkiln black shale. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales 4III'. Upper Birkhill Shales. 4III''. Maximus-zone. 4III'' Exiguus-zone.. 4. Tarannon series. f. Faults. 9 [Symbol for alluvium] Recent alluvium.

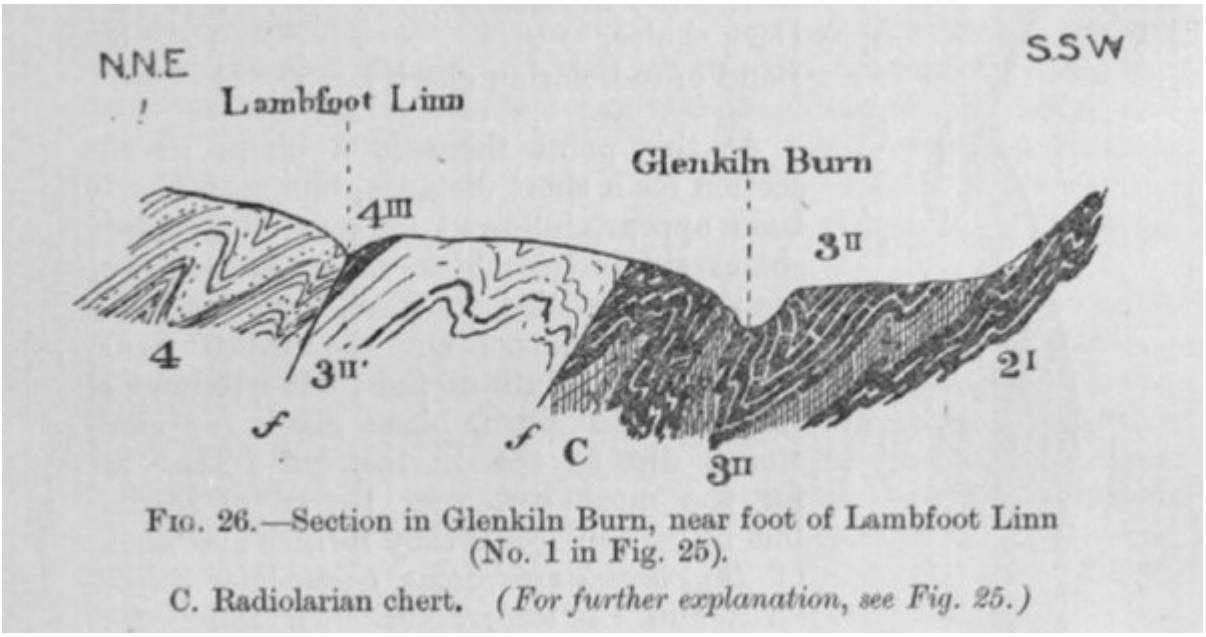


FIG. 26.—Section in Glenkiln Burn, near foot of Lambfoot Linn (No. 1 in Fig. 25).

C. Radiolarian chert. *(For further explanation, see Fig. 25.)*

(Figure 26) Section in Glenkiln Burn, near foot of Lambfoot Linn (No. 1 in (Figure 25)). C. Radiolarian chert. (For further explanation, see (Figure 25).)

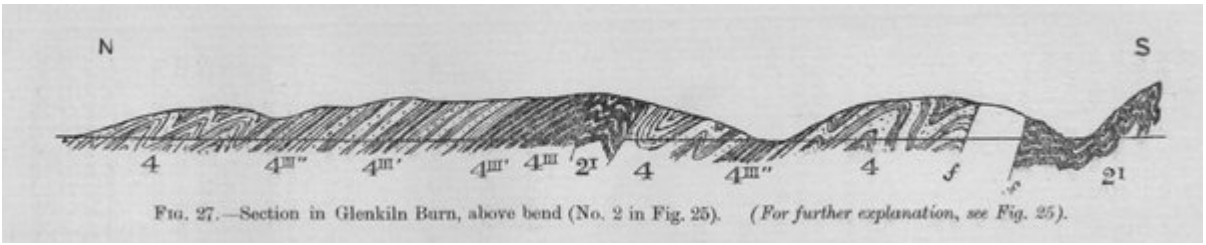


Fig. 27.—Section in Glenkiln Burn, above bend (No. 2 in Fig. 25). *(For further explanation, see Fig. 25).*

(Figure 27) Section in the Glenkiln Burn, above bend (No. 2 in (Figure 25)) (For further explanation, see (Figure 25).)

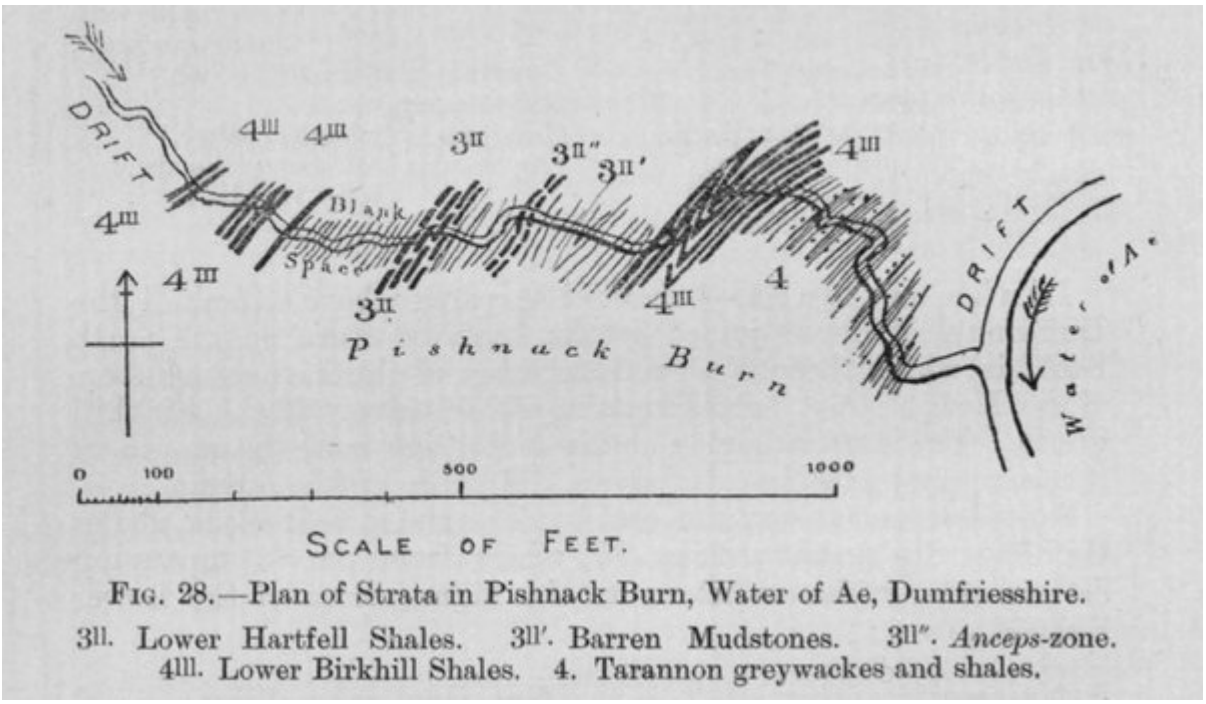


Fig. 28.—Plan of Strata in Pishnack Burn, Water of Ae, Dumfriesshire.
3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 3II''. *Anceps*-zone.
4III. Lower Birkhill Shales. 4. Tarannon greywackes and shales.

(Figure 28) Plan of Strata in Pishnack Burn, Water of Ae, Dumfriesshire. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 3II″. Anceps-zone. 4III. Lower Birkhill Shales, 4. Tarannon greywackes and shales.

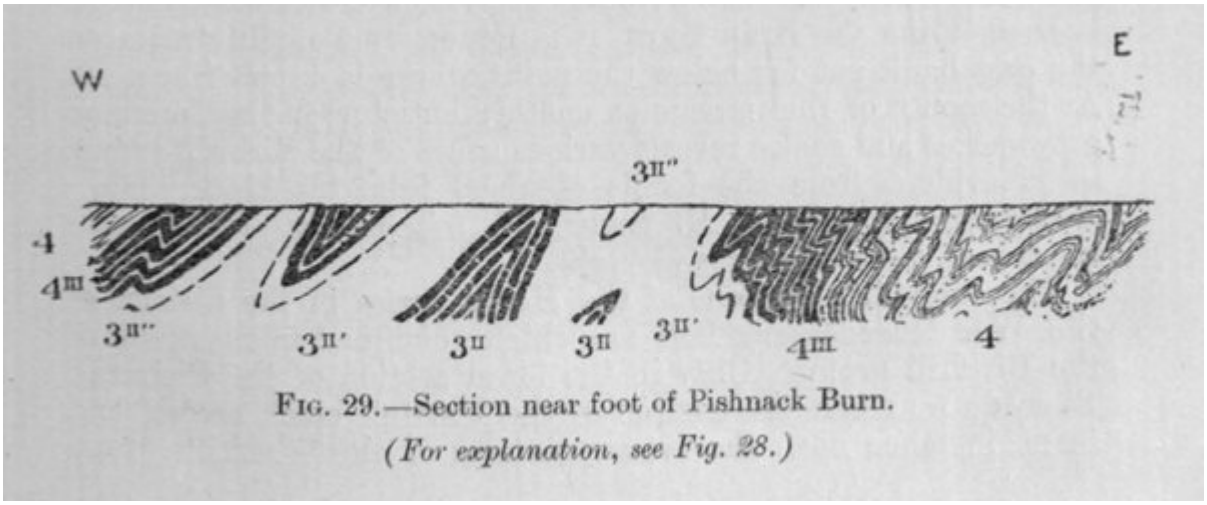


Fig. 29.—Section near foot of Pishnack Burn.
(For explanation, see Fig. 28.)

(Figure 29) Section near foot of Pishnack Burn. (For explanation, see (Figure 28).)

FIG. 30.—Section in Bogrie Burn, Glenessland, Dumfriesshire. (Length, 600 yards.)

3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Birkhill group. 4. Greywacke and shale (Llandovery-Tarannon).

(Figure 30) Section in Bogrie Burn, Glenessland, Dumfriesshire. (Length, 600 yards.) 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Birkhill group. 4. Greywacke and shale (Llandovery–Tarannon).

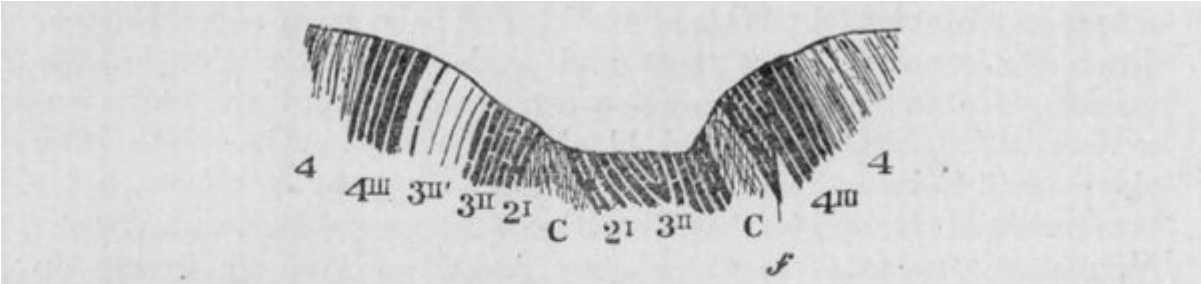


FIG. 31.—Section across Glen Burn, near Glen Farm, north-east of Kirkcudbrightshire.

C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Birkhill Shales. 4. Greywacke and shale (Llandovery-Tarannon). f. Fault.

(Figure 31) Section across Glen Burn, near Glen Farm, north-east of Kirkcudbrightshire. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II′. Barren Mudstones. 4III. Birkhill Shales. 4. Greywacke and shale (Llandovery–Tarannon). f. Fault.

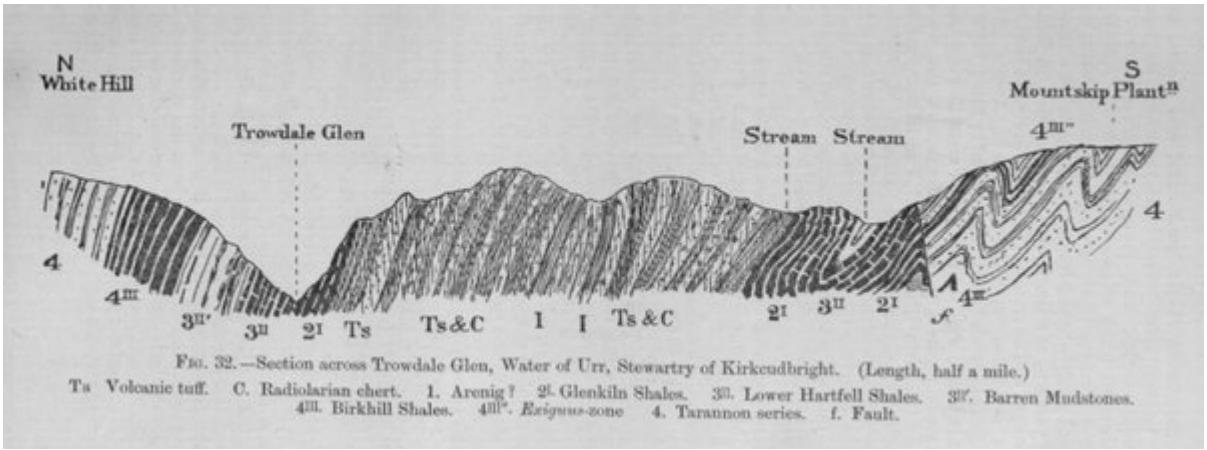


FIG. 32.—Section across Trowdale Glen, Water of Urr, Stewartry of Kirkcudbright. (Length, half a mile.)

Ts Volcanic tuff. C. Radiolarian chert. 1. Arenig? 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Birkhill Shales. 4III". *Exiguus*-zone 4. Tarannon series. f. Fault.

(Figure 32) Section across Trowdale Glen, Water of Urr, Stewartry of Kirkudbright. (Length, half a mile.). Ts Volcanic Tuff. C. Radiolarian chert. 1. Arenig? 2I Glenkiln Shales. 3II Lower Hartfell Shales 3II′. Barren Mudstones 4III Birkhill Shales. 4III″ Exiguus-zone. 4. Tarranon Series. f. Fault.

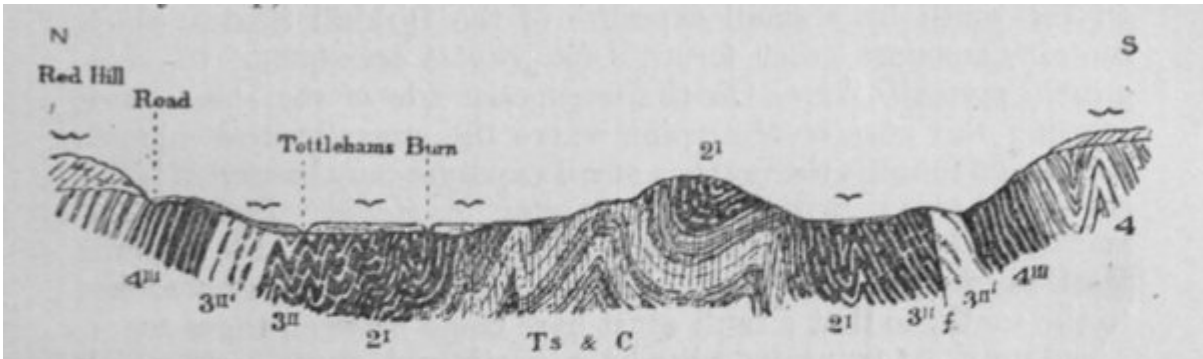


FIG. 33.—Section across Tottlehams Burn, above bend near Corsehill, Water of Urr. (Length, one-third of a mile.)

Ts. Volcanic tuff. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Birkhill Shales. 4. Greywacke and shale (Llandovery-Tarannon). f. Fault. ⌒ Boulder clay. ~ Recent alluvium.

(Figure 33) Section across Tottlehams Burn, above bend near Corsehill, Water of Urr. (Length, one-third of a mile.) Ts. Volcanic tuff. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3II'. Barren Mudstones. 4III. Birkhill Shales. 4. Greywacke and shale (Llandovery–Tarannon). f. Fault. Boulder clay. [Symbol for alluvium] Recent alluvium.

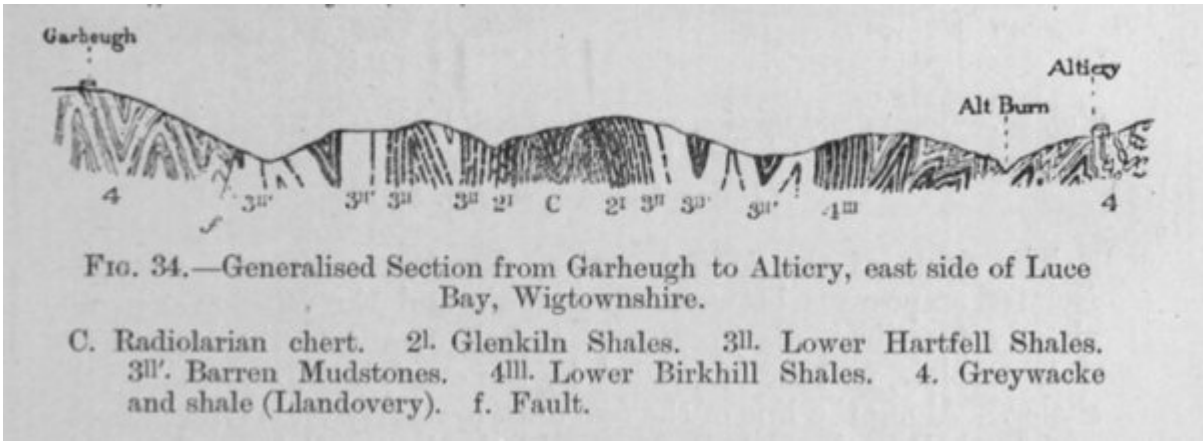


FIG. 34.—Generalised Section from Garheugh to Alticry, east side of Luce Bay, Wigtownshire.

C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). f. Fault.

(Figure 34) Generalised Section from Garheugh to Alticry, east side of Luce Bay, Wigtownshire. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). f. Fault.

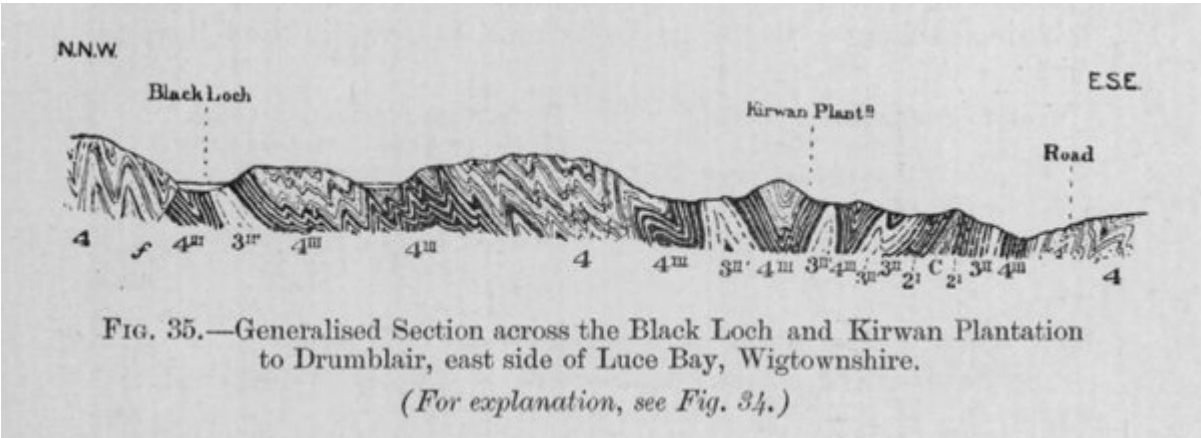


FIG. 35.—Generalised Section across the Black Loch and Kirwan Plantation to Drumblair, east side of Luce Bay, Wigtownshire.

(For explanation, see Fig. 34.)

(Figure 35) Generalised Section across the Black Loch and Kirwan Plantation to Drumblair, east side of Luce Bay, Wigtownshire. (For explanation, see (Figure 34).)

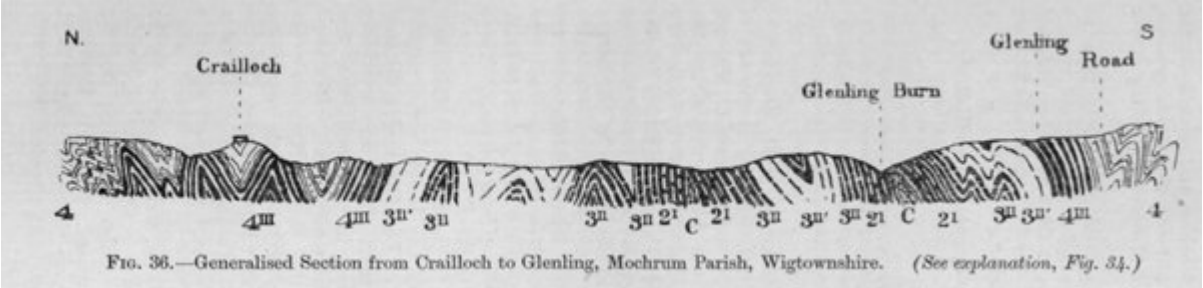


Fig. 36.—Generalised Section from Crailloch to Glenling, Mochrum Parish, Wigtownshire. *(See explanation, Fig. 34.)*

(Figure 36) Generalized section from Craigloch to Glenling, Mochrum Parish, Wigtownshire. (See explanation (Figure 34))

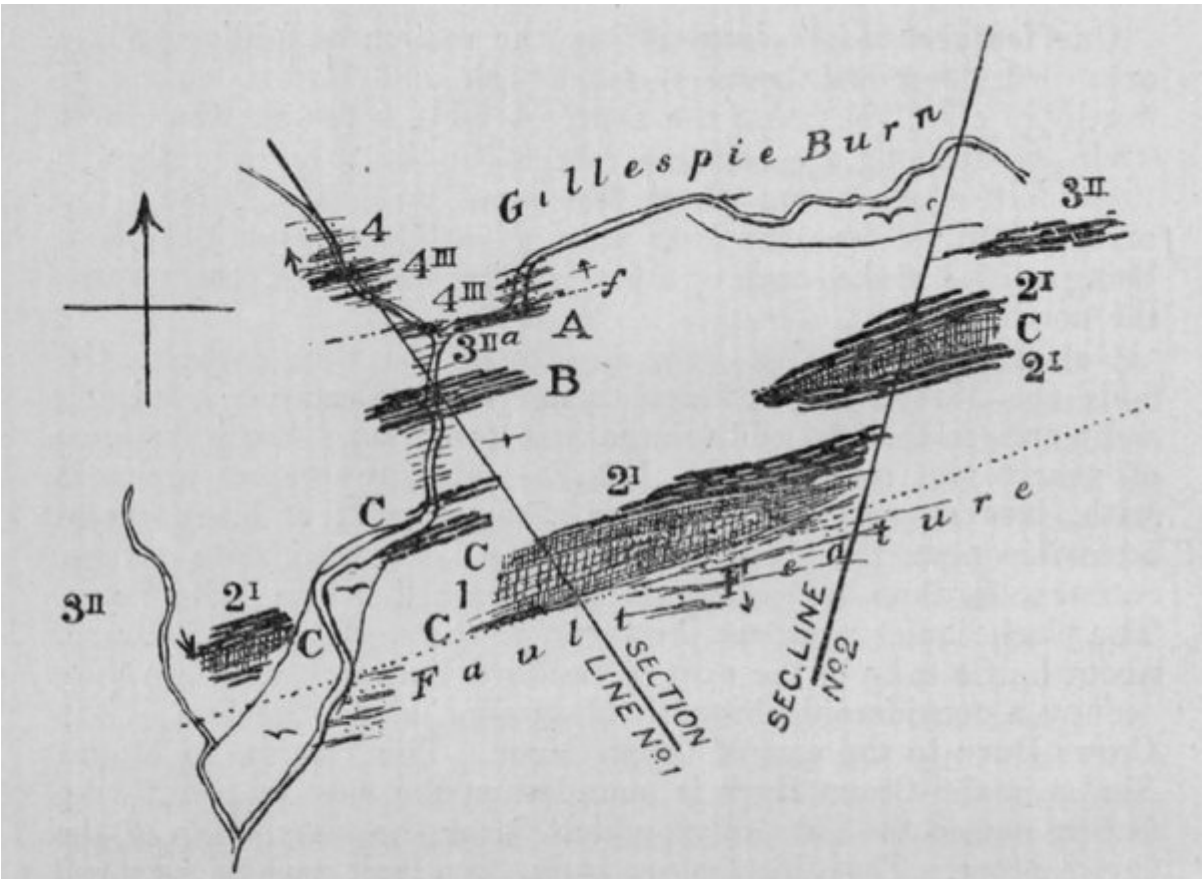


Fig. 37.—Plan of Gillespie Burn, Culroy, Glenluce Parish, Wigtownshire.

1. Mudstones (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3IIa. *Linearis*-zone. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). f. Fault. ~ Recent alluvium.

(Figure 37) Plan of Gillespie Burn, Culroy, Glenluce Parish, Wigtownshire. 1. Mudstones (Arenig). C. Radiolarian chart. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3IIa. Linearis-zone. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). f. Fault. [Symbol alluvium] Recent alluvium.

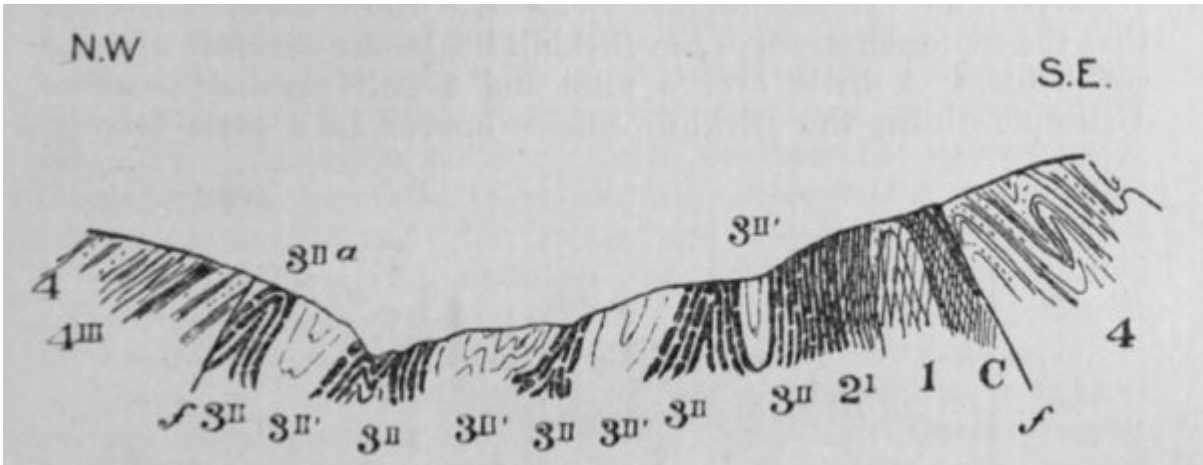


Fig. 38.—Section across Gillespie Burn (No. 1 in Fig. 37).

(Figure 38) Section across Gillespie Burn (No. 1 in (Figure 37)).

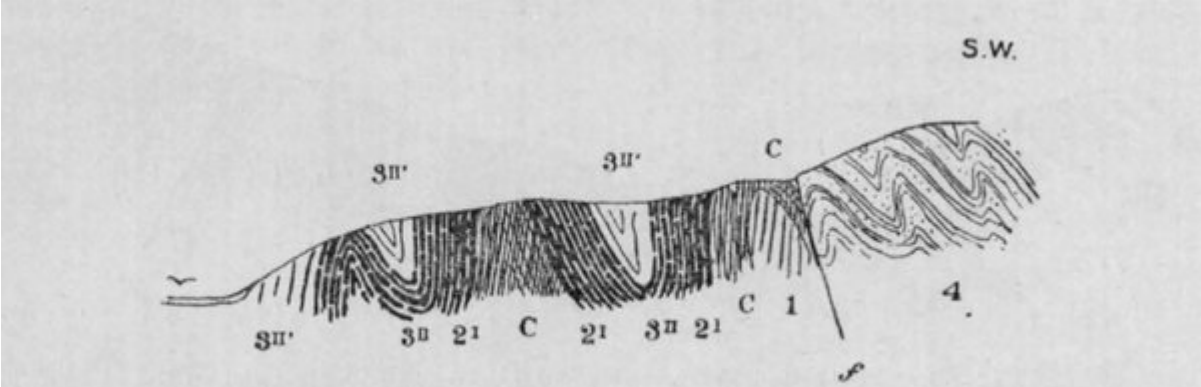


Fig. 39.—Section across Gillespie Burn (No. 2 in Fig. 37).

(Figure 39) Section across Gillespie Burn (No. 2 in (Figure 37)).

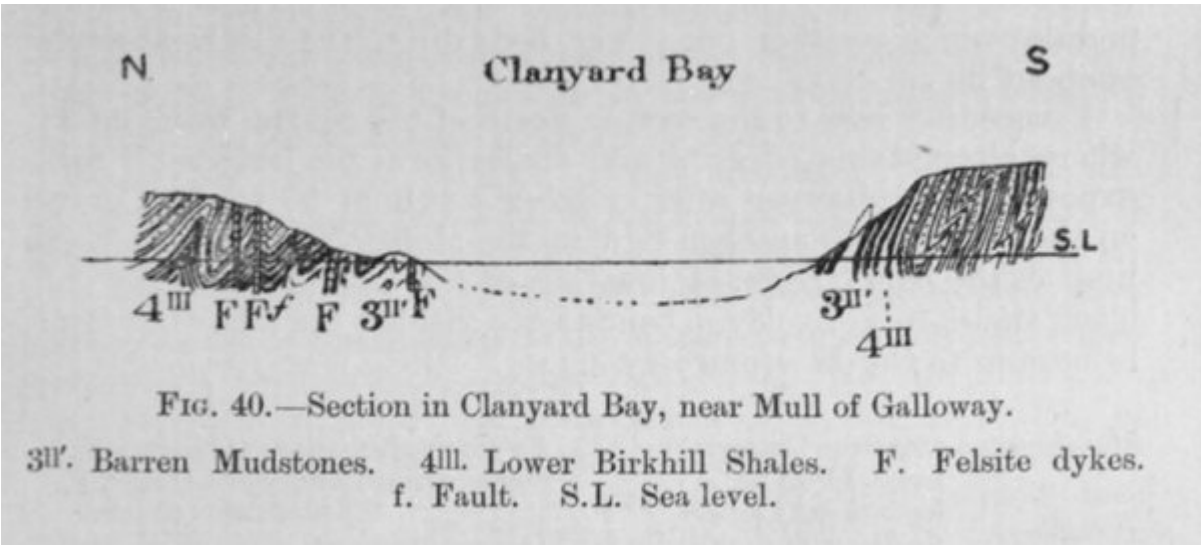


Fig. 40.—Section in Clanyard Bay, near Mull of Galloway.

3II'. Barren Mudstones. 4III. Lower Birkhill Shales. F. Felsite dykes. f. Fault. S.L. Sea level.

(Figure 40) Section in Clanyard Bay, near Mull of Galloway. 3II'. Barren Mudstones. 4III. Lower Birkhill Shales. F. Felsite dykes. f. Fault. S.L. Sea level.

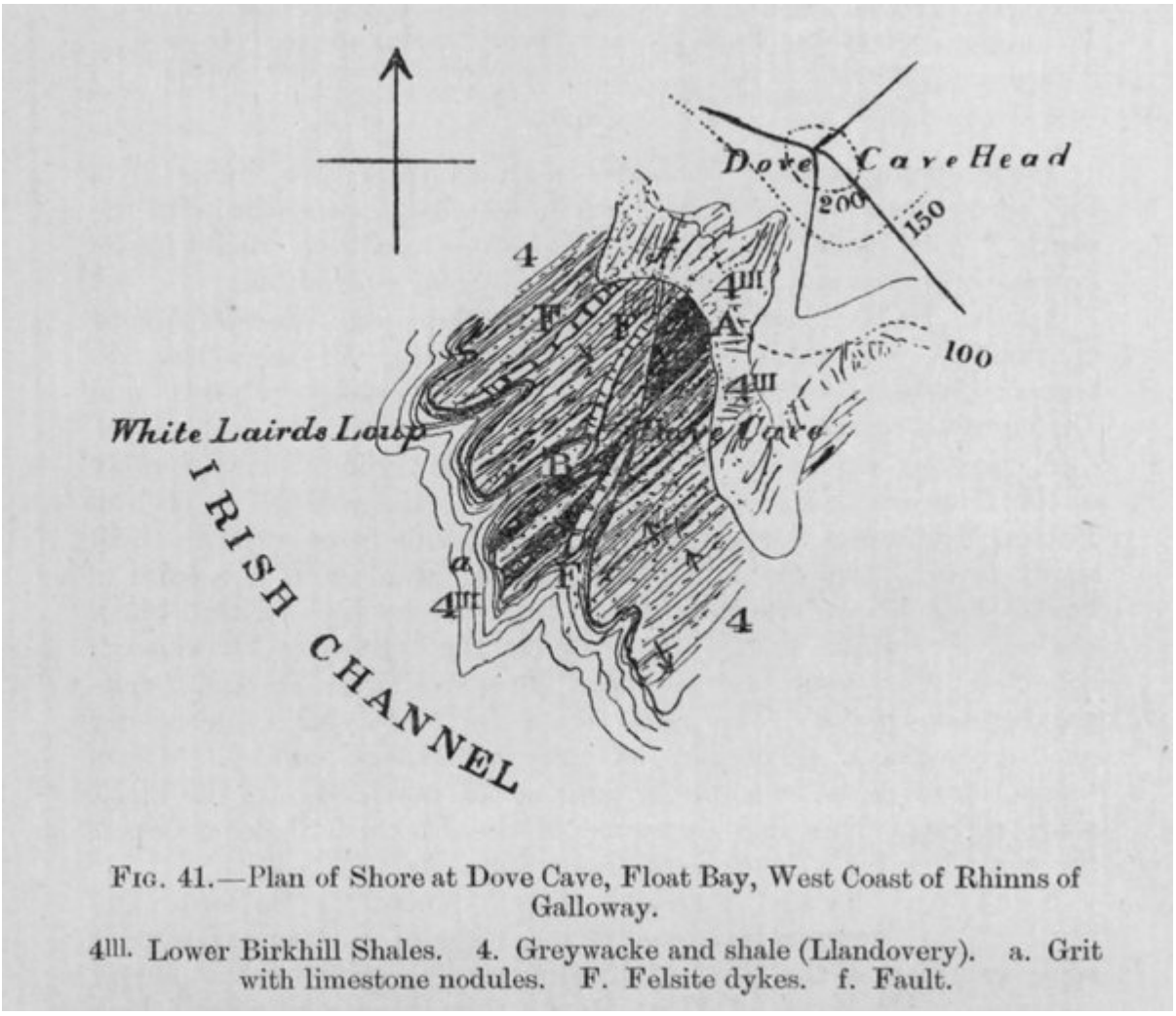


Fig. 41.—Plan of Shore at Dove Cave, Float Bay, West Coast of Rhinns of Galloway.

4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). a. Grit with limestone nodules. F. Felsite dykes. f. Fault.

(Figure 41) Plan of Shore at Dove Cave, Float Bay, West Coast of Rhinns of Galloway. 4III. Lower Birkhill Shales. 4. Greywacke and shale (Llandovery). a. Grit with limestone nodules. F. Felsite dykes. f. Fault.

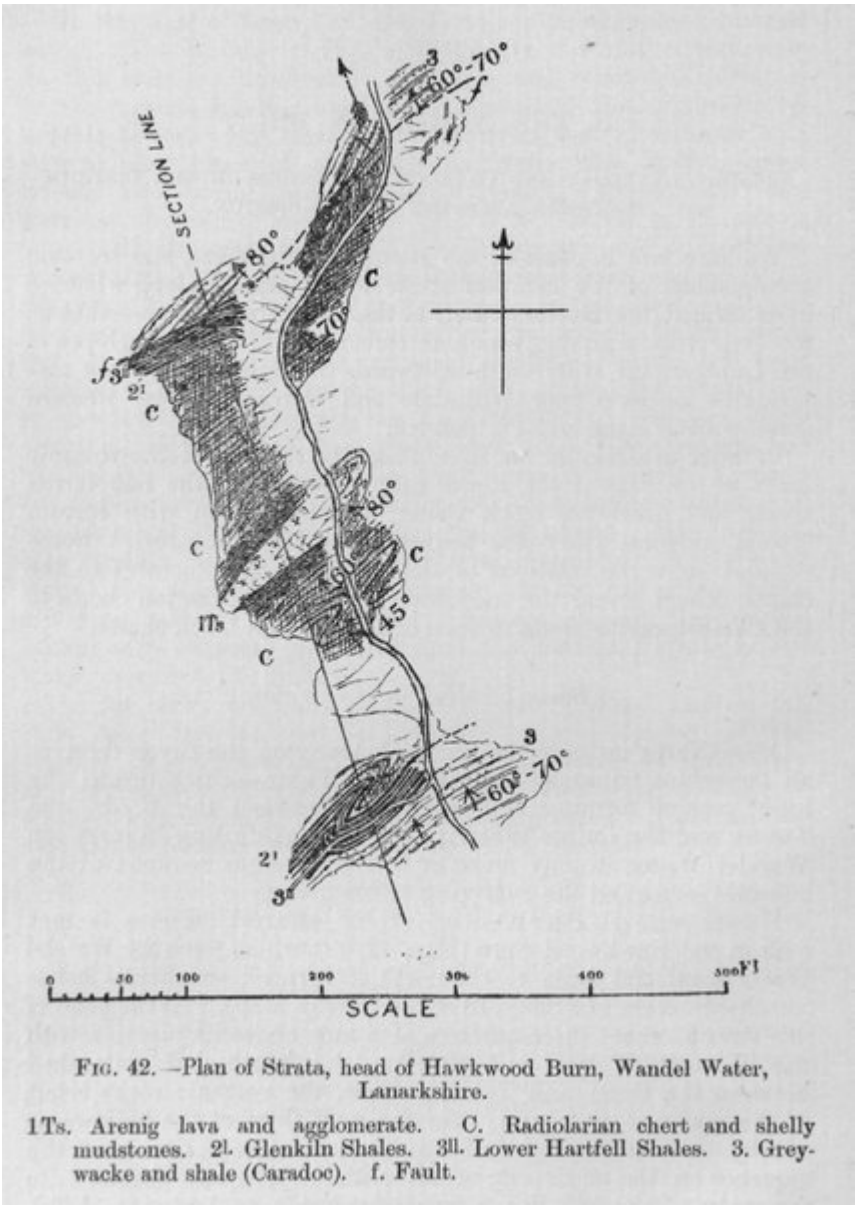


FIG. 42.—Plan of Strata, head of Hawkwood Burn, Wandel Water, Lanarkshire.

1Ts. Arenig lava and agglomerate. C. Radiolarian chert and shelly mudstones. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 42) Plan of Strata, head of Hawkwood Burn, Wandel Water, Lanarkshire. 1 Ts. Arenig lava and agglomerate. C. Radiolarian chert and shelly mudstones. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

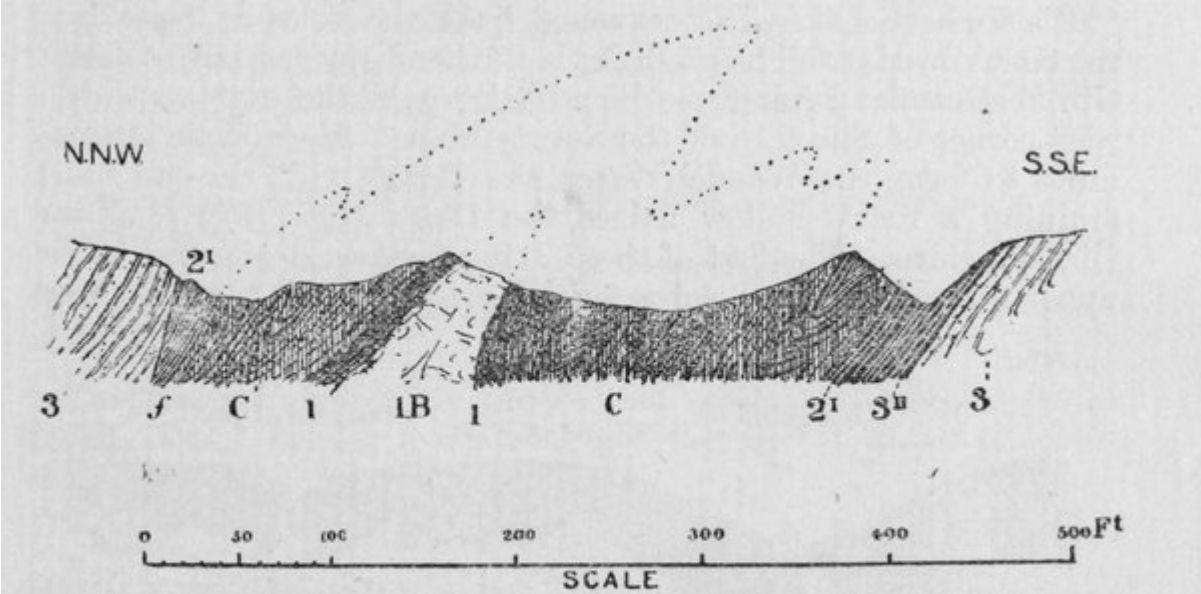


FIG. 43.—Section at the head of Hawkwood Burn, Wandel Water.

1B. Arenig lava and agglomerate. 1. Shelly mudstone (Arenig). C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 43) Section at the head of Hawkwood Burn, Wandel Water. 1B. Arenig lava and agglomerate. 1. Shelly mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

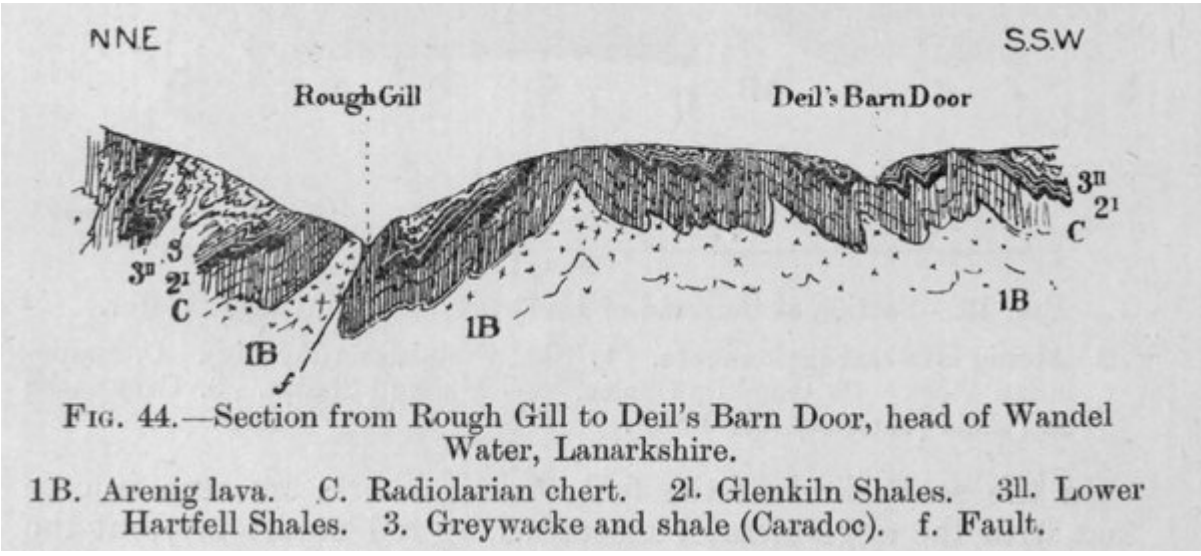


FIG. 44.—Section from Rough Gill to Deil's Barn Door, head of Wandel Water, Lanarkshire.

1B. Arenig lava. C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 44) Section from Rough Gill to Deil's Barn Door, head of Wandel Water, Lanarkshire. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

FIG. 45.—Section in Lead Burn, Wandel Water, Lanarkshire.

1B. Arenig lava. C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc).

(Figure 45) Section in Lead Burn, Wandel Water, Lanarkshire. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc).

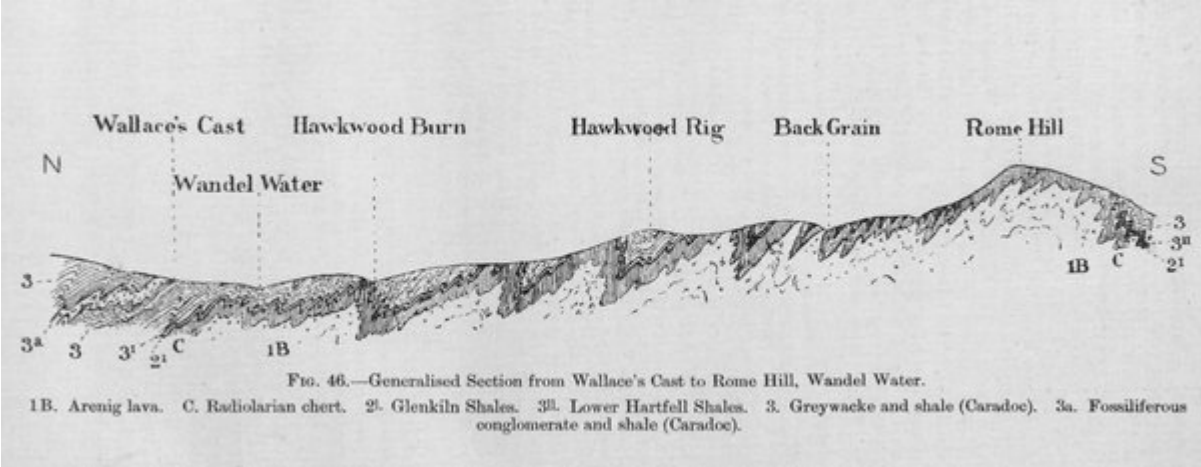


FIG. 46.—Generalised Section from Wallace's Cast to Rome Hill, Wandel Water.

1B. Arenig lava. C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). 3a. Fossiliferous conglomerate and shale (Caradoc).

(Figure 46) Generalised Section from Wallace's Cast to Rome Hill, Wandel Water. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). 3a. Fossiliferous conglomerate and shale (Caradoc).

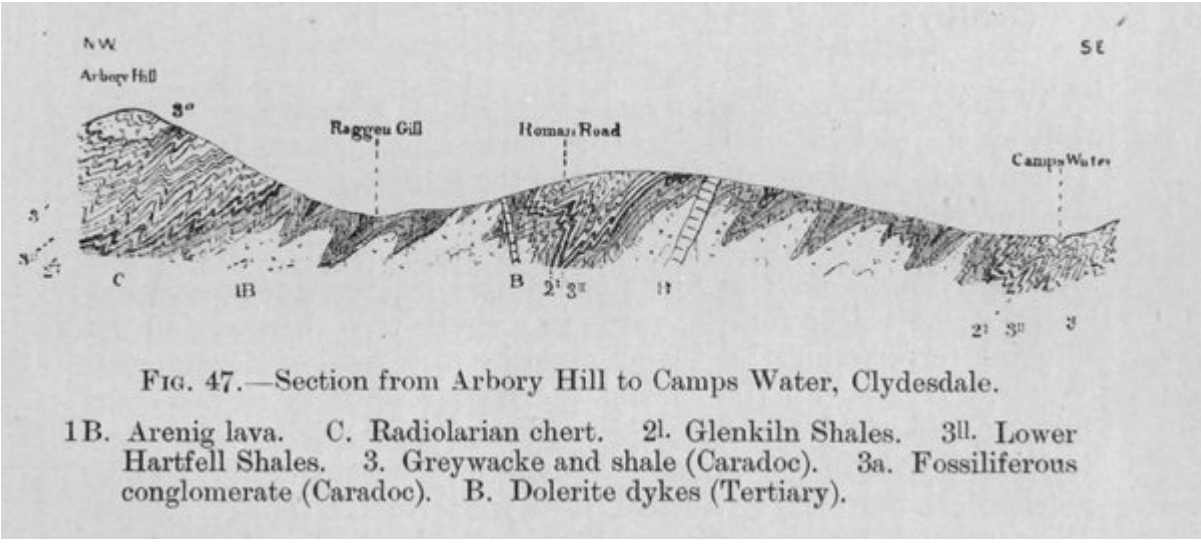


FIG. 47.—Section from Arbory Hill to Camps Water, Clydesdale.

1B. Arenig lava. C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). 3a. Fossiliferous conglomerate (Caradoc). B. Dolerite dykes (Tertiary).

(Figure 47) Section from Arbory Hill to Camps Water, Clydesdale. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3. Greywacke and shale (Caradoc). 3a. Fossiliferous conglomerate (Caradoc). B. Dolerite dykes (Tertiary).

FIG. 48.—Section, Southwood Burn, Abington, Clydesdale.

1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). B. Dolerite dyke (Tertiary).

(Figure 48) Section, Southwood Burn, Abington, Clydesdale. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). B. Dolerite dyke (Tertiary).

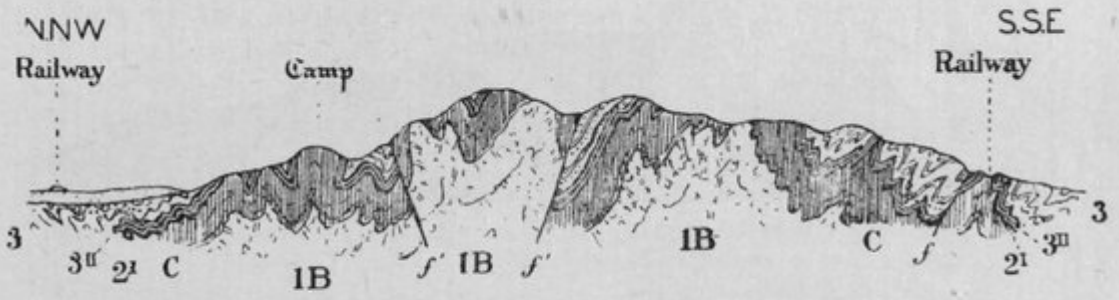


FIG. 49.—Section, Castle Hill, Abington, Clydesdale.

1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 49) Section, Castle Hill, Abington, Clydesdale. 1B. Arenig lava. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

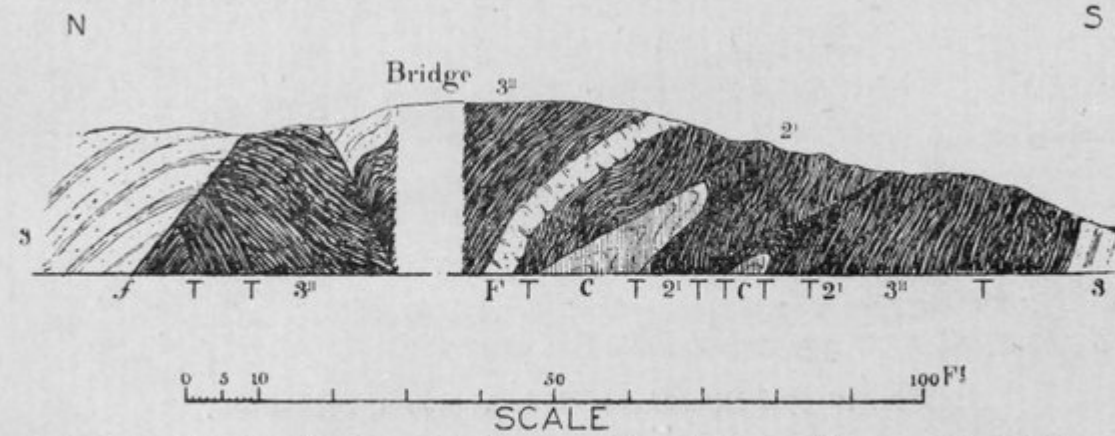


FIG. 50.—Section, Railway Cutting opposite Kirkton, Abington, Clydesdale.

C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault. T. Thrust faults.

(Figure 50) Section, Railway Cutting opposite Kirkton, Abington, Clydesdale. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault. T. Thrust faults.

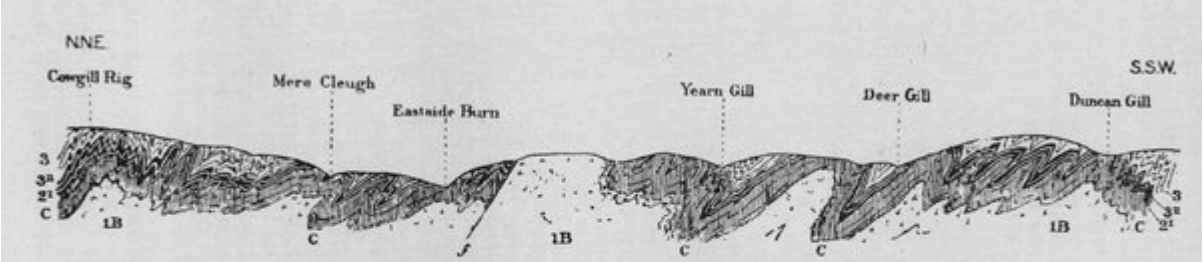


Fig. 51.—Generalised Section, Cowgill Rig to Duncan Gill, Culter Water, Lanarkshire.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 51) Generalised Section, Cowgill Rig to Duncan Gill, Culter Water, Lanarkshire. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

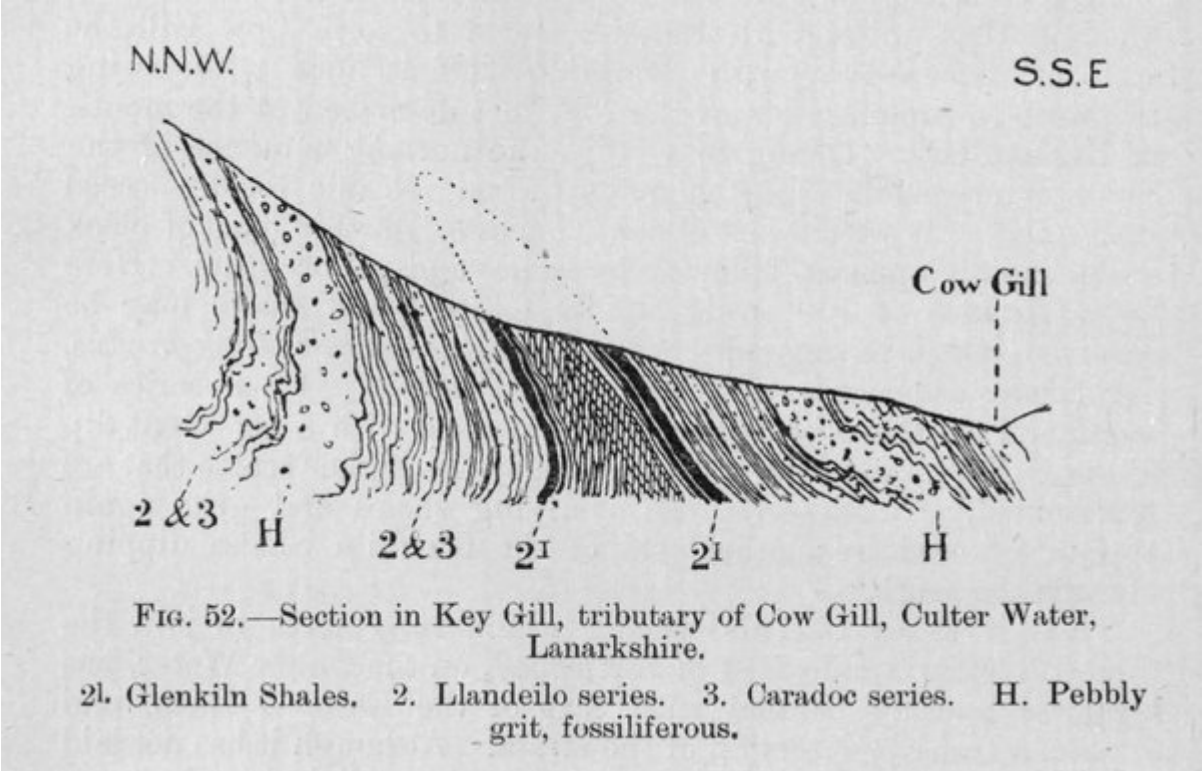


Fig. 52.—Section in Key Gill, tributary of Cow Gill, Culter Water, Lanarkshire.

2I. Glenkiln Shales. 2. Llandeilo series. 3. Caradoc series. H. Pebbly grit, fossiliferous.

(Figure 52) Section in Key Gill, tributary of Cow Gill, Culter Water, Lanarkshire. 2I. Glenkiln Shales. 2. Llandeilo series. 3. Caradoc series. H. Pebbly and fossiliferous.

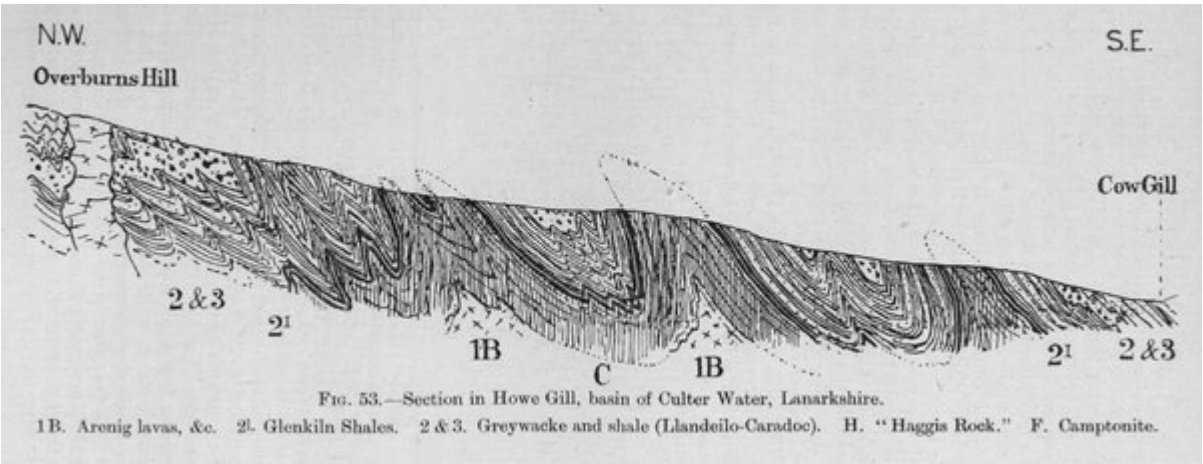


Fig. 53.—Section in Howe Gill, basin of Culter Water, Lanarkshire.

1B. Arenig lavas, &c. 2I. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo-Caradoc). H. "Haggis Rock." F. Camptonite.

(Figure 53) Section in Howe Gill, basin of Culter Water, Lanarkshire. 1B. Arenig lavas, &c. 2I- Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo–Caradoc). H. "Haggis Rock". F. Camptonite.

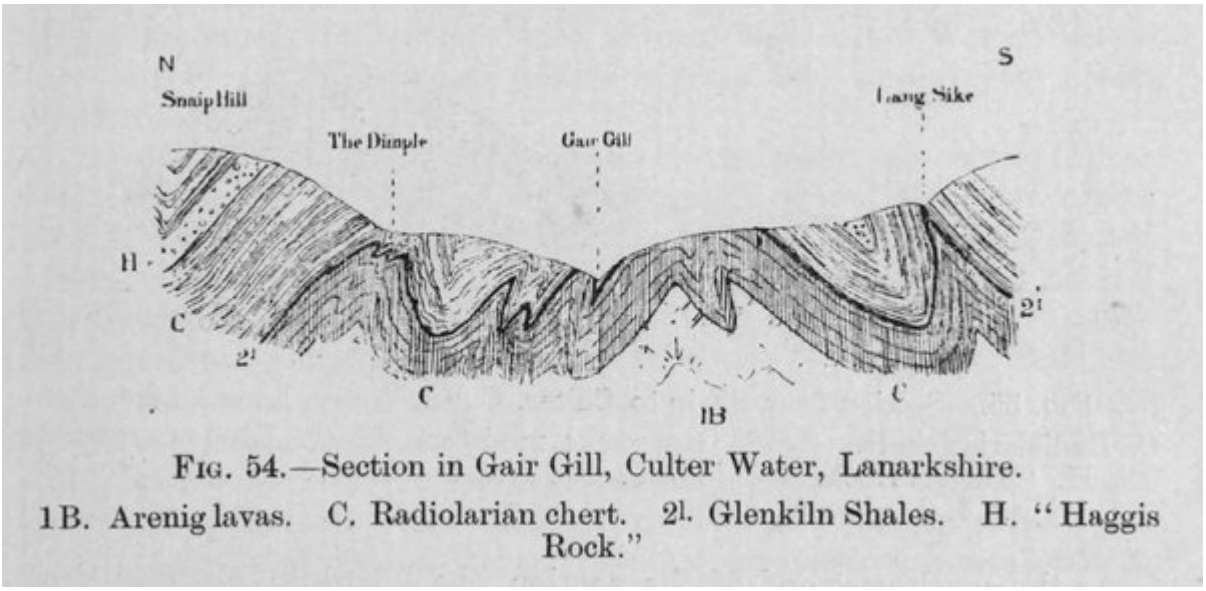


Fig. 54.—Section in Gair Gill, Culter Water, Lanarkshire.

1B. Arenig lavas. C. Radiolarian chert. 2l. Glenkiln Shales. H. "Haggis Rock."

(Figure 54) Section in Gair Gill, Culter Water, Lanarkshire. 1B. Arenig lavas. C. Radiolarian chert. 2I. Glenkiln Shales. H. "Haggis Rock".

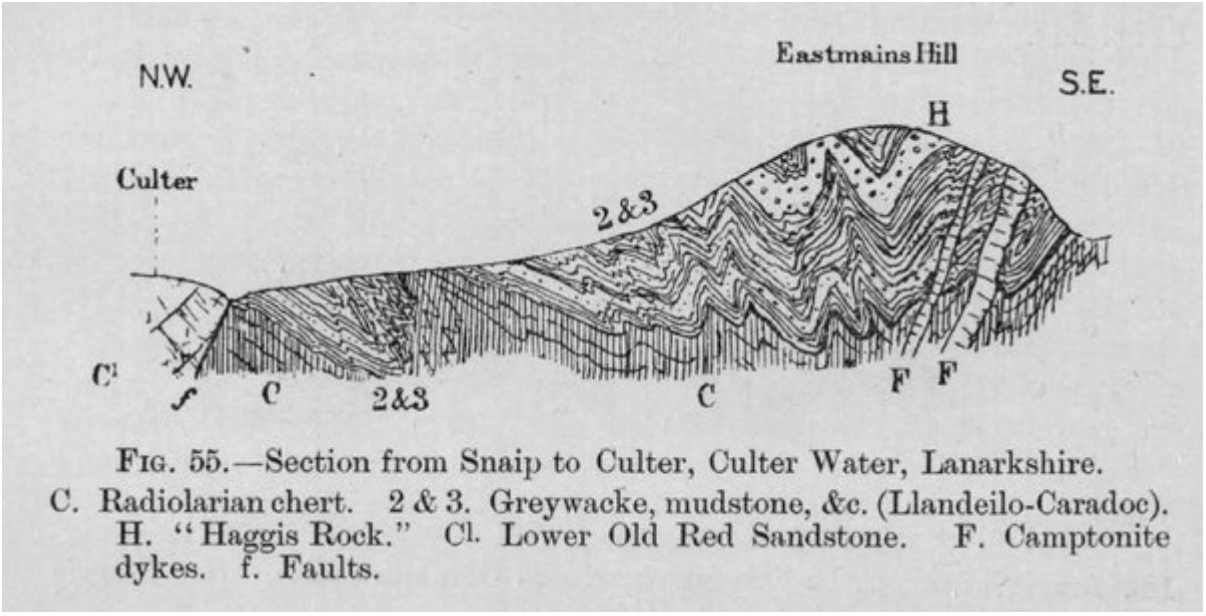


Fig. 55.—Section from Snaip to Culter, Culter Water, Lanarkshire.

C. Radiolarian chert. 2 & 3. Greywacke, mudstone, &c. (Llandeilo-Caradoc). H. "Haggis Rock." Cl. Lower Old Red Sandstone. F. Camptonite dykes. f. Faults.

(Figure 55) Section from Snaip to Culter, Culter Water, Lanarkshire. C. Radiolarian chert. 2 & 3. Greywacke, mudstone, &c. (Llandeilo–Caradoc). H. "Haggis Rock". Lower Old Red Sandstone. F. Camptonite dykes. f. Faults.

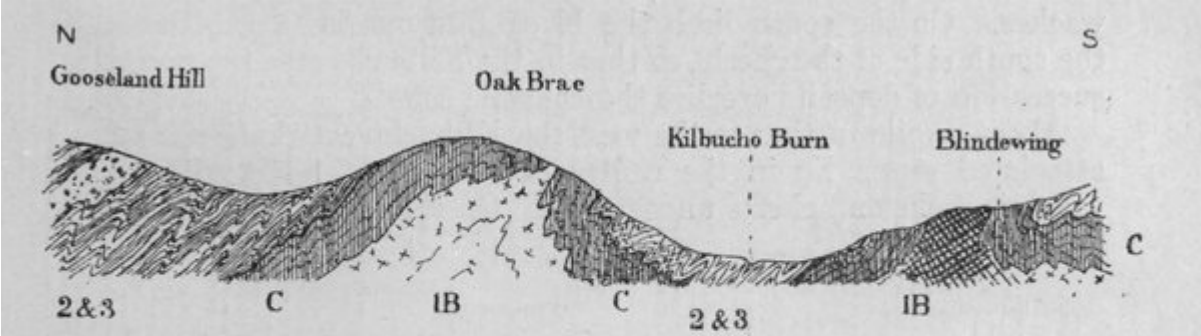


FIG. 56.—Section from Blindewing to Goseland Hill, Kilbucho Burn, Peeblesshire.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2 & 3. Greywacke and shale (Llandeilo-Caradoc).

(Figure 56) Section from Blindewing to Goseland Hill, Kilbucho Burn, Peeblesshire. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2 & 3. Greywacke and shale (Llandeilo-Caradoc).

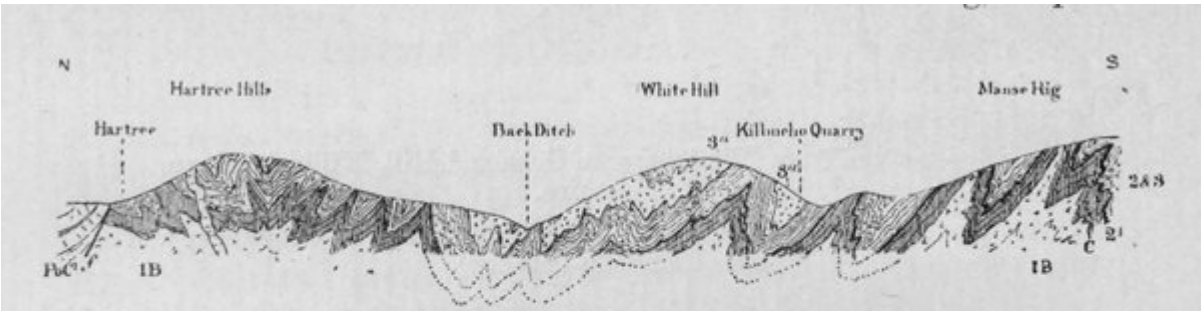


FIG. 57.—Generalised Section from Manse Rig, Kilbucho, to Hartree (near Biggar), Peeblesshire.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2l. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo-Caradoc). 3a. Fossiliferous conglomerate (Caradoc). F. Camptonite dykes. PoCl. Lower Old Red Sandstone volcanic rocks. f. Faults.

(Figure 57) Generalised Section from Manse Rig, Kilbucho, to Hartree (near Biggar), Peeblesshire. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2l. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo–Caradoc). 3a. Fossiliferous conglomerate (Caradoc). F. Camptonite dykes. PoCl. Lower Old Red Sandstone volcanic rocks. f. Faults.

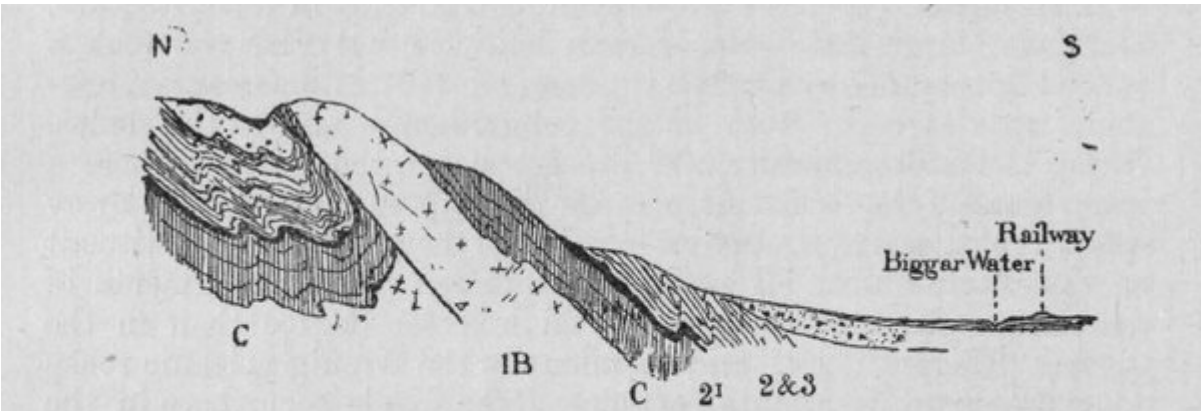


FIG. 58.—Section, Pisgah Hill, Biggar Water, Peeblesshire. (Length, half a mile.)

1B. Arenig volcanic rocks. C. Radiolarian cherts. 2l. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo-Caradoc).

(Figure 58) Section, Pisgah Hill, Biggar Water, Peeblesshire.7 (Length, half a mile.) 1B. Arenig volcanic rocks. C. Radiolarian cherts. 2I. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo-Caradoc).

Fig. 59.—Generalised Section from Broughton to Broughton Knowe, Peeblesshire. (Length, two miles.)
1B. Arenig volcanic rocks. C. Radiolarian chert. 2l. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo-Caradoc). Cl. Lower Old Red Sandstone. f. Fault.

(Figure 59) Generalised Section from Broughton to Broughton Knowe, Peeblesshire. (Length, two miles.) 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 2 & 3. Greywacke and shale (Llandeilo–Caradoc). CI. Lower Old Red Sandstone. f. Fault.

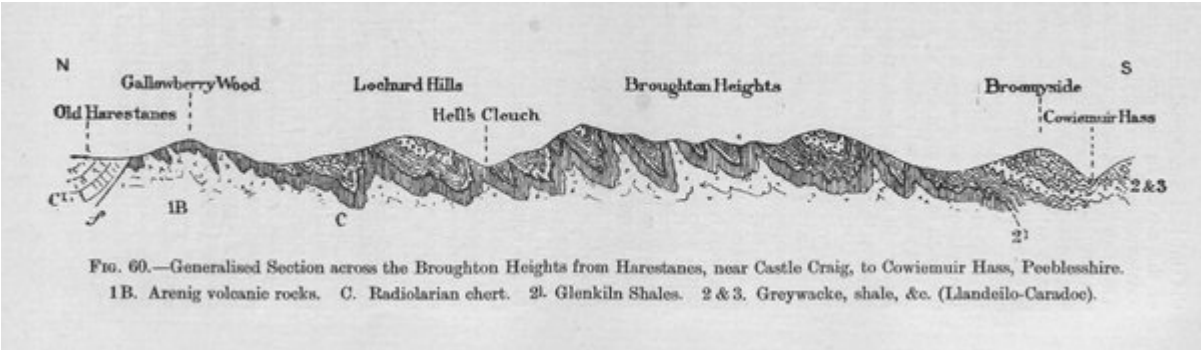


Fig. 60.—Generalised Section across the Broughton Heights from Harestanes, near Castle Craig, to Cowiemuir Hass, Peeblesshire.
1B. Arenig volcanic rocks. C. Radiolarian chert. 2l. Glenkiln Shales. 2 & 3. Greywacke, shale, &c. (Llandeilo-Caradoc).

(Figure 60) Generalized section aross The Broughton Heights from Harestanes, near Castle Craig to Cowiemuir Hass, Peebleshire. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales 2&3 Greywacke, shale &c. (Llandeilo–Caradoc).

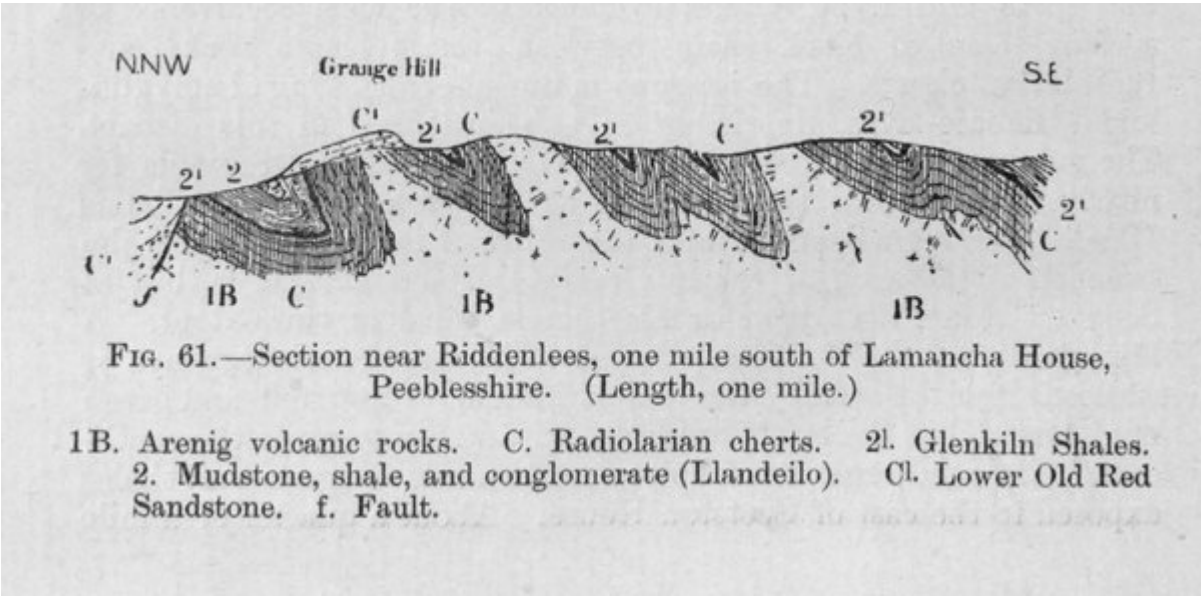


Fig. 61.—Section near Riddenlees, one mile south of Lamancha House, Peeblesshire. (Length, one mile.)

1B. Arenig volcanic rocks. C. Radiolarian cherts. 2l. Glenkiln Shales. 2. Mudstone, shale, and conglomerate (Llandeilo). Cl. Lower Old Red Sandstone. f. Fault.

(Figure 61) Section near Riddenlees, one mile south of Lamancha House, Peeblesshire. (Length, one mile.) 1B. Arenig volcanic rocks. C. Radiolarian cherts. 2I. Glenkiln Shales. 2. Mudstone, shale, and conglomerate (Llandeilo). CL Lower Old Red Sandstone. f. fault

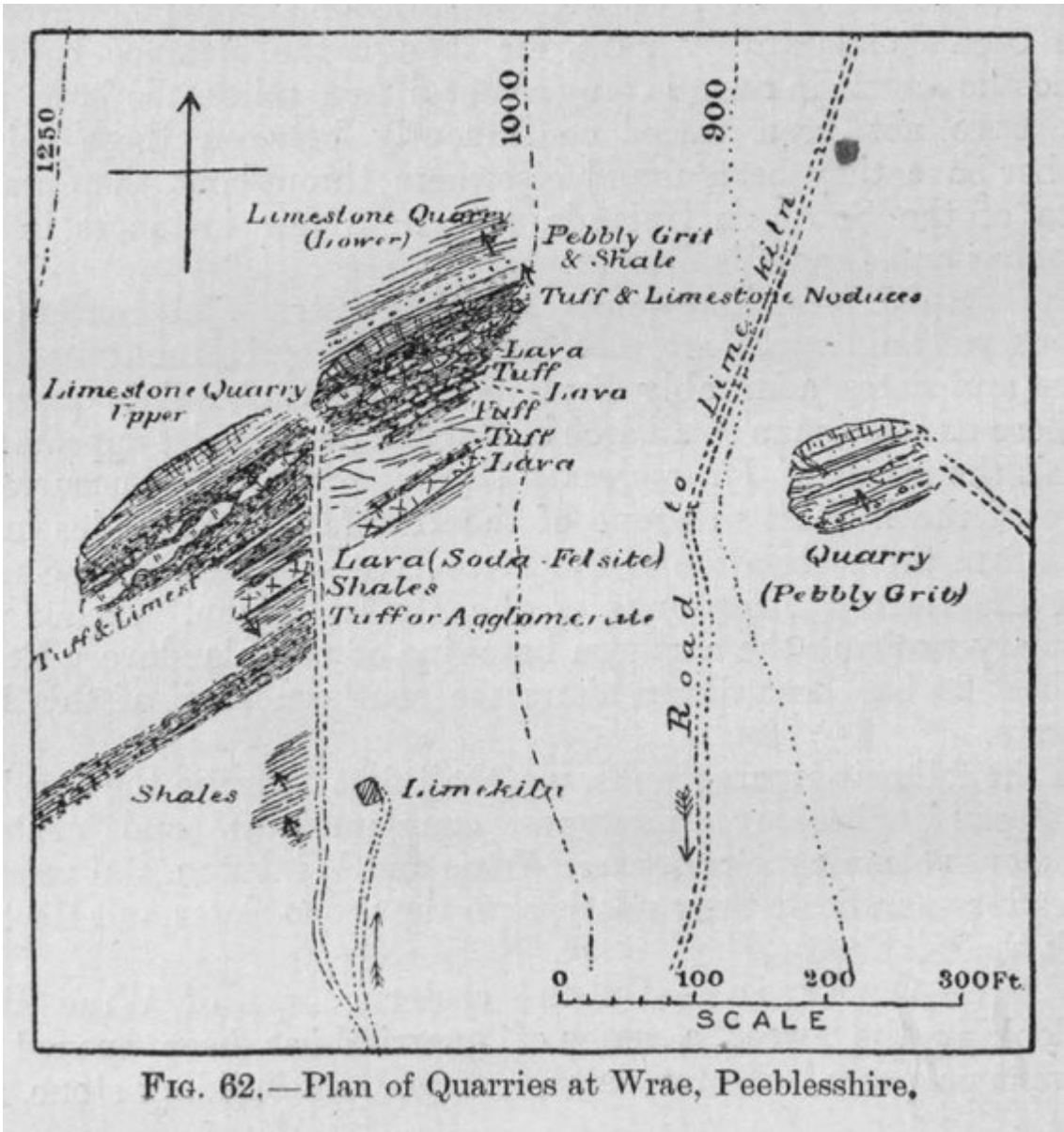


FIG. 62.—Plan of Quarries at Wrae, Peeblesshire.

(Figure 62) Plan of Quarries at Wrae, Peeblesshire.

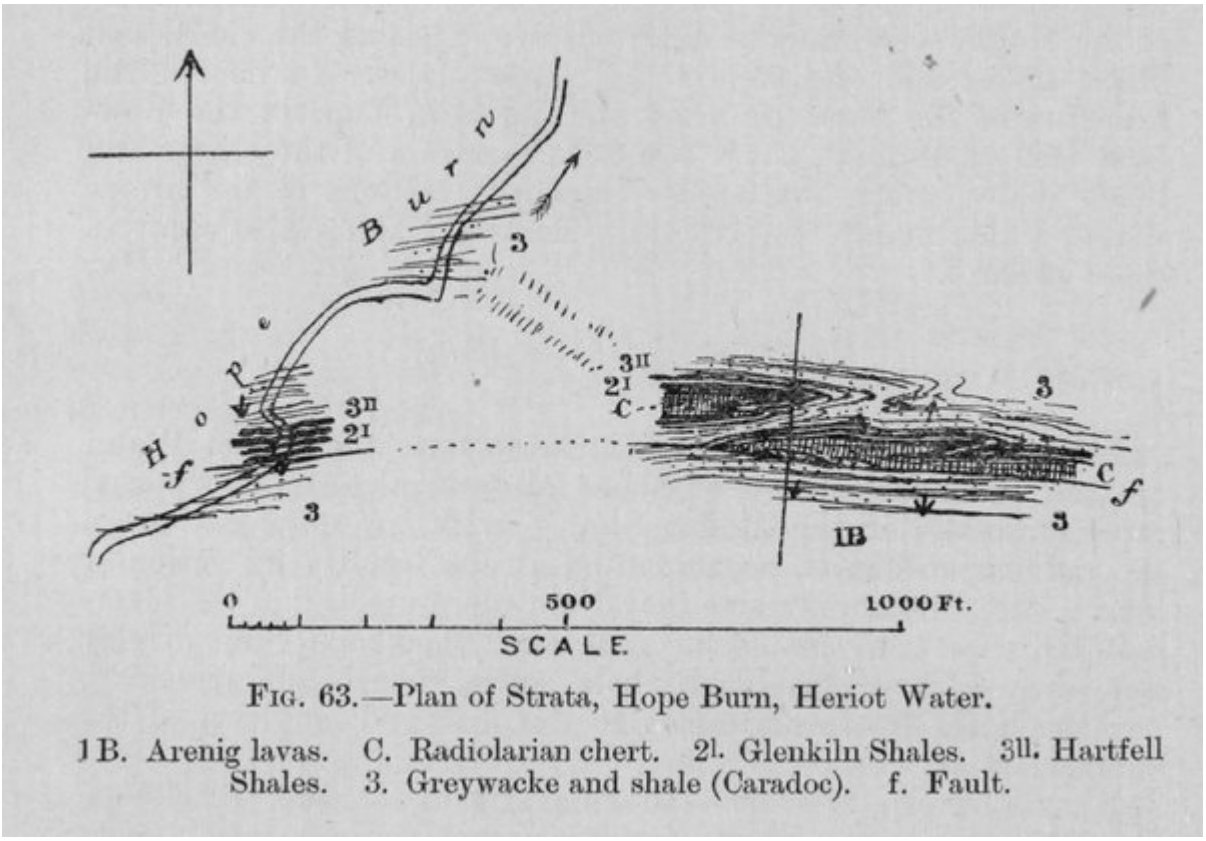


FIG. 63.—Plan of Strata, Hope Burn, Heriot Water.

1 B. Arenig lavas. C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 63) Plan of Strata, Hope Burn, Heriot Water. B. Arenig lavas. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

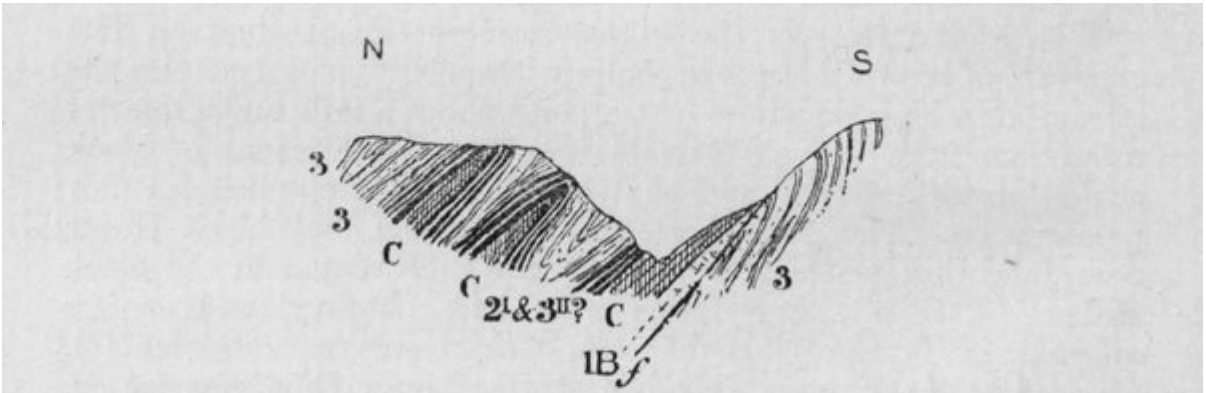


FIG. 64.—Section at Head of Gully, West Slope of Garvald Law, Hope Burn, Heriot Water, along line marked in Fig. 63.

(Figure 64) Section at Head of Gully, West Slope of Garvald Law, Hope Burn, Heriot Water, along line marked in (Figure 63).

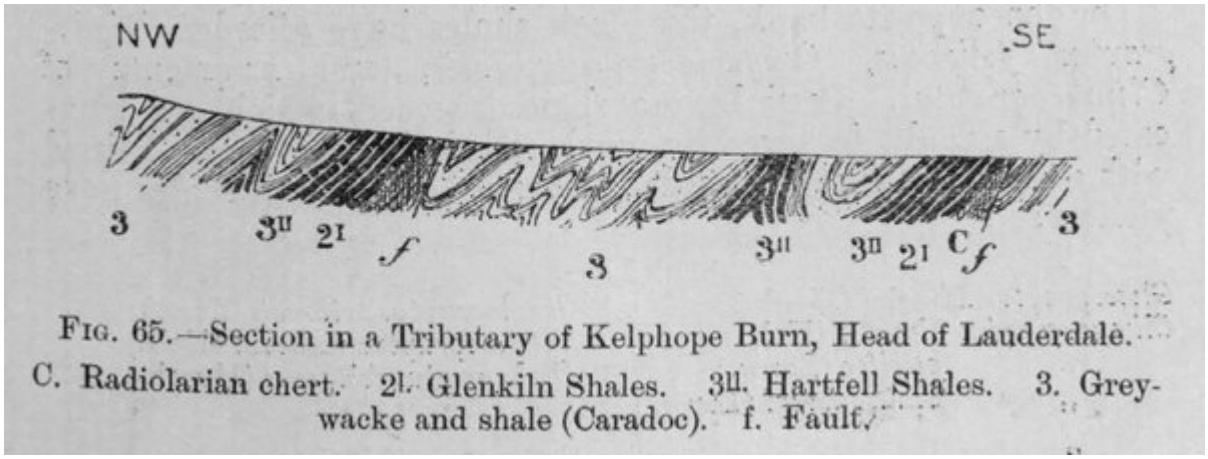


FIG. 65.—Section in a Tributary of Kelphope Burn, Head of Lauderdale.
C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 65) Section in a Tributary of Kelphope Burn, Head of Lauderdale. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

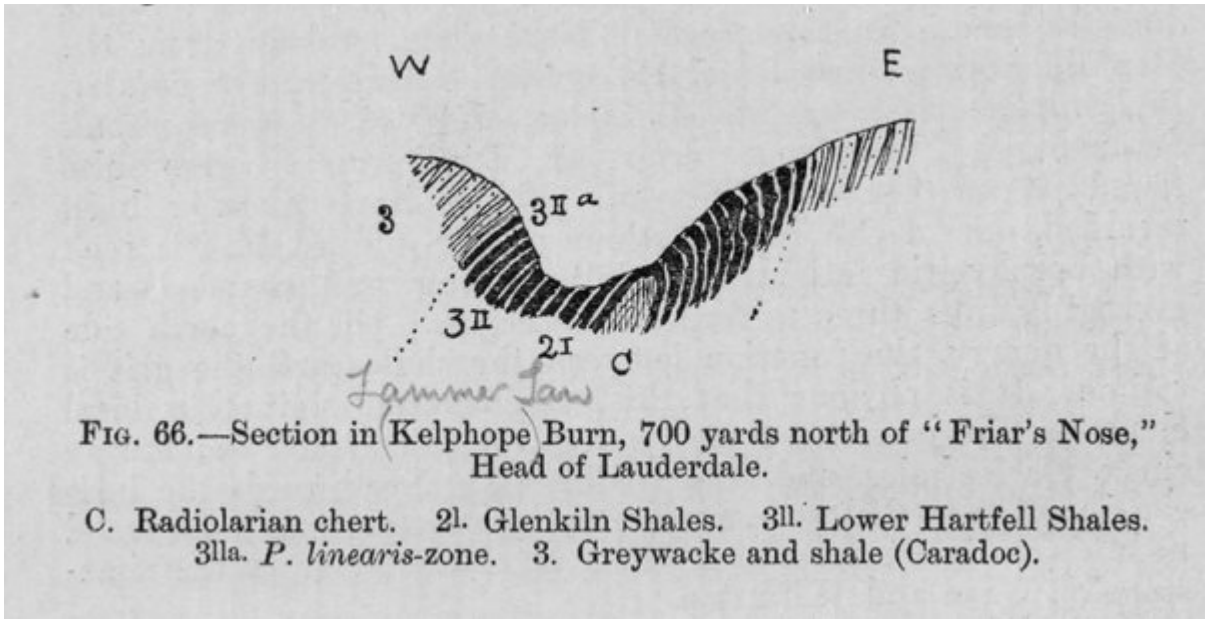


FIG. 66.—Section in Kelphope Burn, 700 yards north of "Friar's Nose," Head of Lauderdale.
C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3IIa. *P. linearis*-zone. 3. Greywacke and shale (Caradoc).

(Figure 66) Section inKelphope Burn, 700 yards north of "Friar's Nose", Head of Lauderdale. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3IIa. P. linearis-zone. 3. Greywacke and shale (Caradoc).

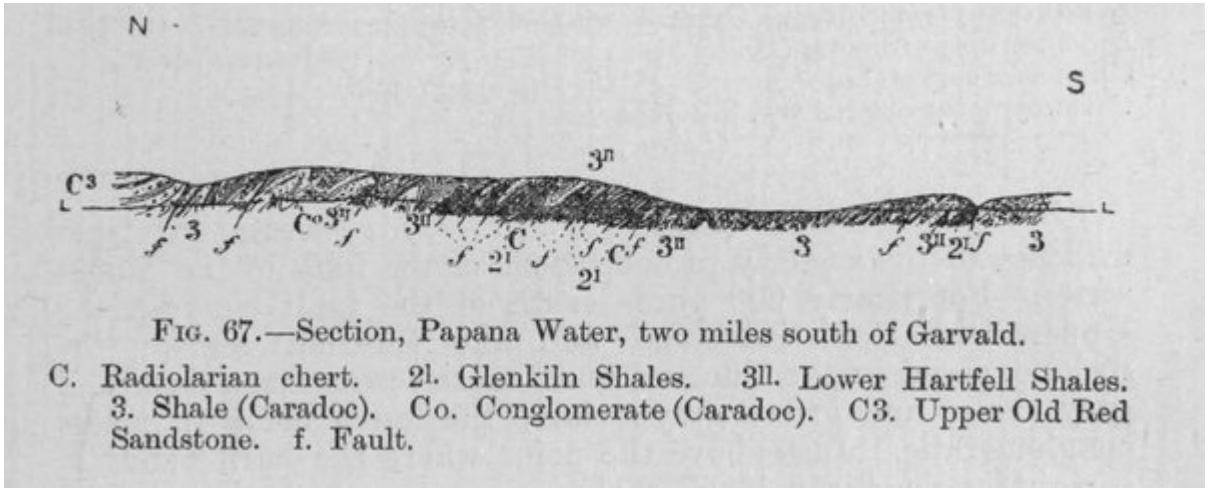


FIG. 67.—Section, Papana Water, two miles south of Garvald.
C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Shale (Caradoc). Co. Conglomerate (Caradoc). C3. Upper Old Red Sandstone. f. Fault.

(Figure 67) Section, Papana Water, two miles south of Garvald. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Shale (Caradoc). Co. Conglomerate (Caradoc). C3. Upper Old Red Sandstone. f. Fault.

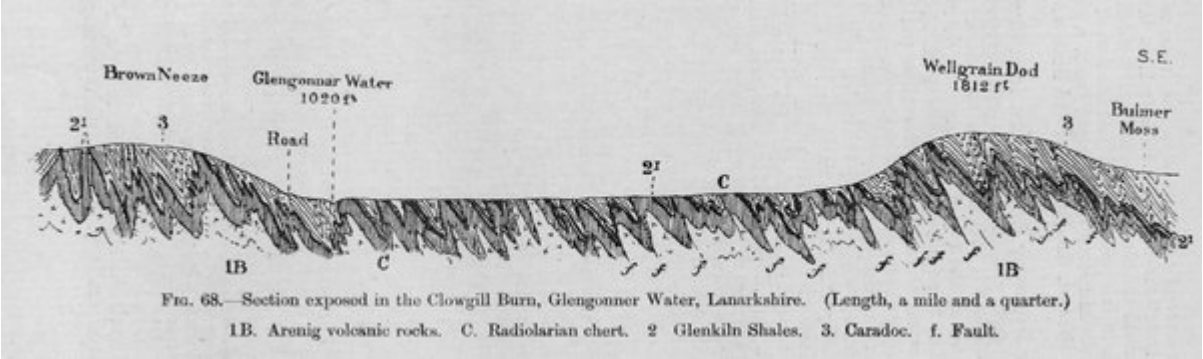


Fig. 68.—Section exposed in the Clowgill Burn, Glengonner Water, Lanarkshire. (Length, a mile and a quarter.)
1B. Arenig volcanic rocks. C. Radiolarian chert. 2 Glenkiln Shales. 3. Caradoc. f. Fault.

(Figure 68) Section exposed in the Clowgill Burn, Glengonner Water, Lanarkshire. (Length, a mile and a quarter.) 1B. Arenig volcanic rocks. C. Radiolarian chart. 2 Glenkiln Shales. 3. Caradoc. f. Fault.

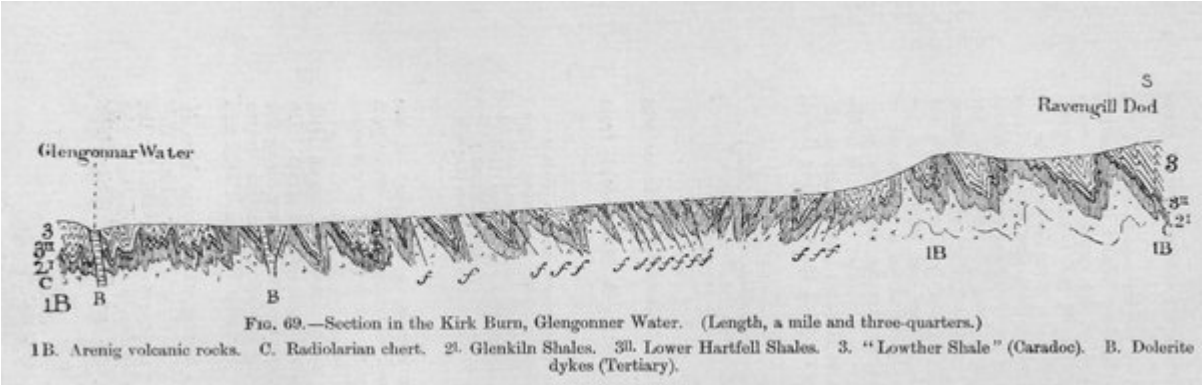


Fig. 69.—Section in the Kirk Burn, Glengonner Water. (Length, a mile and three-quarters.)
1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. "Lowther Shale" (Caradoc). B. Dolerite dykes (Tertiary).

(Figure 69) Section in the Kirk Burn, Glengonner Water. (Length, a mile and three-quarters.) 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3. "Lowther Shale" (Caradoc). B. Dolerite dykes (Tertiary).

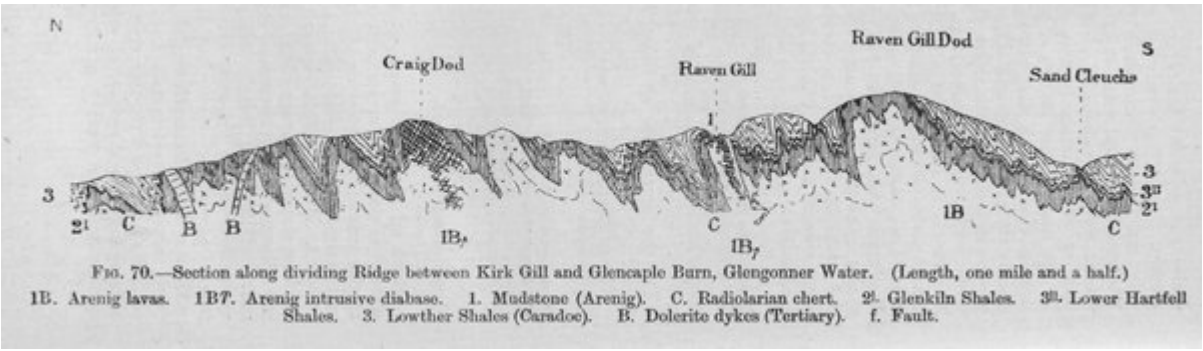


Fig. 70.—Section along dividing Ridge between Kirk Gill and Glencaple Burn, Glengonner Water. (Length, one mile and a half.)
1B. Arenig lavas. 1B7. Arenig intrusive diabase. 1. Mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Lowther Shales (Caradoc). B. Dolerite dykes (Tertiary). f. Fault.

(Figure 70) Section along dividing Ridge between Kirk Gill and Glencaple Burn, Glengonner Water. (Length, one mile and a half.) 1B. Arenig lavas. 1B■. Arenig intrusive diabase. 1. Mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Lowther Shales (Caradoc). B. Dolerite dykes (Tertiary). f. Fault.

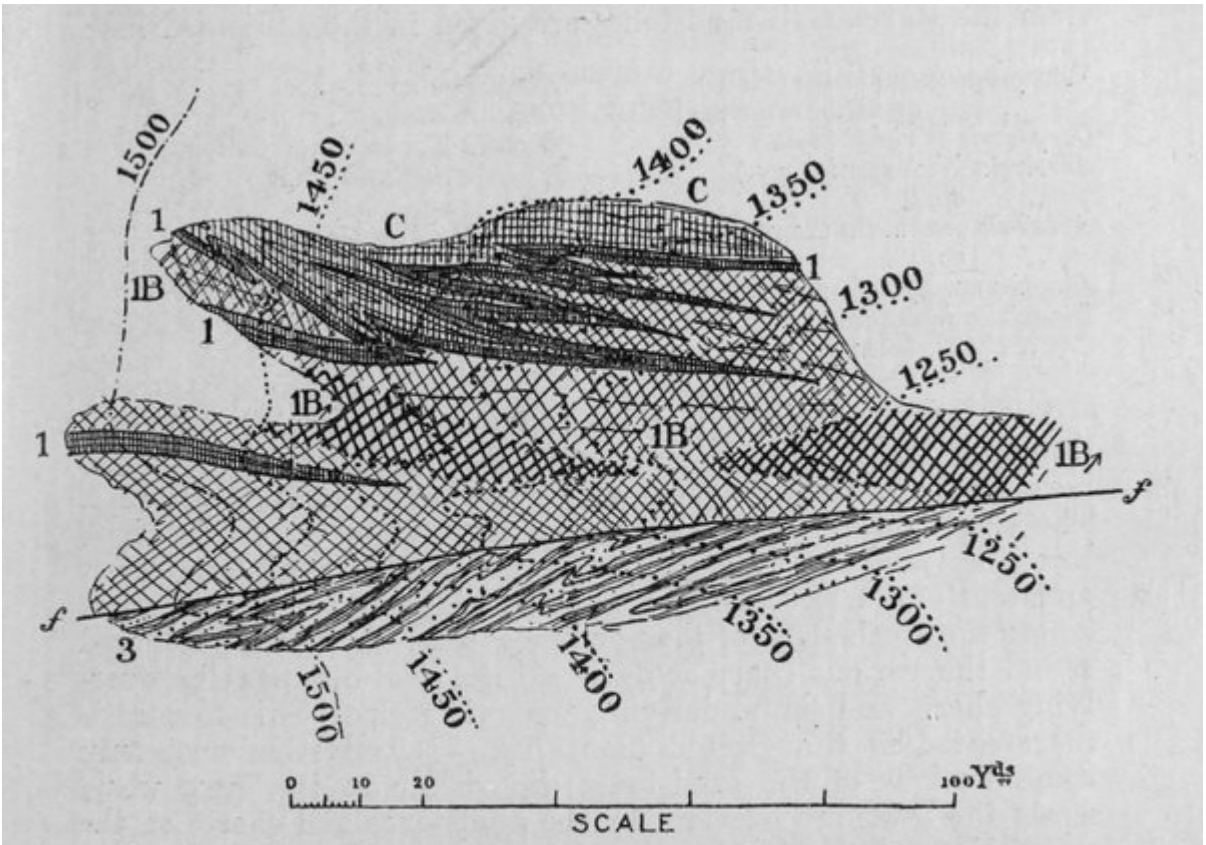


Fig. 71.—Plan of Strata, Head of Raven Gill, Glencaple, Lanarkshire.

1B. Arenig lavas and tuffs. 1B*T*. Intrusive diabase (Arenig). 1. Shelly mudstone Arenig). C. Radiolarian chert. 3. Greywacke and shale (Caradoc). f. Fault. Dotted lines are lines of contour showing the height of the ground in feet.

(Figure 71) Plan of Strata, Head of Raven Gill, Glencaple, Lanarkshire. 1B. Arenig lavas and tuffs. 1B■. Intrusive diabase (Arenig). 1. Shelly mudstone (Arenig). C. Radiolarian chert. 3. Greywacke and shale (Caradoc). f. Fault. Dotted lines are lines of contour showing the height of the ground in feet.

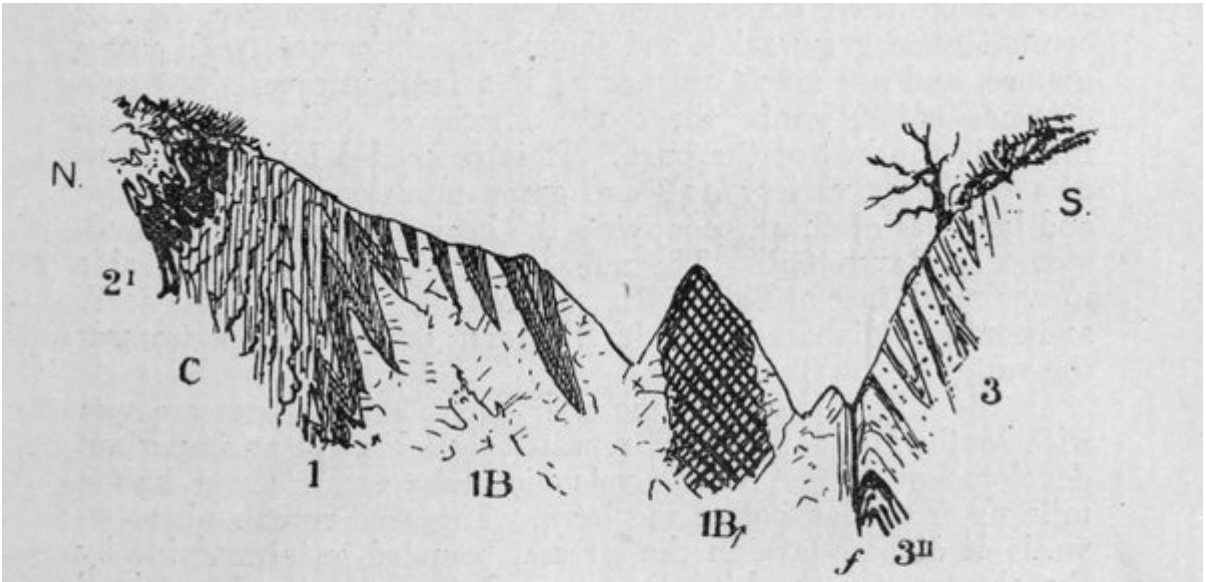


Fig. 72.—Section across the Head of Raven Gill.

1B. Arenig lavas and tuffs. 1B*T*. Intrusive diabase (Arenig). 1. Shelly mudstone (Arenig). C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Fault.

(Figure 72) Section across the Head of Raven Gill. 1B. Arenig lavas and tuffs. 1B■. Intrusive diabase (Arenig). 1. Shelly mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Zovief Harden Shales.' S. Greywacke and shale (Caradoc). f. Fault.

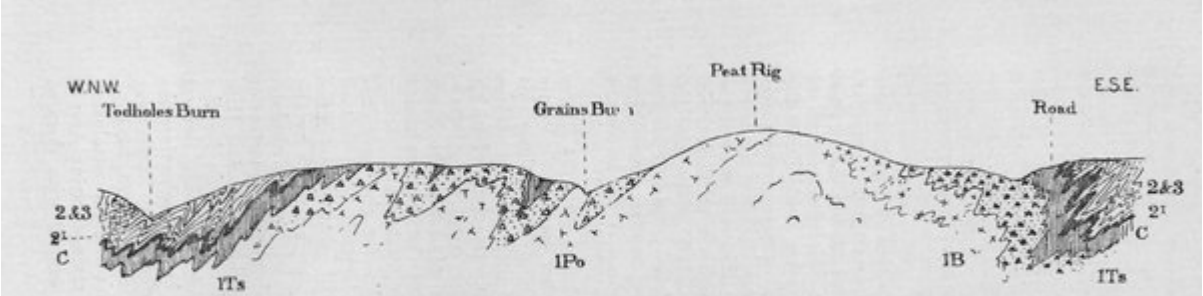


FIG. 73.—Section across the Bail Hill Volcanic Area, from Todholes Burn to Old Road, a quarter of a mile north of Towerhill. (Length, one mile and a half.)
1B. Diabase lavas. 1Po. Mica-andesite lava. 1Ts. Agglomerate (Arenig). C. Radiolarian cherts. 2l. Glenkiln Shales. 2 & 3. Llandeilo-Caradoc series.

(Figure 73) Section across the Bail Hill Volcanic Area, from Todholes Burn to Old Road, a quarter of a mile north of Towerhill. (Length, one mile and a half.) 1B. Diabase lavas. 1Po. Mica-andesite lava. 1Ts. Agglomerate (Arenig). C. Radiolarian cherts. 2I. Glenkiln Shales. 2 & 3. Llandeilo–Caradoc series.

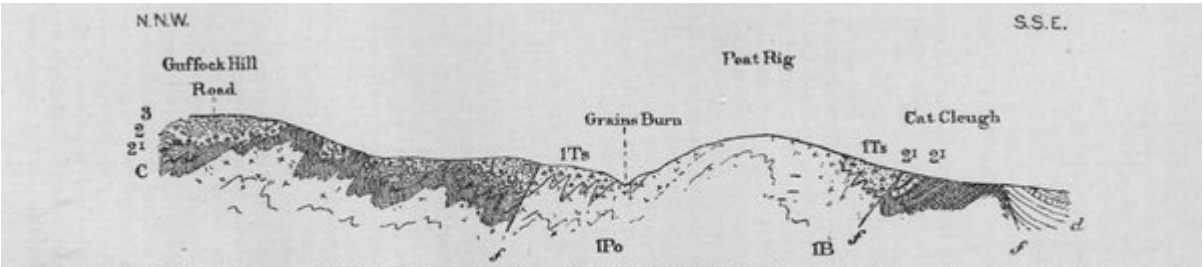


FIG. 74.—Section across Bail Hill Volcanic Area, from Guffock Hill to Cat Cleugh. (Length, one mile and a quarter.)
1B. Diabase lava. 1Po. Mica-andesite lava. 1Ts. Agglomerate (Arenig). C. Radiolarian chert. 2l. Glenkiln shales. 2. Greywacke and shales (Llandeilo). 3. Conglomerate, greywacke, and shales (Caradoc ?). d. Carboniferous series. f. Fault.

(Figure 74) Section across Bail Hill Volcanic Area, from Guffock Hill to Cat Cleugh. (Length, one mile and a quarter.) 1B. Diabase lava. 1Po. Mica-andesite lava. 1Ts. Agglomerate (Arenig). C. Radiolarian chert. 2I Glenkiln shales. 2. Greywacke and shales (Llandeilo). 3. Conglomerate, greywacke, and shales (Caradoc?). d. Carboniferous series. f. Fault.

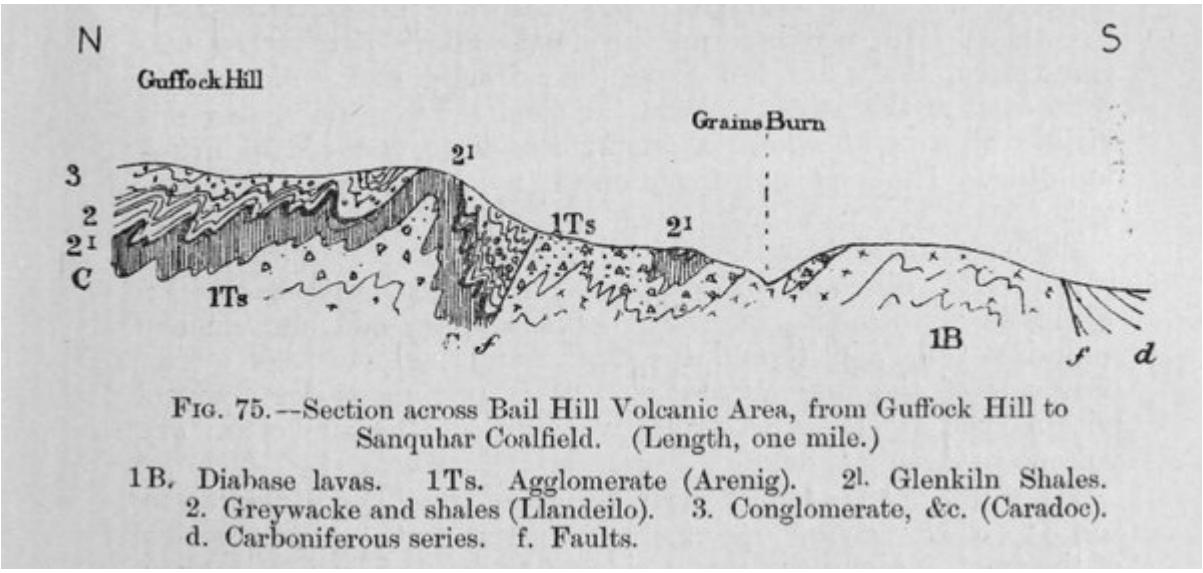


FIG. 75.—Section across Bail Hill Volcanic Area, from Guffock Hill to Sanquhar Coalfield. (Length, one mile.)
1B. Diabase lavas. 1Ts. Agglomerate (Arenig). 2l. Glenkiln Shales.
2. Greywacke and shales (Llandeilo). 3. Conglomerate, &c. (Caradoc).
d. Carboniferous series. f. Faults.

(Figure 75). —Section across Bail Hill Volcanic Area, from Guffock Hill to Sanquhar Coalfield. (Length, one mile.) 1B, Diabase lavas. 1Ts. Agglomerate (Arenig). 2I. Glenkiln Shales. 2. Greywacke and shales (Llandeilo). 3. Conglomerate, &c. (Caradoc). d. Carboniferous series. f. Faults.

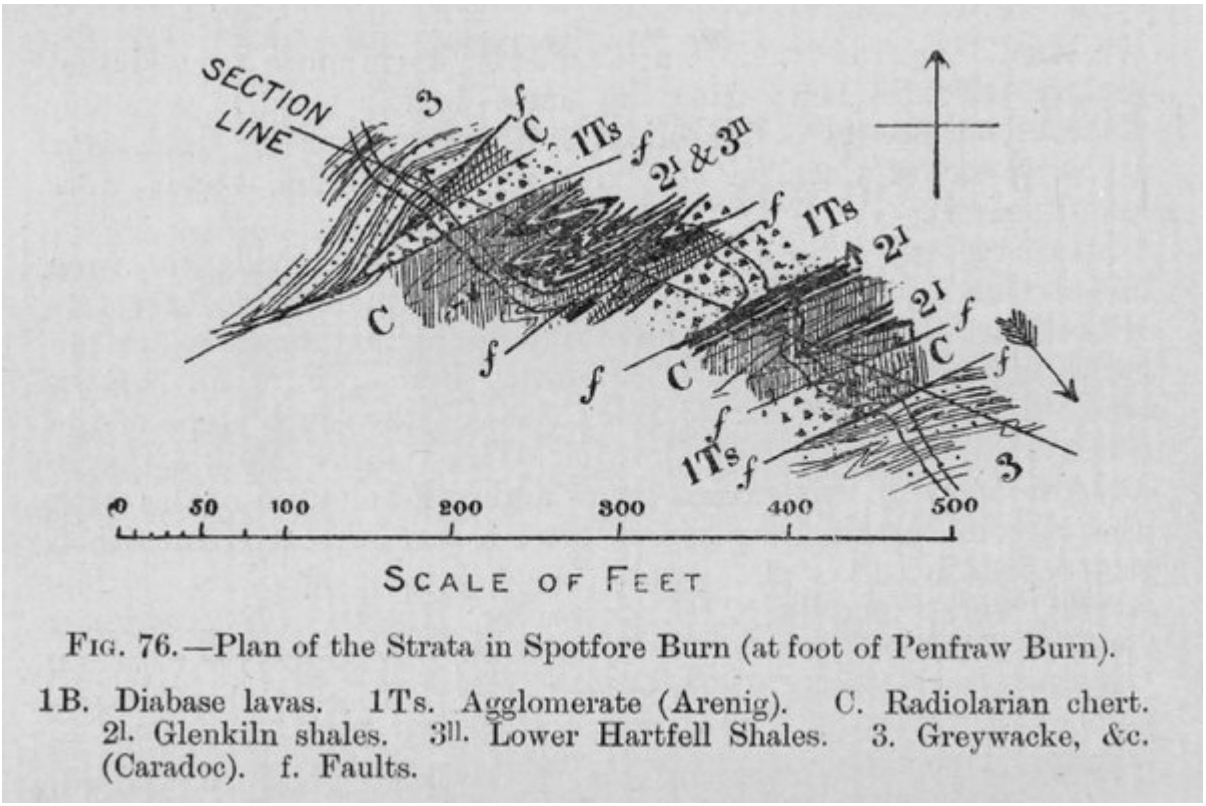


FIG. 76.—Plan of the Strata in Spotfore Burn (at foot of Penfraw Burn).

1B. Diabase lavas. 1Ts. Agglomerate (Arenig). C. Radiolarian chert. 2I. Glenkiln shales. 3II. Lower Hartfell Shales. 3. Greywacke, &c. (Caradoc). f. Faults.

(Figure 76) Plan of the Strata in Spotfore Burn (at foot of Penfraw Burn). 1B. Diabase lavas. 1Ts. Agglomerate (Arenig). C. Radiolarian chert. 2I. Glenkiln shales. 3II. Lower Harden. Shales. 3. Greywacke, &c. (Caradoc). f. Faults.

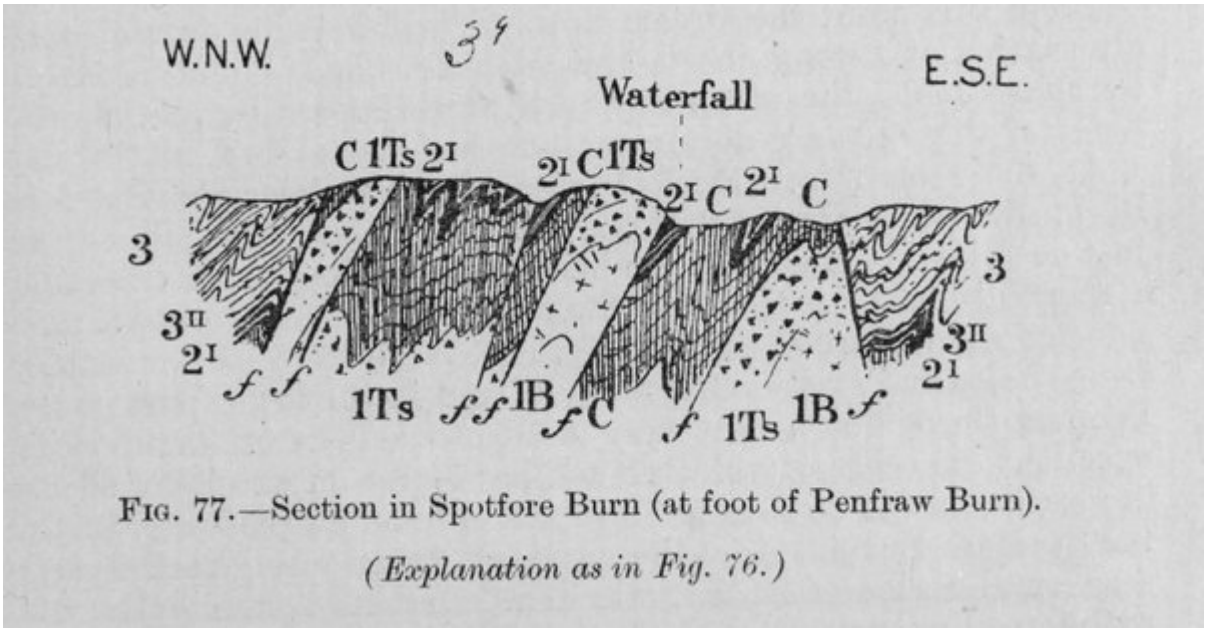


FIG. 77.—Section in Spotfore Burn (at foot of Penfraw Burn).

(Explanation as in Fig. 76.)

(Figure 77) Section in Spotfore Burn (at foot of Penfraw Burn). (Explanation as in (Figure 76).

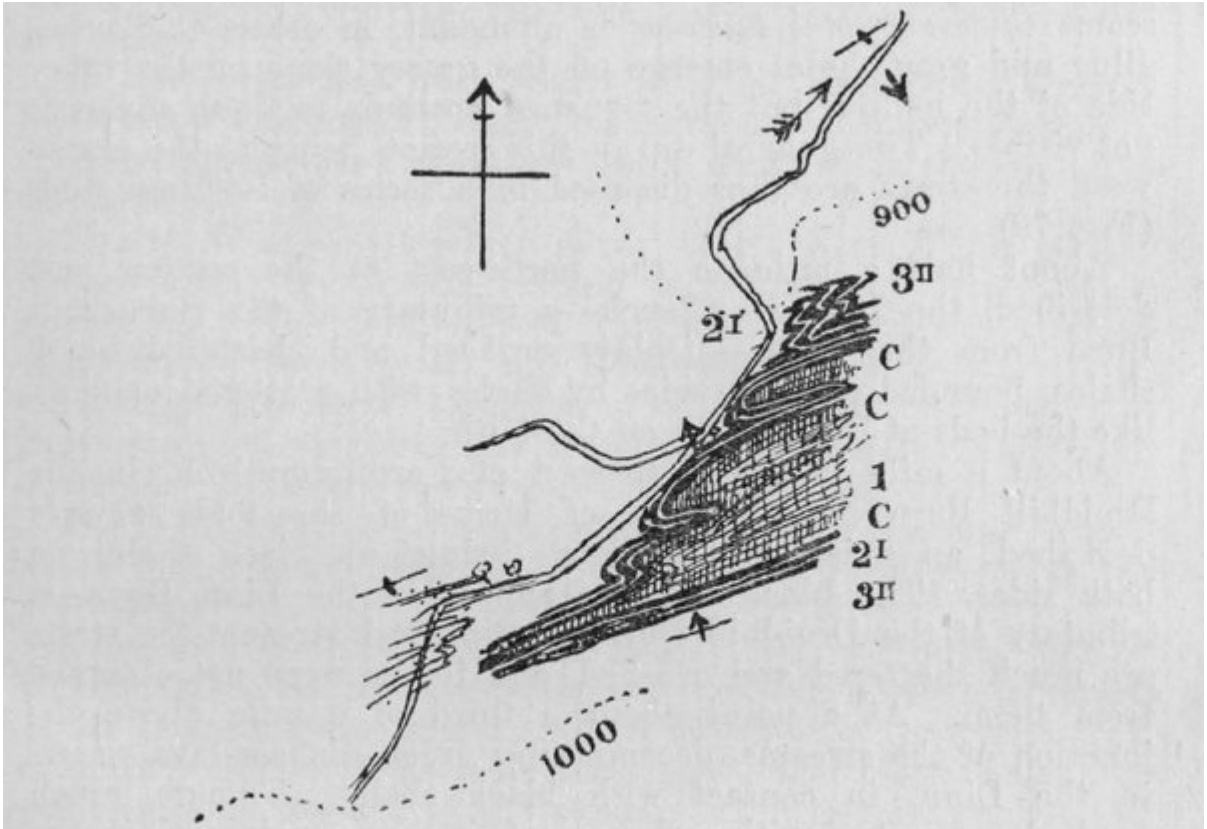


Fig. 78.—Plan of Strata in a tributary of Burnsands Burn, 400 yards east of Fardingmullach, Nithsdale.

1. Red mudstone (Arenig). C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc).

(Figure 78) Plan of Strata in a tributary of Burnsands Burn, 400 yards east of Fardingmullach, Nithsdale. 1. Red mudstone (Arenig). C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc).

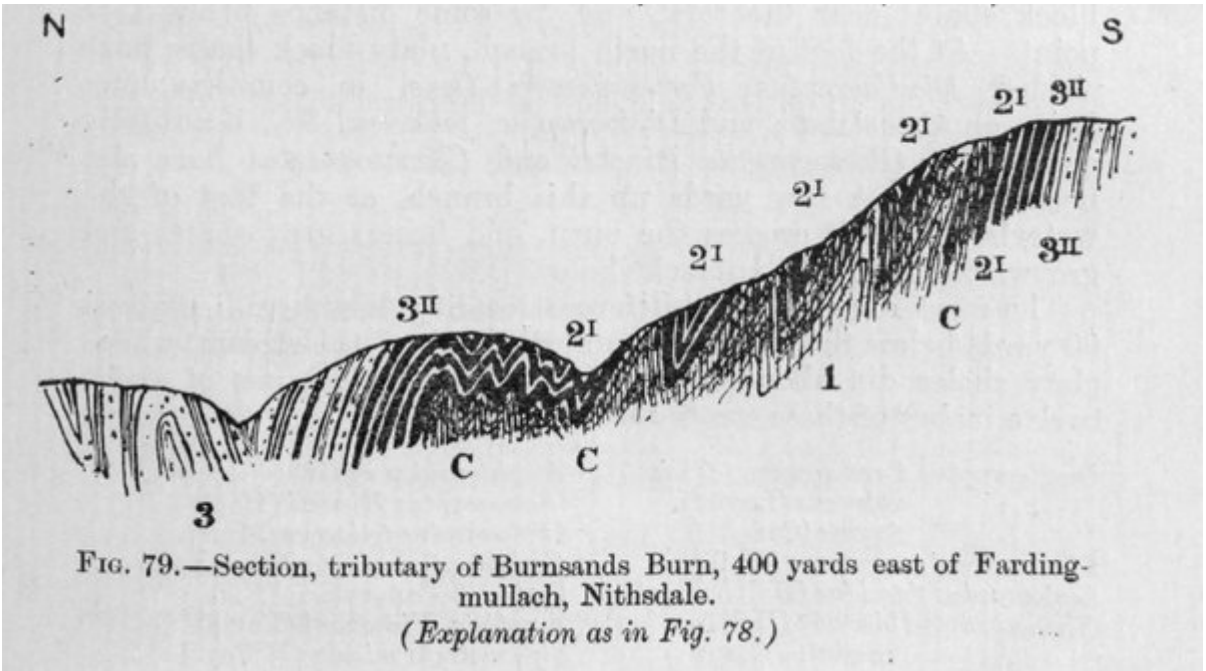


Fig. 79.—Section, tributary of Burnsands Burn, 400 yards east of Fardingmullach, Nithsdale.

(Explanation as in Fig. 78.)

(Figure 79) Section, tributary of Burnsands Burn, 400 yards east of Fardingmullach, Nithsdale. (Explanation as in (Figure 78).)

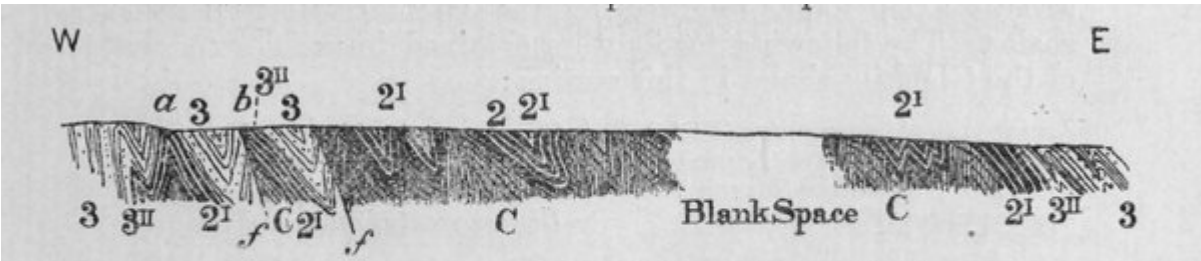


FIG. 80.—Section in Chanlock Water, Chanlockhead.
C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales.
3. Greywacke and shale (Caradoc).

(Figure 80) Section in Chanlock Water, Chanlockhead. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc).

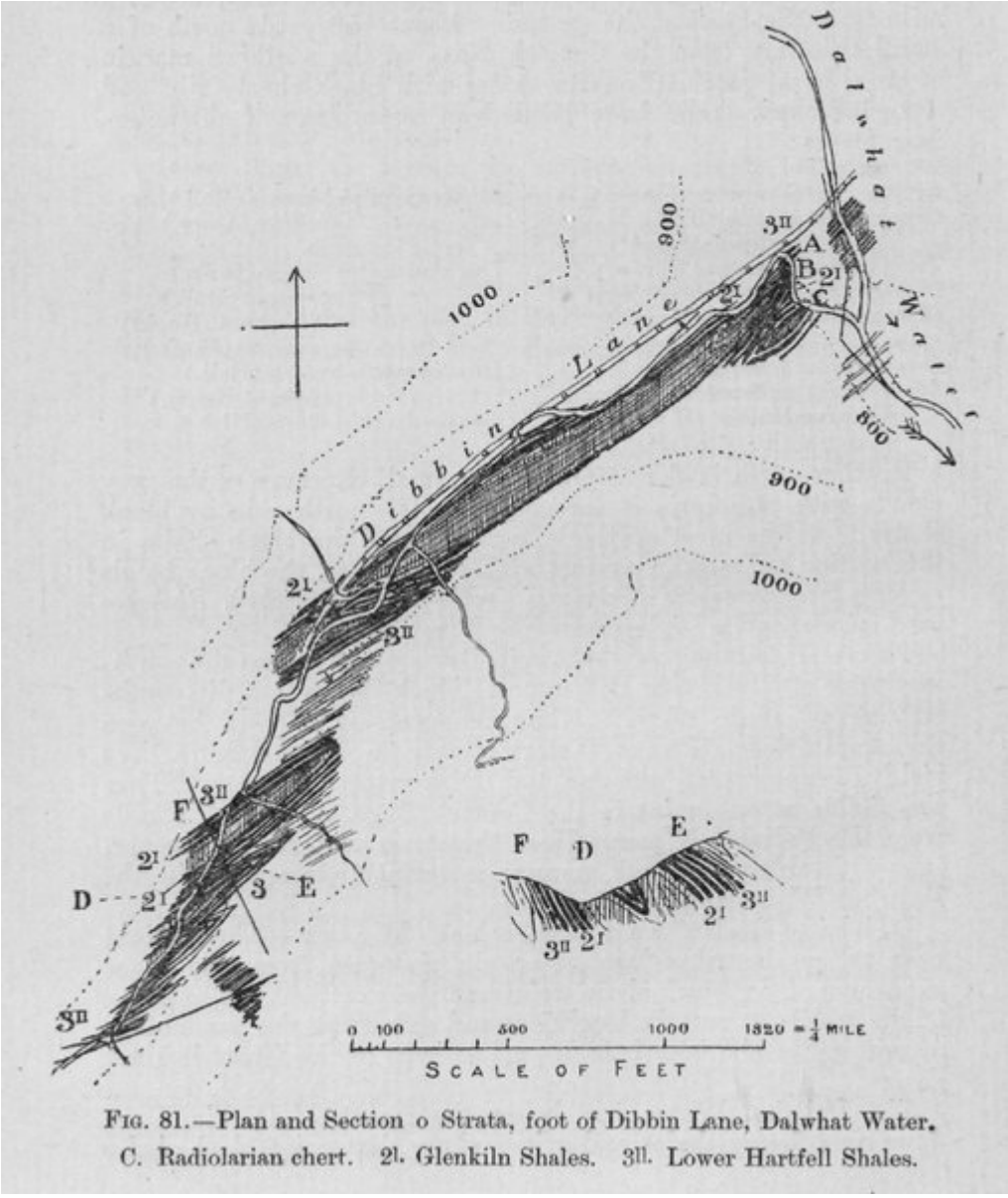


FIG. 81.—Plan and Section o Strata, foot of Dibbin Lane, Dalwhat Water.
C. Radiolarian chert. 2l. Glenkiln Shales. 3ll. Lower Hartfell Shales.

(Figure 81) Plan and Section o Strata, foot of Dibbin Lane, Dalwhat Water. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales.

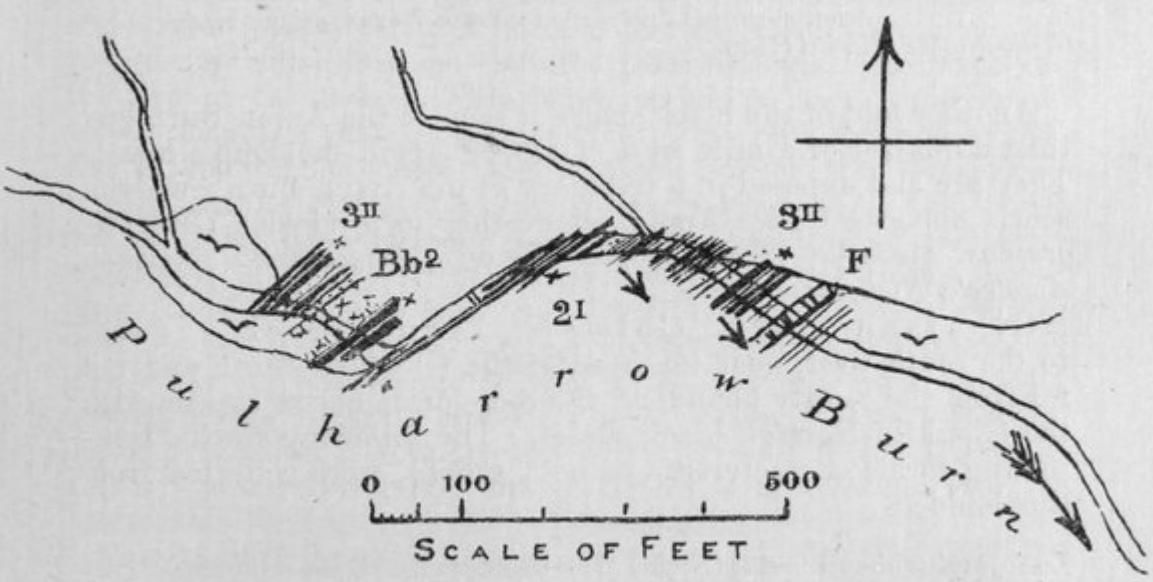


FIG. 82.—Plan of Strata in Pulharrow Burn, near Nether Forrest.

2l. Glenkiln Shales. 3ll. Lower Hartfell Shales. Bb2. Diabase-lava.
F. Felsite dyke. ~ Alluvium.

(Figure 82) Plan of Strata in Pulharrow Burn, near Nether Forrest. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. Bb2. Diabase-lava. F. Felsite dyke. [Alluvium symbol] Alluvium.

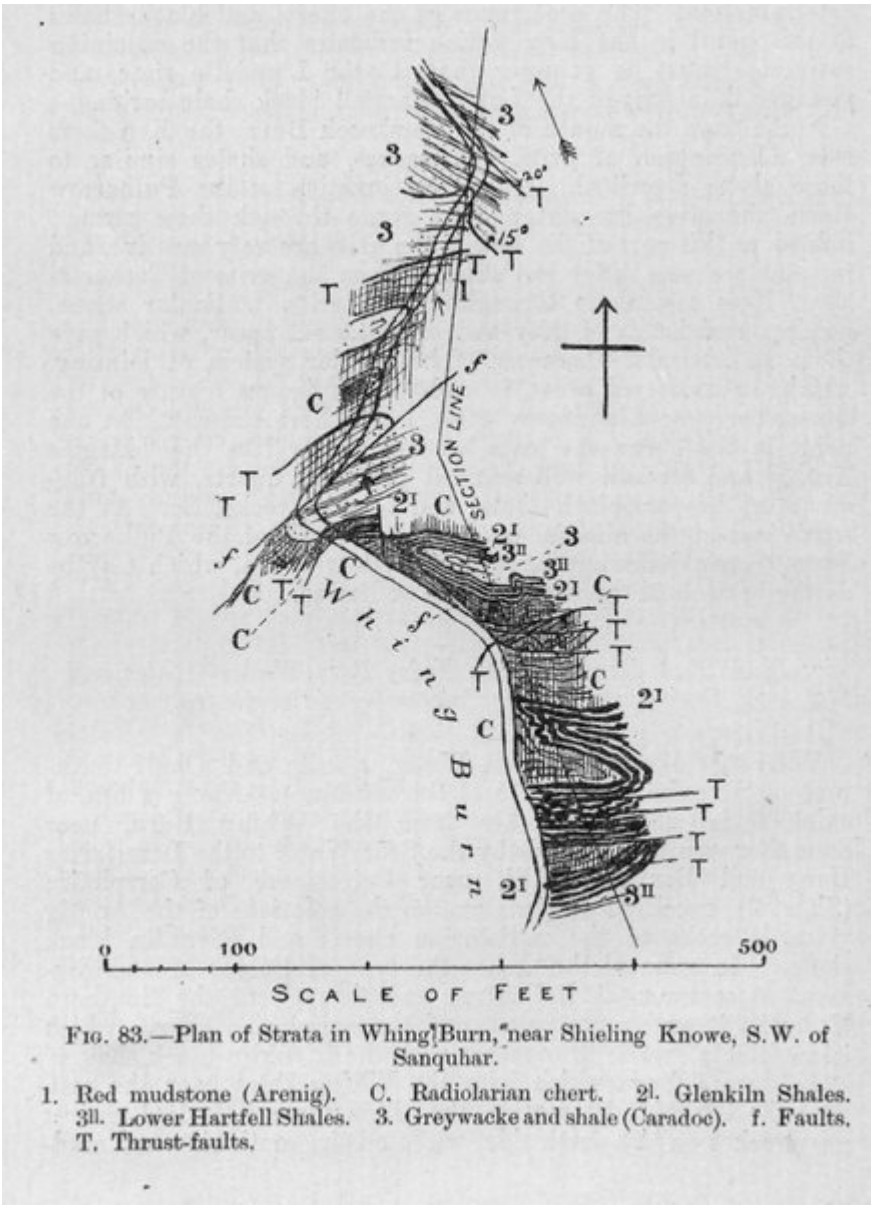


FIG. 83.—Plan of Strata in Whing Burn, near Shieling Knowe, S.W. of Sanquhar.

1. Red mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Faults, T. Thrust-faults.

(Figure 83) Plan of Strata in Whing Burn, near Shieling Knowe, S.W. of Sanquhar. 1. Red mudstone (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). f. Faults, T. Thrust-faults.

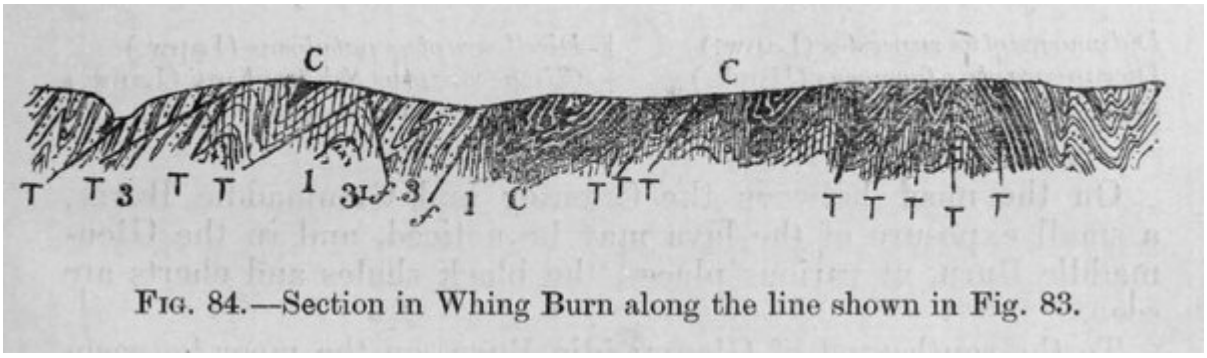


FIG. 84.—Section in Whing Burn along the line shown in Fig. 83.

(Figure 84) Section in Whing Burn along the line shown in (Figure 83).

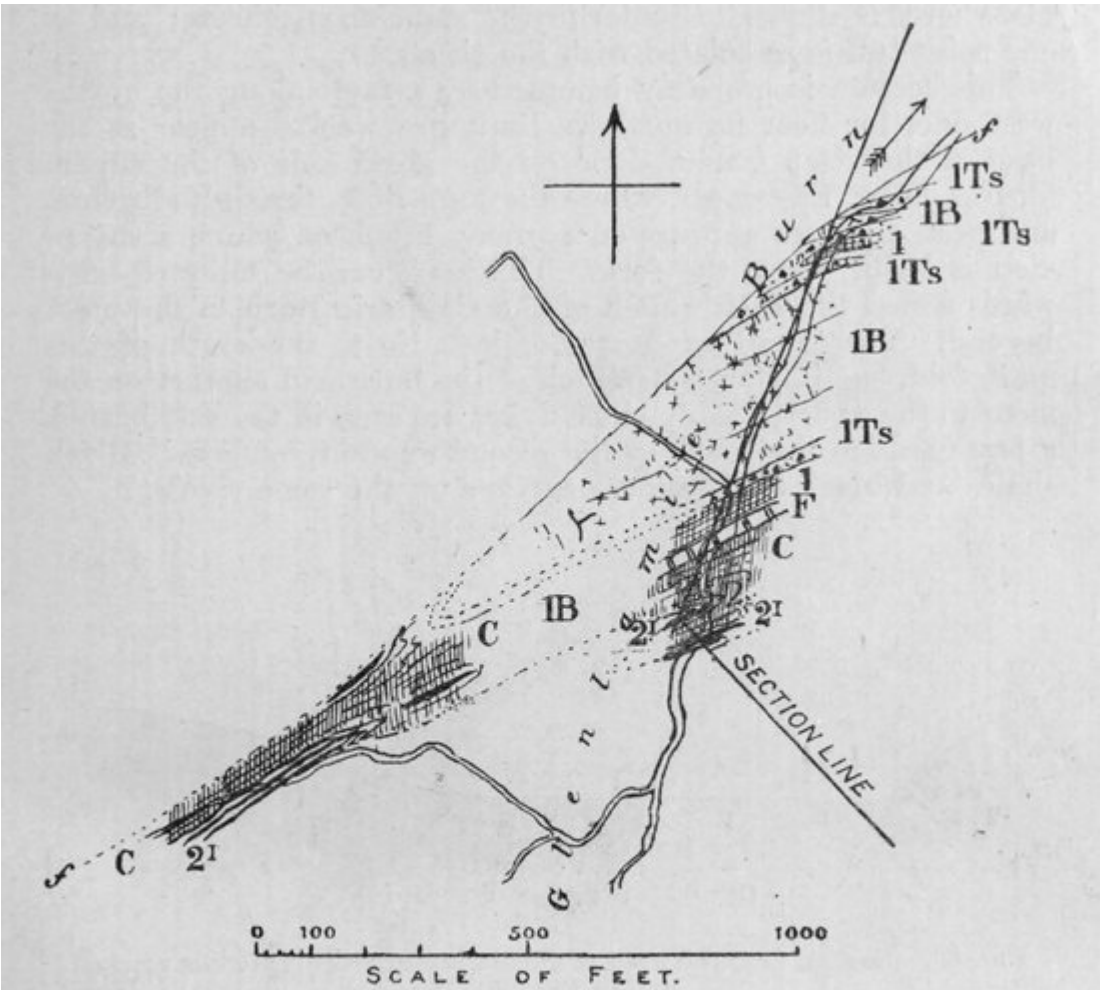


FIG. 85.—Plan of the Strata near the Head of Glenlarie Burn, 4½ miles S.W. from Sanquhar.

1B. Diabase-lavas. 1Ts. Tuff. 1. Red mudstones. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke.

(Figure 85) Plan of the Strata near the Head of Glenlarie Burn, 4½ miles S.W. from Sanquhar. 1B. Diabase-lavas. 1Ts. Tuff. 1. Red mudstones. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke.

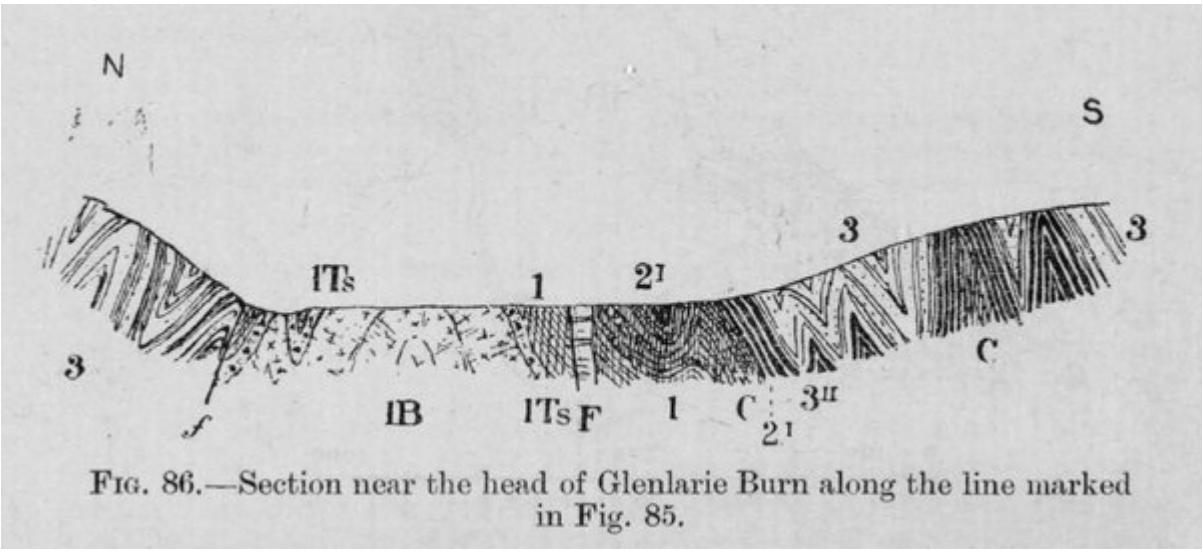


FIG. 86.—Section near the head of Glenlarie Burn along the line marked in Fig. 85.

(Figure 86) Section near the head of Glenlarie Burn along the line marked in (Figure 85).

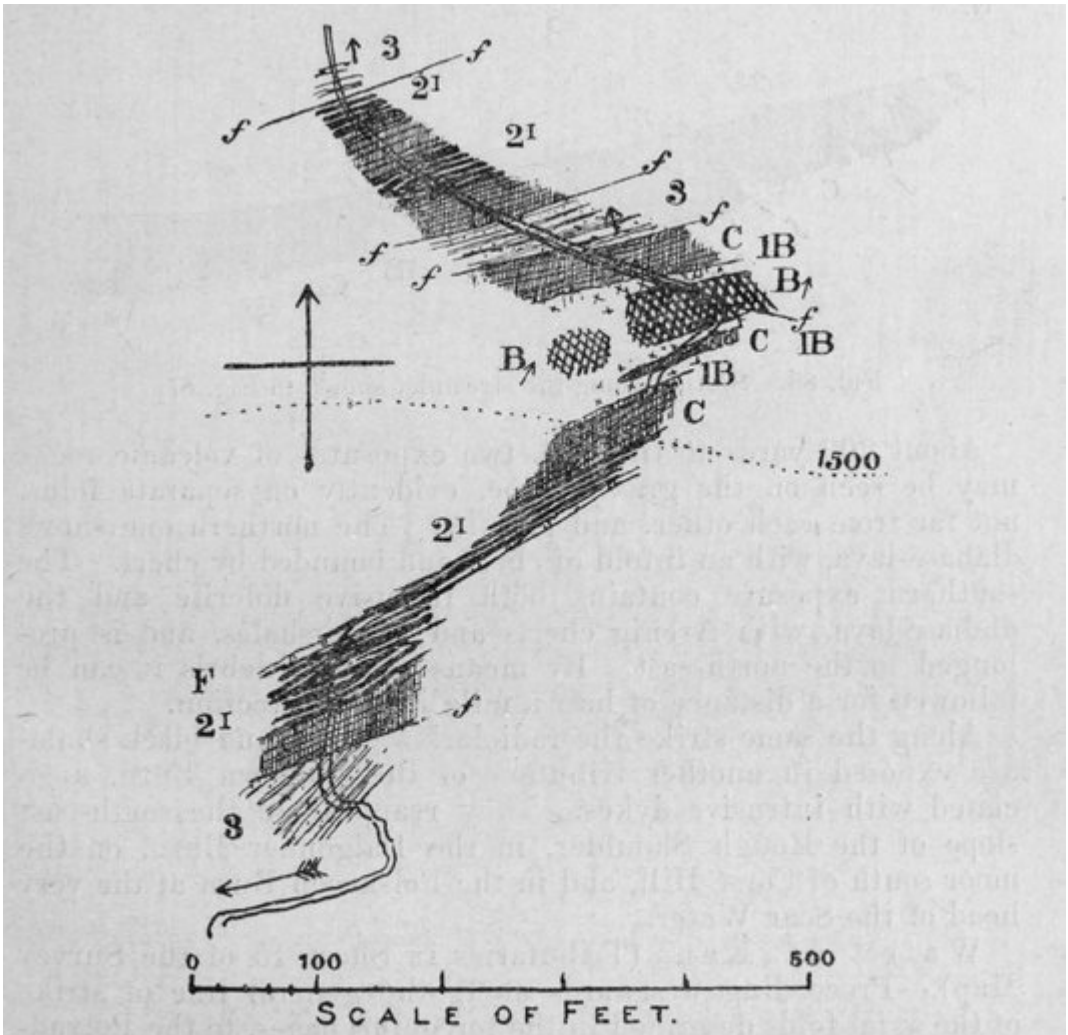


FIG. 87.—Plan of Strata in Streamlet near Polgown, Scar Water.

1B. Arenig lavas. 1B*T*. Intrusive dolerite (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywake and shale (Caradoc). F. Felsite dyke. f. Fault.

(Figure 87) Plan of Strata in Streamlet near Polgown, Scar Water. 1B. Arenig lavas. 1B■ Intrusive dolerite (Arenig). C. Radiolarian chest. 2I. Glenkiln Shales. 3II. Lower Harden Shales. 3. Greywake and shale (Caradoc). F. Felsite dyke. f. Fault.

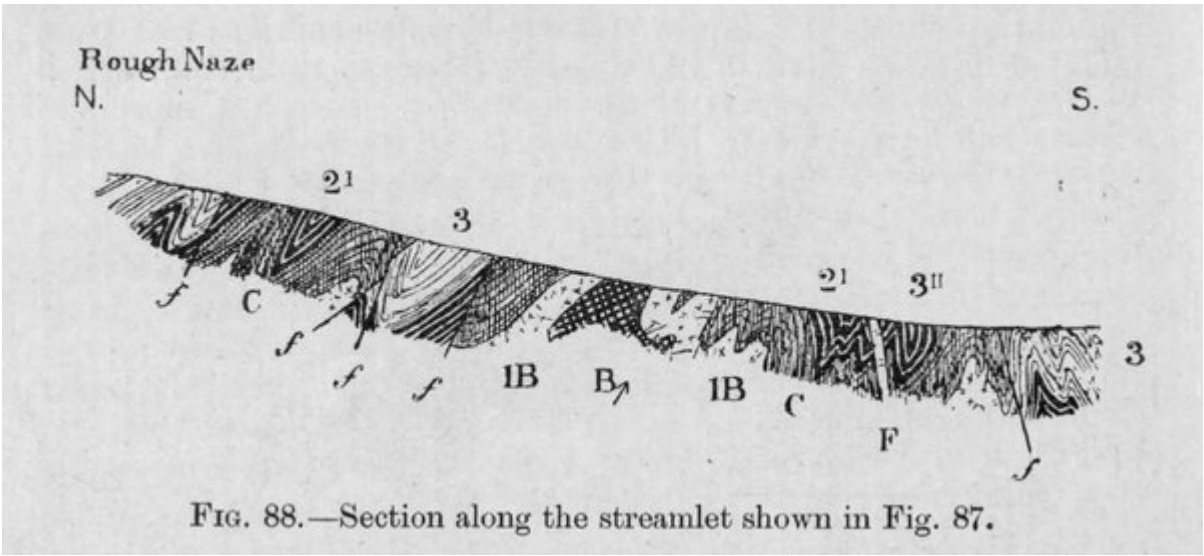


FIG. 88.—Section along the streamlet shown in Fig. 87.

(Figure 88) Section along the streamlet shown in (Figure 87).

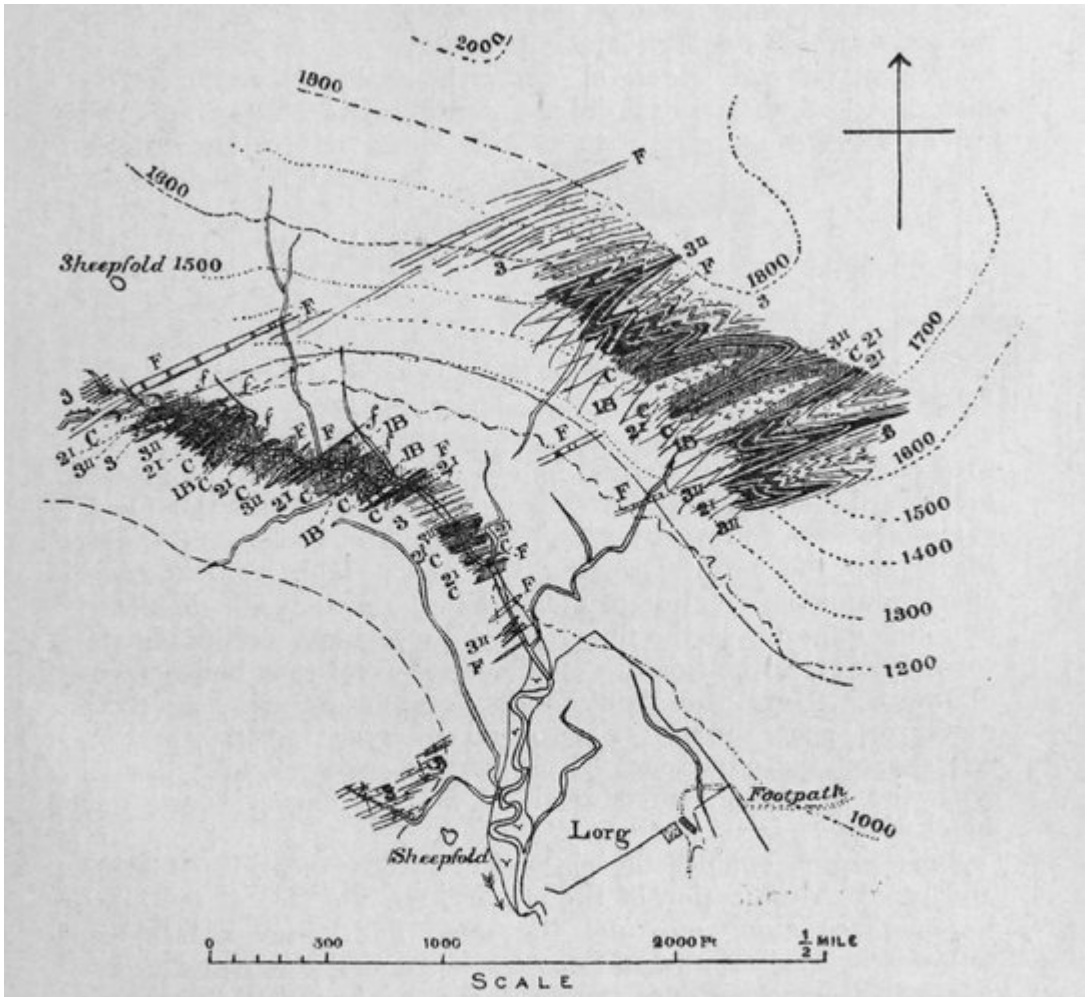


FIG. 89.—Ground Plan of Strata in Lorg Burn and Rough Craig, Water of Ken, Kirkcudbrightshire.

1B. Arenig lavas. C. Radiolarian chert. 2l. Glenkiln shales. 3ll. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault. Dotted lines, contour lines. Interrupted lines, upper limit of glacial deposits.

(Figure 89) Ground Plan of Strata in Lorg Burn and Rough Craig, Water of Ken, Kirkcudbightshire. 1B. Arenig lavas. C. Radiolarian chert. 2I. Glenkiln shales. 3II. Lower Harden Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault. Dotted lines, contour lines. Interrupted lines, upper limit of glacial deposits.

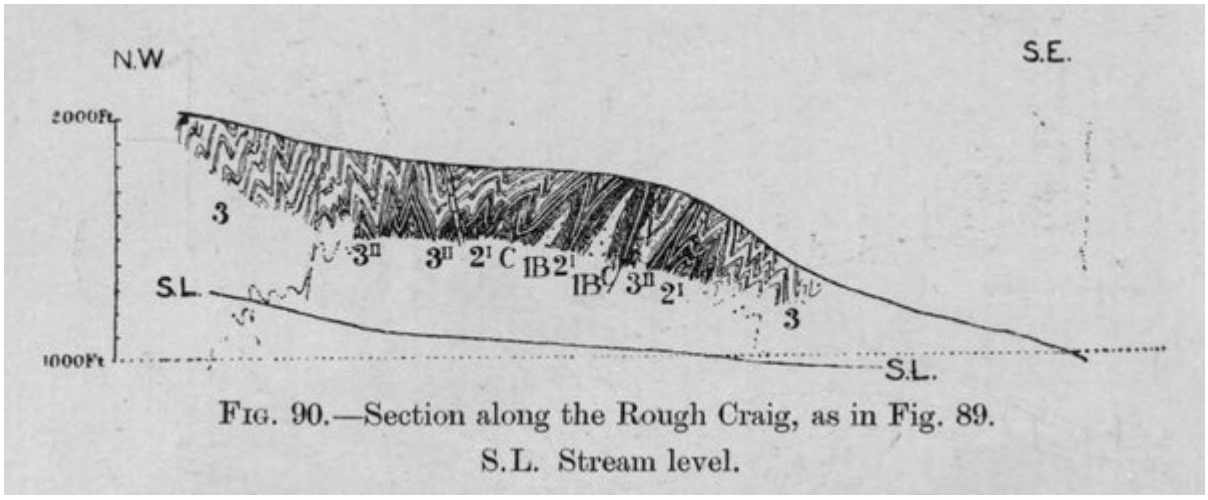


FIG. 90.—Section along the Rough Craig, as in Fig. 89.

S.L. Stream level.

(Figure 90) Section along the Rough Craig, as in (Figure 89). S.L. Stream level.

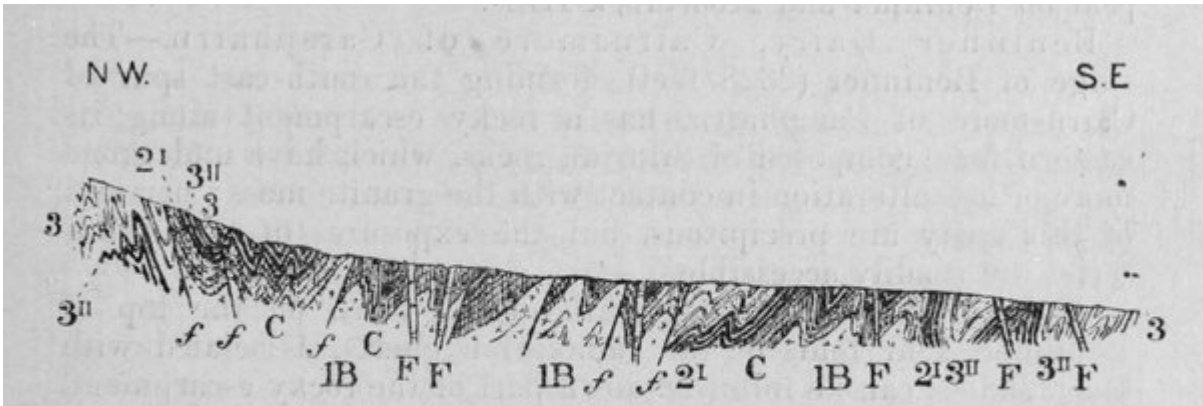


Fig. 91.—Section in Lorg Burn, above Lorg Shepherd's House, Water of Ken, Kirkcudbrightshire.

(Explanation as in Fig. 89.)

(Figure 91) Section in Lorg Burn, above Lorg Shepherd's House, Water of Ken, Kirkcudbrightshire. (Explanation as in (Figure 89).)

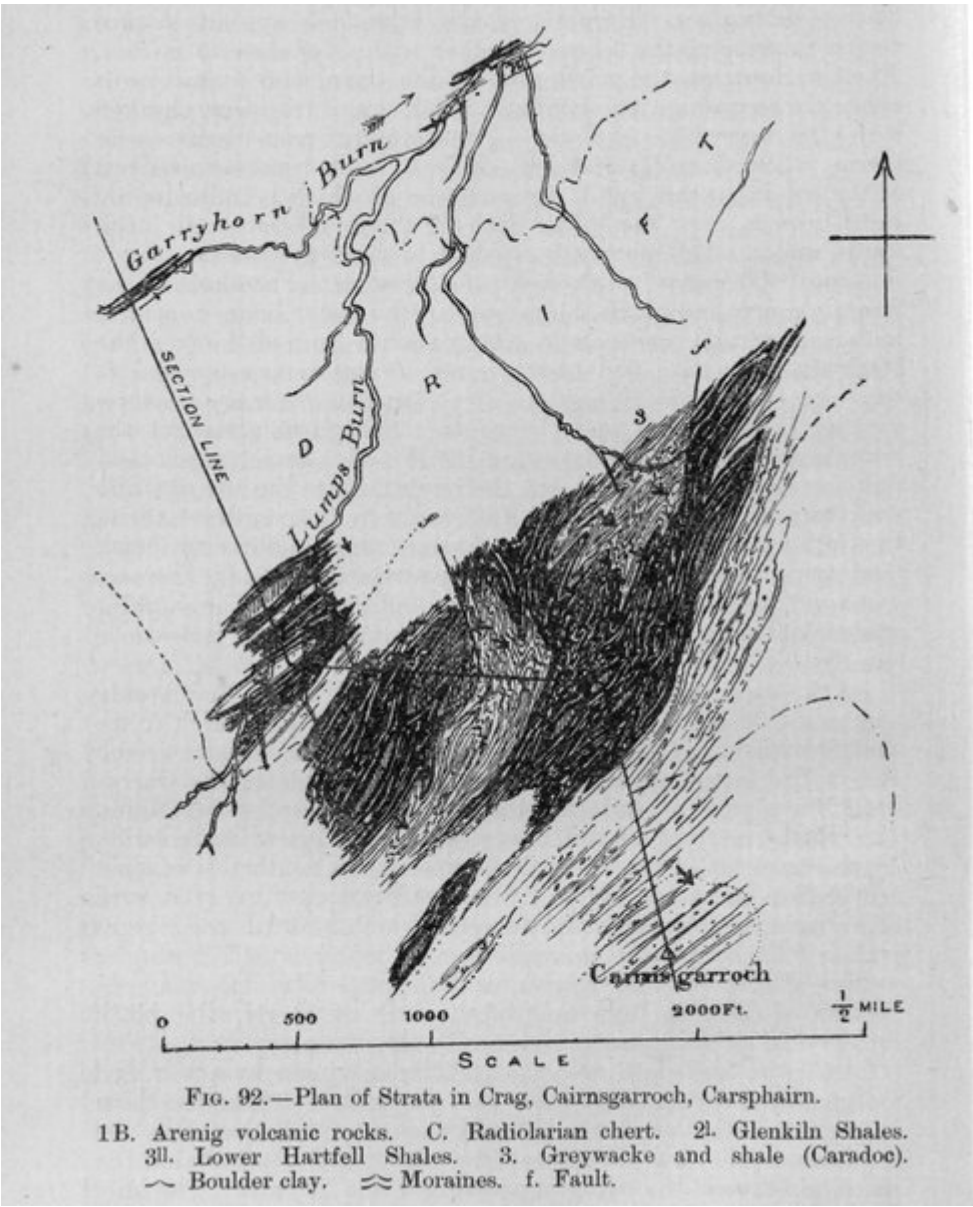


Fig. 92.—Plan of Strata in Crag, Cairnsgarroch, Carsphairn.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). ~ Boulder clay. ≈ Moraines. f. Fault.

(Figure 92) Plan of Strata in Crag, Cairnsgarroch, Carsphairn. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Lower Hartfell Shales. 3. Greywacke and shale (Caradoc). [Boulder-clay symbol] Boulder clay. [Moraines symbol] Moraines. f. Fault.

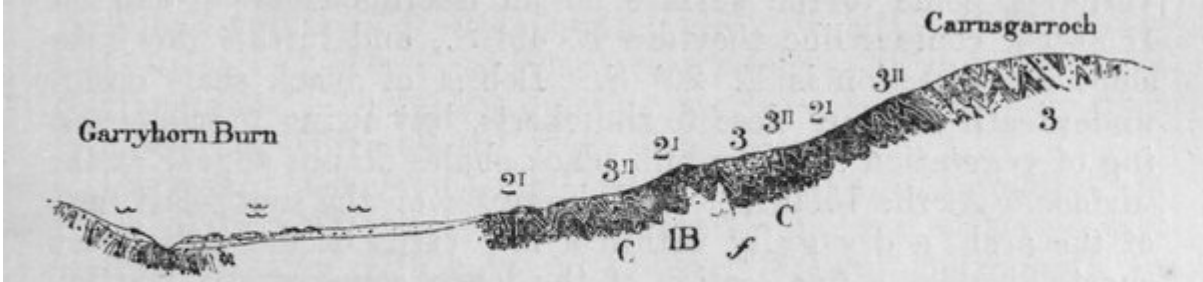


FIG. 93.—Section of Crag, Cairnsgarroch, Carsphairn, along the line marked in Fig. 92.

(Figure 93) Section of Crag, Cairnsgarroch, Carsphairn, along the line marked in (Figure 92).

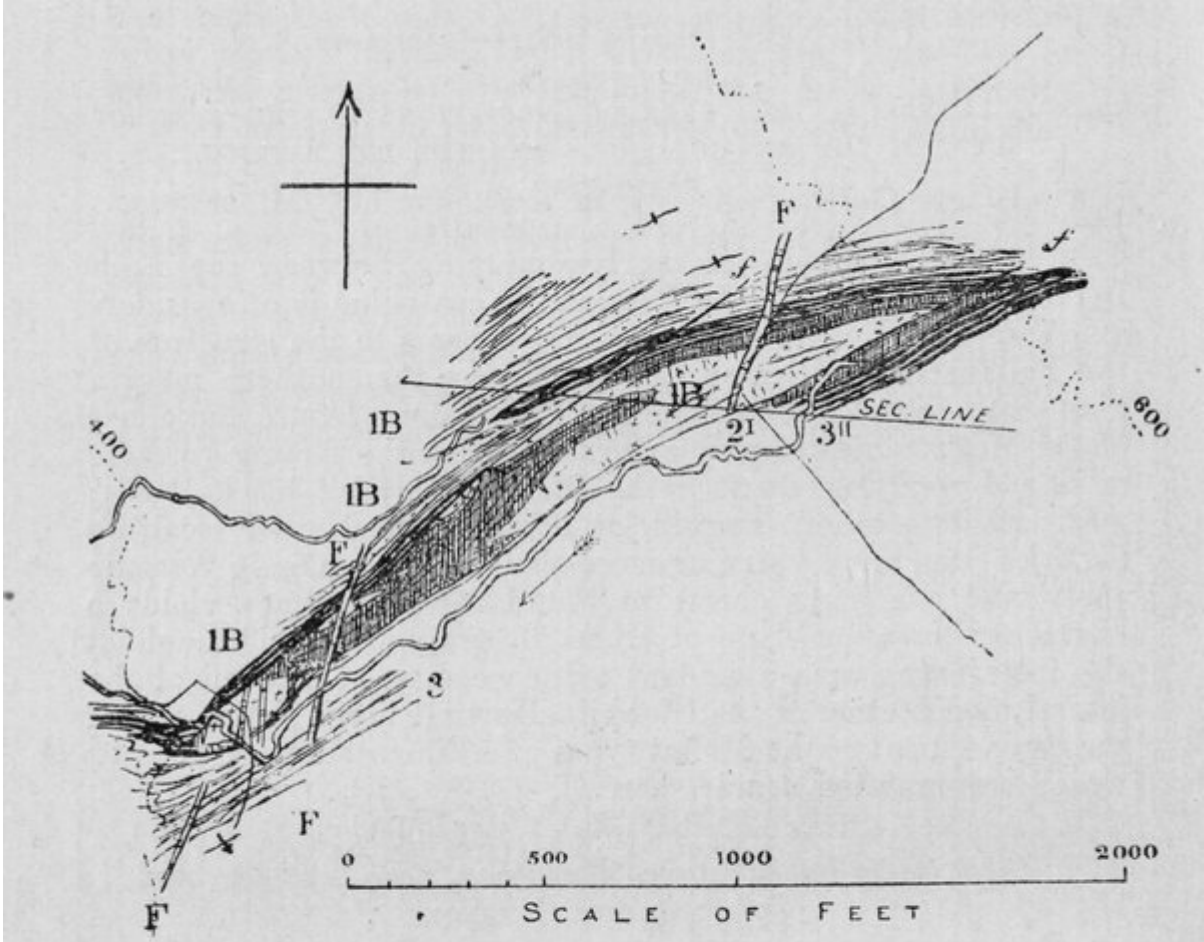


FIG. 94.—Plan of the Strata in part of Lagbaes Burn, Cardorkin, Kirkcudbrightshire.

1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault.

(Figure 94) Plan of the Strata in part of Lagbaes Burn, Cardorkin, Kirkcudbrightshire. 1B. Arenig volcanic rocks. C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke and shale (Caradoc). F. Felsite dyke. f. Fault.

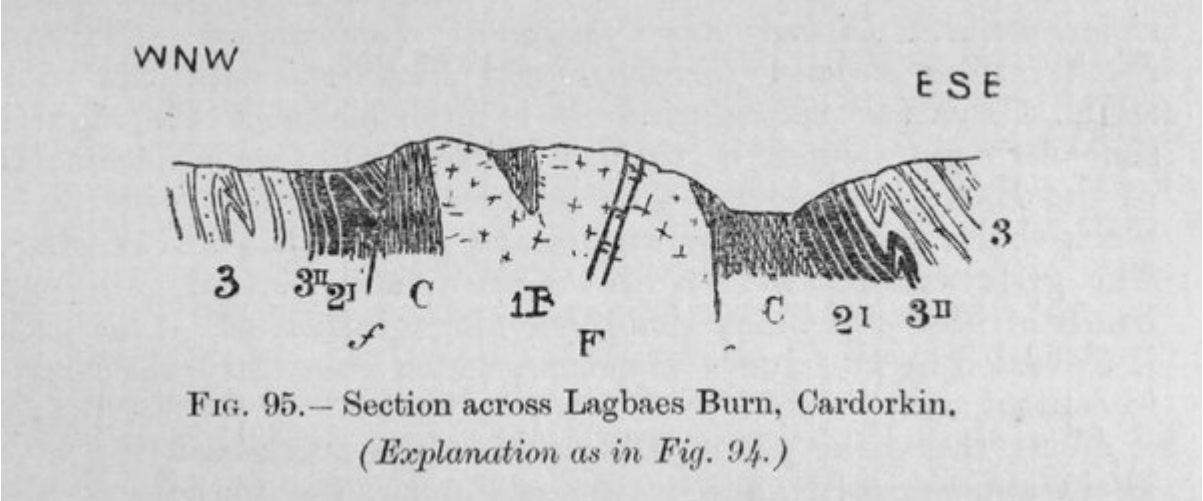


FIG. 95.—Section across Lagbaes Burn, Cardorkin.
(Explanation as in Fig. 94.)

(Figure 95) Section across Lagbaes Burn, Cardorkin. (Explanation as in (Figure 94).)

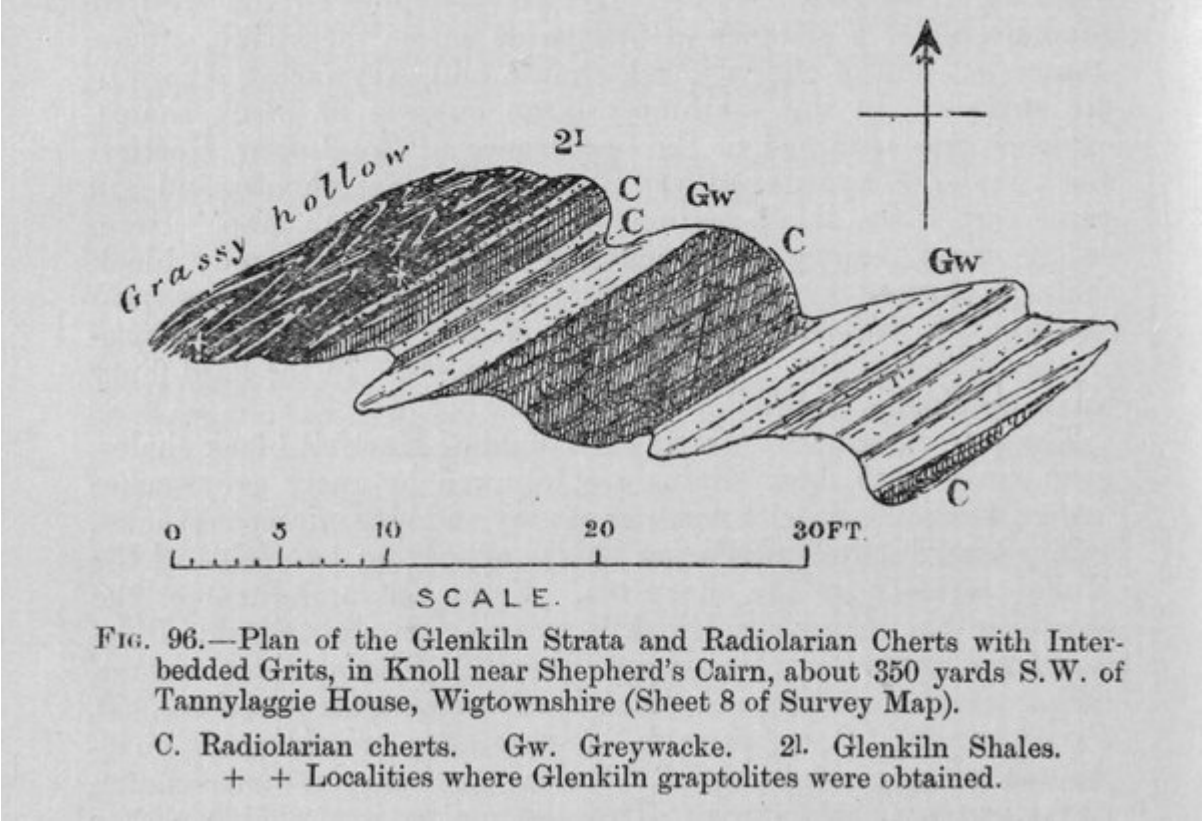


FIG. 96.—Plan of the Glenkiln Strata and Radiolarian Cherts with Interbedded Grits, in Knoll near Shepherd's Cairn, about 350 yards S.W. of Tannylaggie House, Wigtownshire (Sheet 8 of Survey Map).

C. Radiolarian cherts. Gw. Greywacke. 2l. Glenkiln Shales.
+ + Localities where Glenkiln graptolites were obtained.

(Figure 96) Plan of the Glenkiln Strata and Radiolarian Cherts with Interbedded Grits, in Knoll near Shepherd's Cairn, about 350 yards S.W. of Tannylaggie House, Wigtownshire (Sheet 8 of Survey Map). C. Radiolarian cherts. Gw. Greywacke. 2l. Glenkiln Shales. + + Localities where Glenkiln graptolites were obtained.

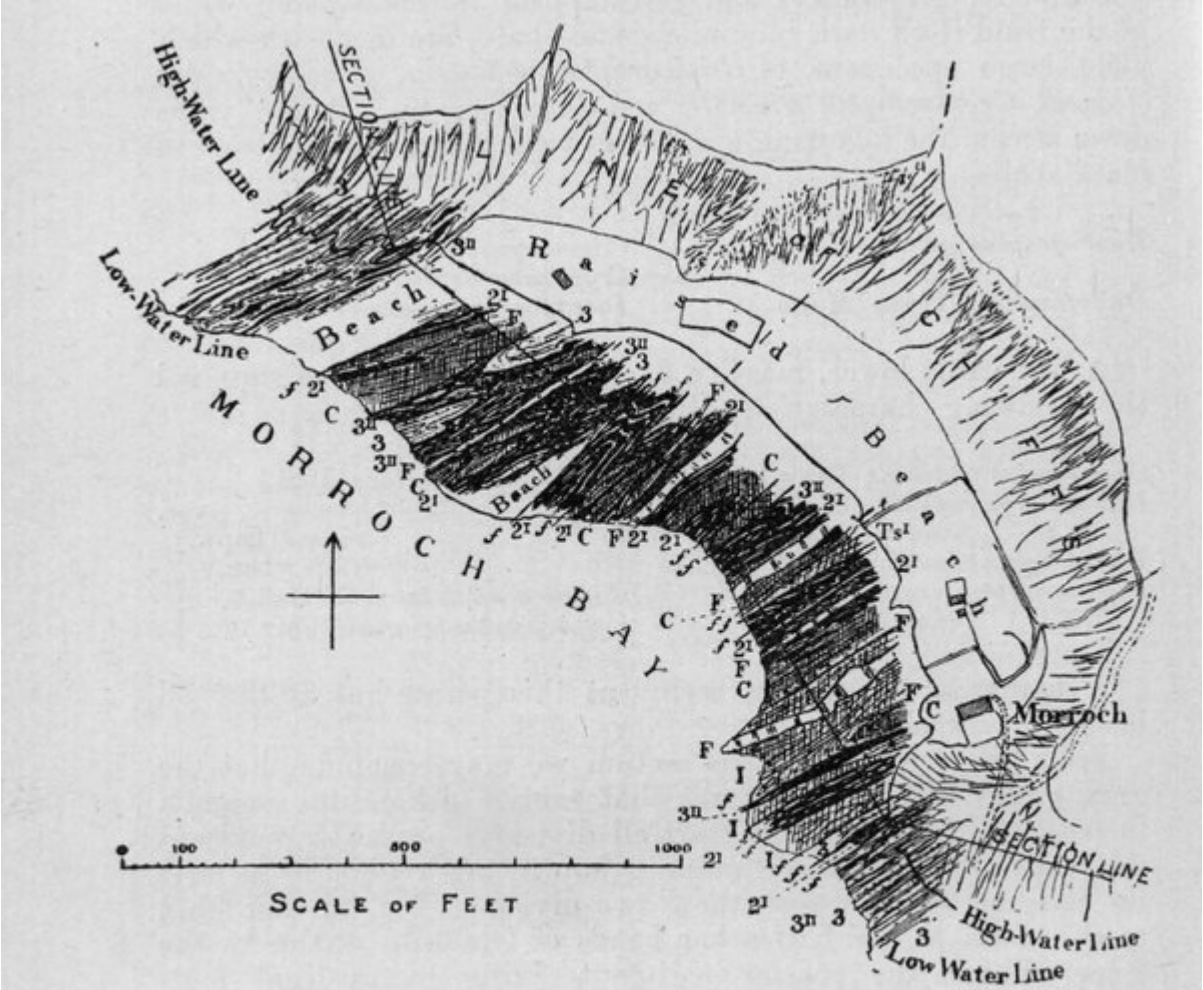


FIG. 97.—Plan of Strata in Morroch Bay, Wigtownshire.

1. Volcanic mudstone and tuff (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke, mudstone, and shale (Caradoc). F. Porphyrite dykes. f. Fault. ~ Fifty-foot raised beach.

(Figure 97) Plan of Strata in Morroch Bay, Wigtownshire. 1. Volcanic mudstone and tuff (Arenig). C. Radiolarian chert. 2I. Glenkiln Shales. 3II. Hartfell Shales. 3. Greywacke, mudstone, and shale (Caradoc). F. Porphyrite dykes. f. Fault. [Symbol Fifty-foot raised beach] Fifty-foot raised beach.

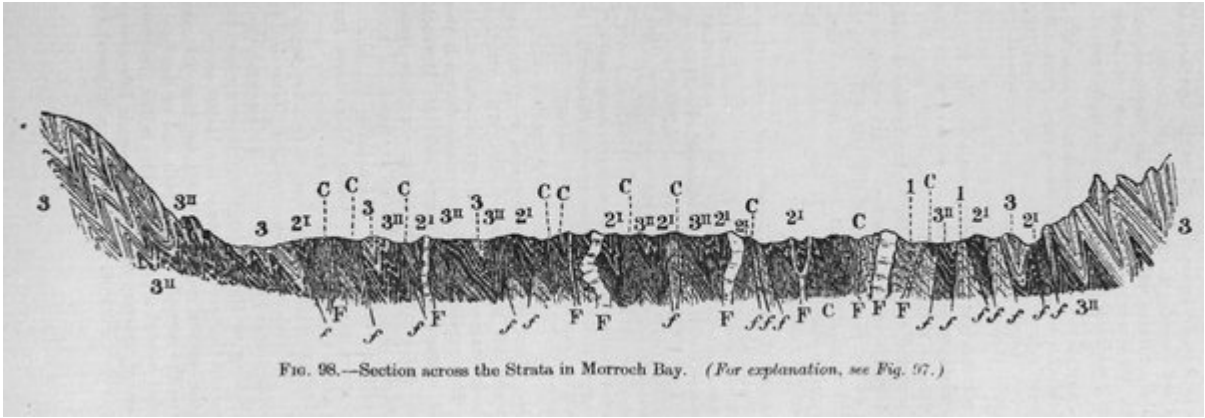


FIG. 98.—Section across the Strata in Morroch Bay. *(For explanation, see Fig. 97.)*

(Figure 98) Section across the Strata in Morroch Bay. (For explanation, see (Figure 97).)

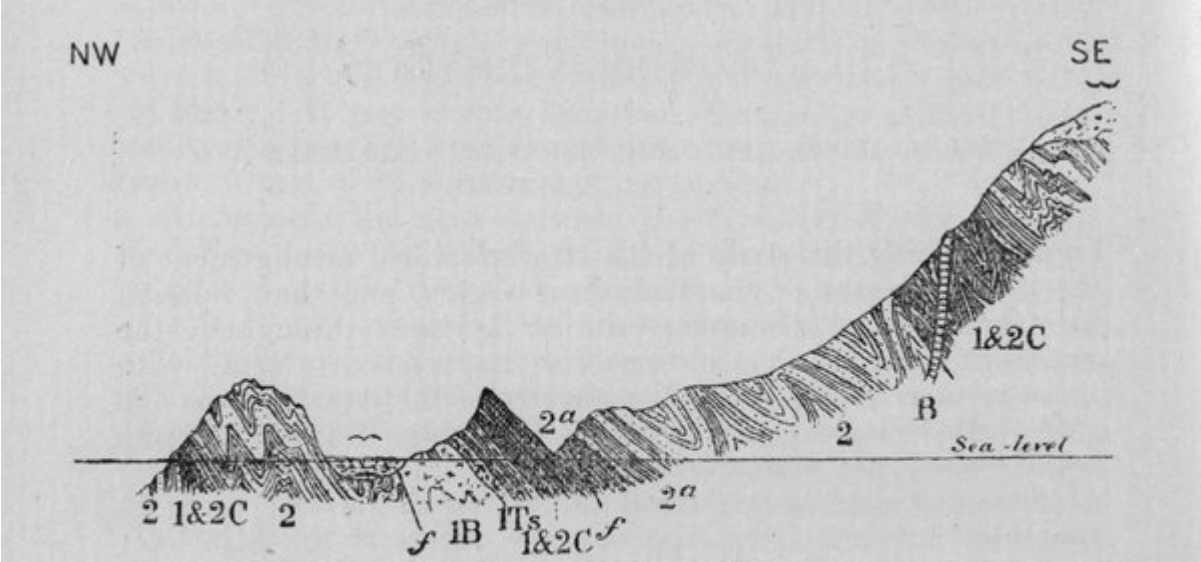


Fig. 99.—Section of Strata at Portandea, South of River Stinchar.

1B. Diabase lava. 1Ts. Agglomerate (Arenig). 1&2C. Radiolarian chert.
2a. Dark shale with Glenkiln graptolites. 2. "Tappin's Group."
B. Dolerite dyke (Tertiary). ~ Beach deposits. ~~ Boulder clay.

(Figure 99) Section of Strata at Portandear South of River Stinchar. 1B. Diabase lava. 1Ts. Agglomerate (Arenig). 1 &2C. Radiolarian chert. 2a. Dark shale with Glenkiln graptolites. 2. "Tappin's Group". B. Dolerite dyke (Tertiary). [symbol] Beach deposits. [symbol] Boulder clay.

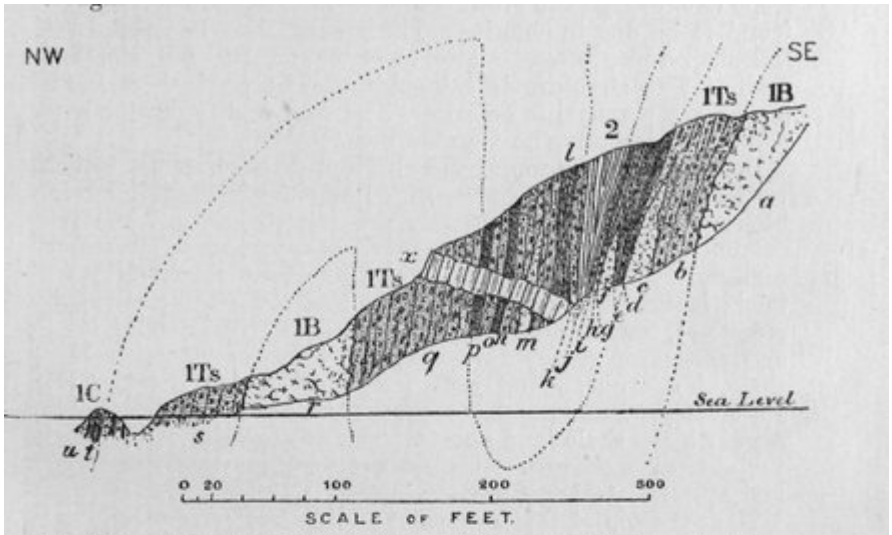


Fig. 100.—Section at Knockgown, North of Currarie, Ballantrae, Ayrshire.

1B. Diabase lava.
1Ts. Agglomerate.
2. Dark shale with Glenkiln graptolites.
a. Porphyritic lava with pillow-structure, 37 ft.
b. Agglomerate with blocks of black chert, 29 ft.
c. Lenticular pillowy porphyritic lava, 17 ft. greatest breadth.
d. Red radiolarian cherts, 5½ ft. above, a few inches below.
e. Red mudstones, 3 ft.

Below.
f. Pillowy lava, 13 ft.
g. Mudstone, 10 in.
h. Ash and calcareous agglomerate, 3½ ft.
i. Fossiliferous mudstones and thin lenticular bed of calcareous agglomerate.
} At top of cliff represented by green muds., with a few large scattered blocks of lava and fragments of red and green chert with splendid radiolaria.

j. Fossiliferous mudstones, 5½ ft.
k. Agglomerate (calcareous), 7 ft.
l. Green and grey mudstones, 10 ft.
m. Agglomerate with lenticular bed of lava, 26 ft.
n. Green and red mudstones and cherts, 7 ft.
o. Ash or agglomerate, 9 ft.
p. Green and red mudstone, ashy, 5 ft.
q. Agglomerate, 23 ft.
r. Felstone dyke, pink.
s. Agglomerate.
t. Radiolarian chert.
u. Agglomerate.
x. Felsite dyke.

(Figure 100) Section at Knockgown, North of Currarie, Ballantrae, Ayrshire. 1B. Diabase lava. 1Ts. Agglomerate. 2. Dark shale with Glenkiln graptolites. a. Porphyritic lava with pillow-structure, 37 ft. b. Agglomerate with blocks of black chert, 29 ft. c. Lenticular pillowy porphritic lava, 17 ft. greatest breadth. d Red radiolarian cherts, 5½ ft. above, a few inches below. e. Red mudstones, 3 ft. f. Pillowy lava, 13 ft. g. Mudstone, 10 in. h. Ash and calcareous agglomerate, 3½ ft. i. Fossiliferous mudstones and thin lenticular bed of calcareous agglomerate. j. Fossiliferous mudstones, 5½ ft. k. Agglomerate (calcareous), 7 ft. l. Green and grey mudstones, 10 ft. m. Agglomerate with lenticular bed of lava, 26 ft. n. Green and red mudstones and cherts, 7 ft. o. Ash or agglomerate, 9 ft. p. Green and red mudstone, ashy, 5 ft. q. Agglomerate, 23 ft. r. Feletone dyke, pink. s. Agglomerate. t. Radiolarian chert. u. Agglomerate. x. Felsite dyke. f. to i. Below. At top of cliff represented by green muds, with a few large scattered blocks of lava and fragments of red a green chert with splendid radiolaria.

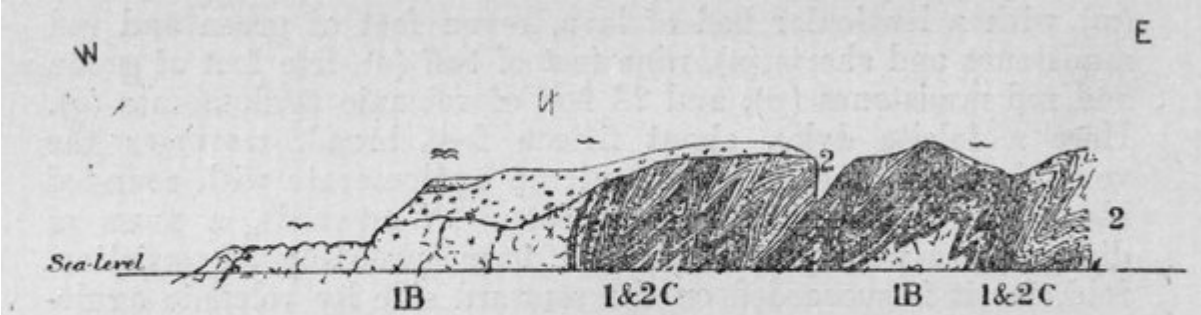


FIG. 101.—Section in Wilson's Burn, between Currarie and Downan, Ballantrae.

1B. Arenig volcanic rocks. 1&2C. Radiolarian chert. 2. "Tappins Group" (Llandeilo). ~ Boulder clay. ≈ 100 Feet Beach. ~ 25 Feet Beach.

(Figure 101) Section in Wilson's Burn, between Currarie and Downan, Ballantrae. 1B. Arenig volcanic rocks. 1&2 C. Radiolarian chert. 2. "Tappins Group" (Llandeilo). [symbol] Boulder clay. [symbol] 100 Feet Beach. [symbol] 25 Feet Beach.

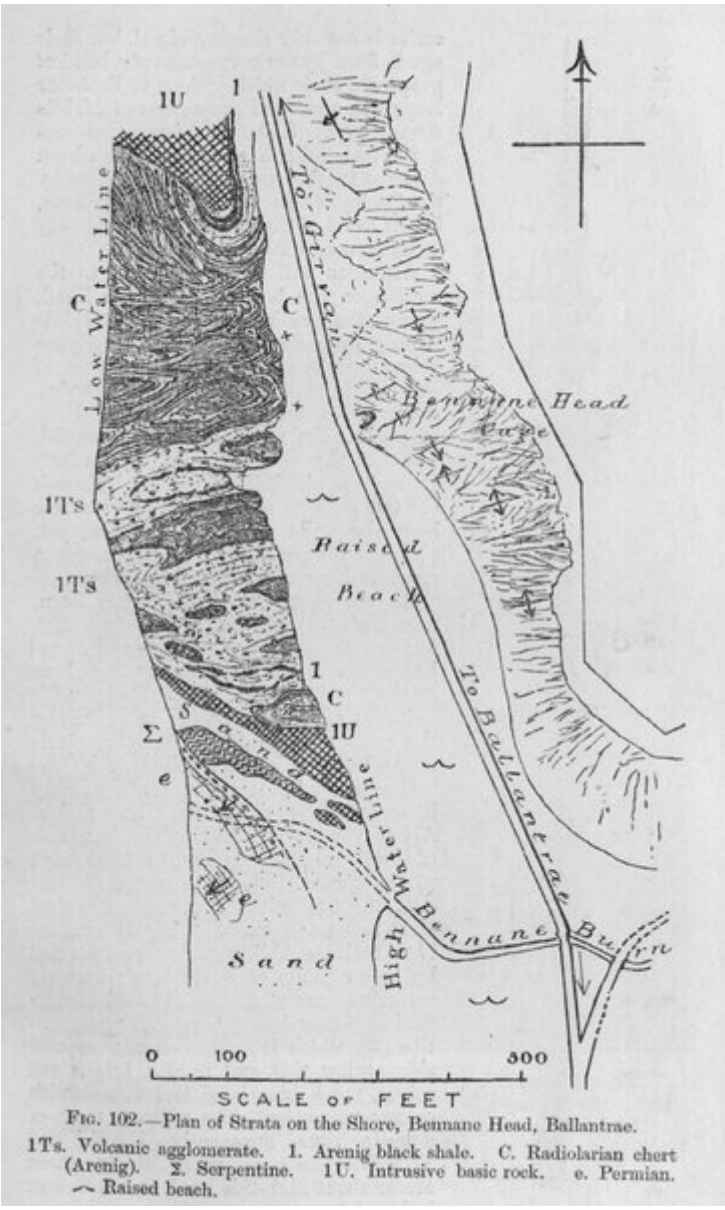


FIG. 102.—Plan of Strata on the Shore, Bennane Head, Ballantrae.

1Ts. Volcanic agglomerate. 1. Arenig black shale. C. Radiolarian chert (Arenig). Σ. Serpentine. 1U. Intrusive basic rock. e. Permian. ~ Raised beach.

(Figure 102) Plan of Strata on the Shore, Bennane Head, Ballantrae. 1 Ts. Volcanic agglomerate. 1. Arenig black shale. C. Radiolarian chert (Arenig). Σ. Serpentine. 1U. Intrusive basic rock. e. Permian. [symbol] Raised beach.

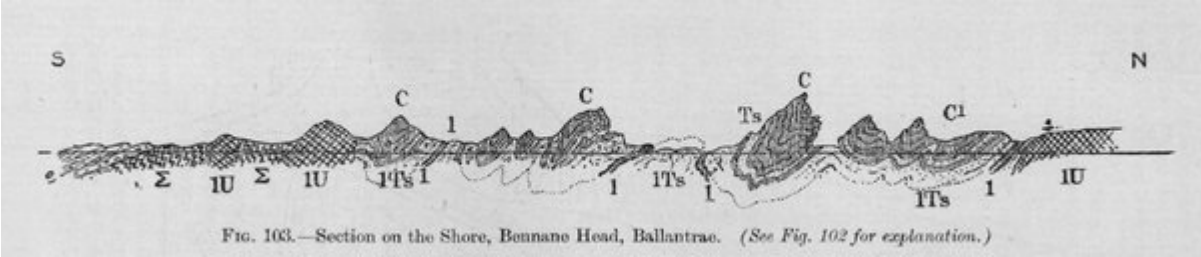


Fig. 103.—Section on the Shore, Bennane Head, Ballantrae. *(See Fig. 102 for explanation.)*

(Figure 103) Section on the shore, Benane Head, Ballantrae. (See (Figure 102) for explanation.)

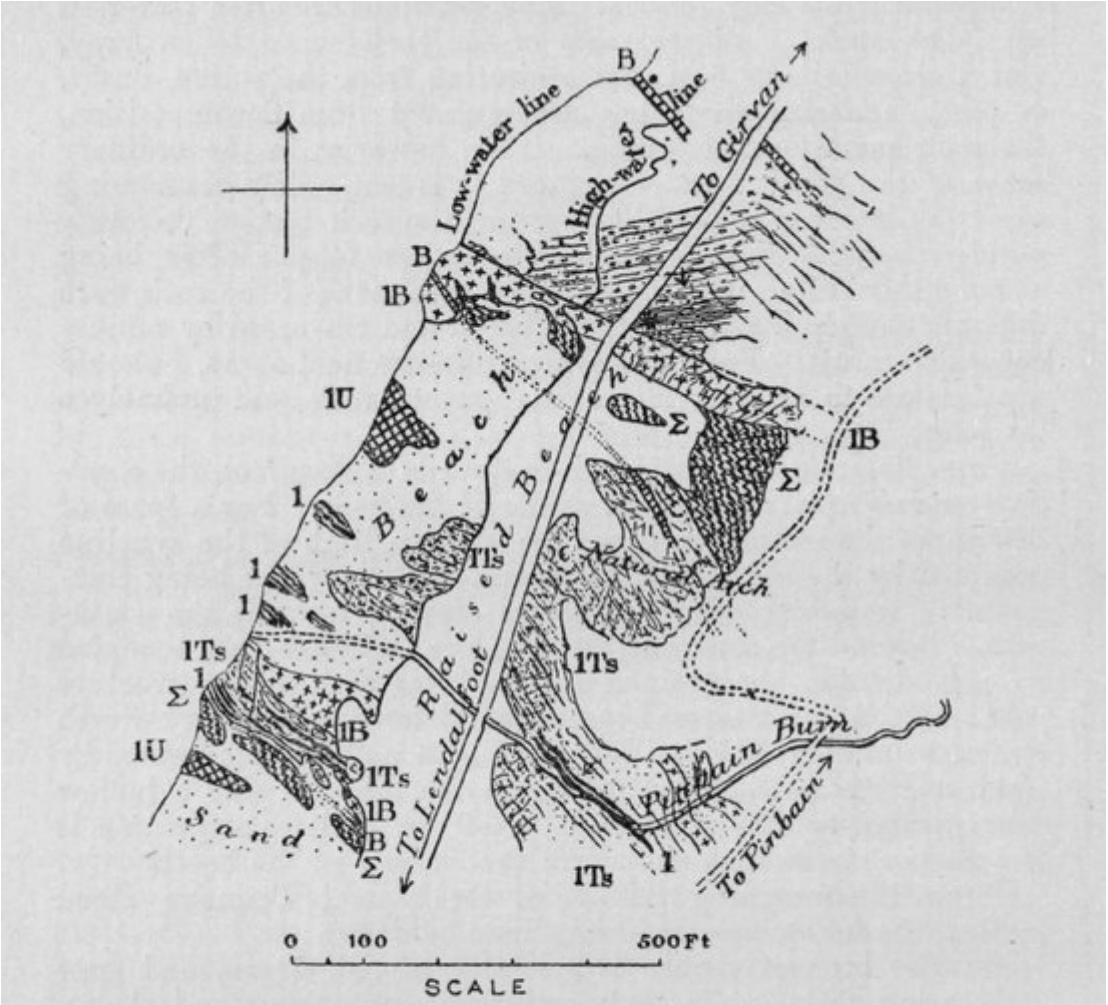


Fig. 104.—Plan of Strata on the Shore, Pinbain, one mile north of Lendalfoot, Ayrshire.

1. Arenig black shale. 1B. Diabase lava. 1Ts. Agglomerate. Σ. Serpentine. 1U. Intrusive basic rock (Silurian). B B. Dolerite dykes (Tertiary). f. Fault.

(Figure 104) Plan of Strata on the Shore, Pinbain, one mile north of Lendalfoot, Ayrshire. 1. Arenig black shale. 1B. Diabase lava. 1 Ts. Agglomerate. Σ. Serpentine. 1U. Intrusive basic rock (Silurian). B B. Dolerite dykes (Tertiary). f. Fault.

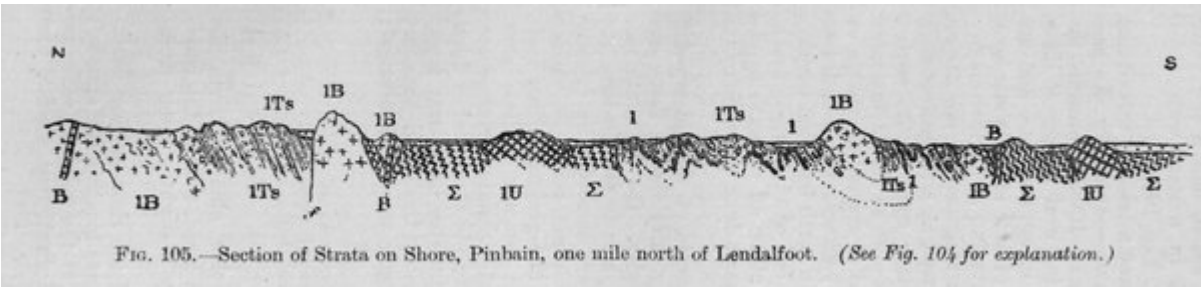


Fig. 105.—Section of Strata on Shore, Pinbain, one mile north of Lendalfoot. *(See Fig. 104 for explanation.)*

(Figure 105) Section of strata on shore, Pinbain, one mile north of Lendalfoot. See (Figure 104) for explanation.)

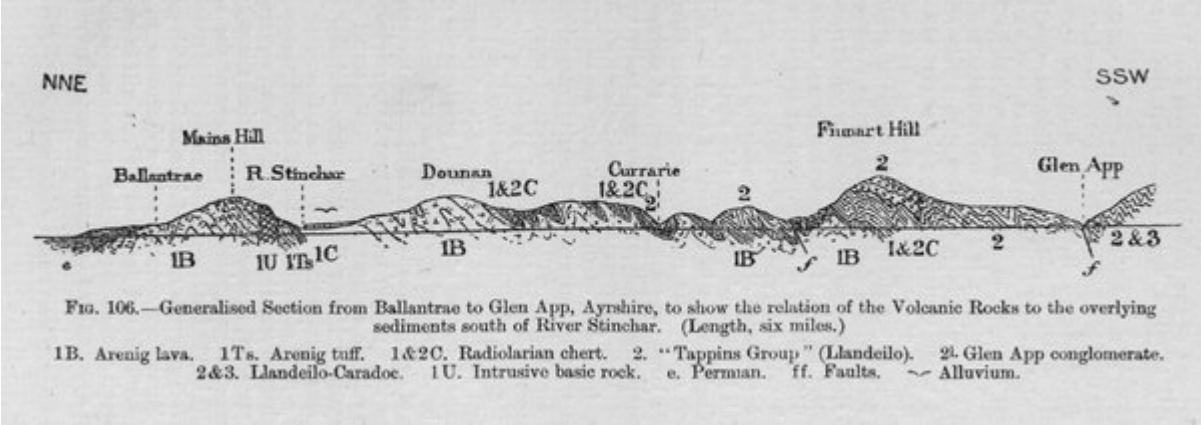


Fig. 106.—Generalised Section from Ballantrae to Glen App, Ayrshire, to show the relation of the Volcanic Rocks to the overlying sediments south of River Stinchar. (Length, six miles.)

1B. Arenig lava. 1Ts. Arenig tuff. 1&2C. Radiolarian chert. 2. "Tappins Group" (Llandeilo). 2I. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 1U. Intrusive basic rock. e. Permian. ff. Faults. ~ Alluvium.

(Figure 106) Generalised Section from Ballantrae to Glen App, Ayrshire, to show the relation of the Volcanic Rocks to the overlying sediments south of River Stinchar. (Length, six miles.) 1B. Arenig lava. 1 Ts. Arenig tuff. 1&20. Radiolarian chert. 2. "Tapping Group" (Llandeilo). 2I. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 1U. Intrusive basic rock. e. Permian. ff. Faults. [symbol] Alluvium.

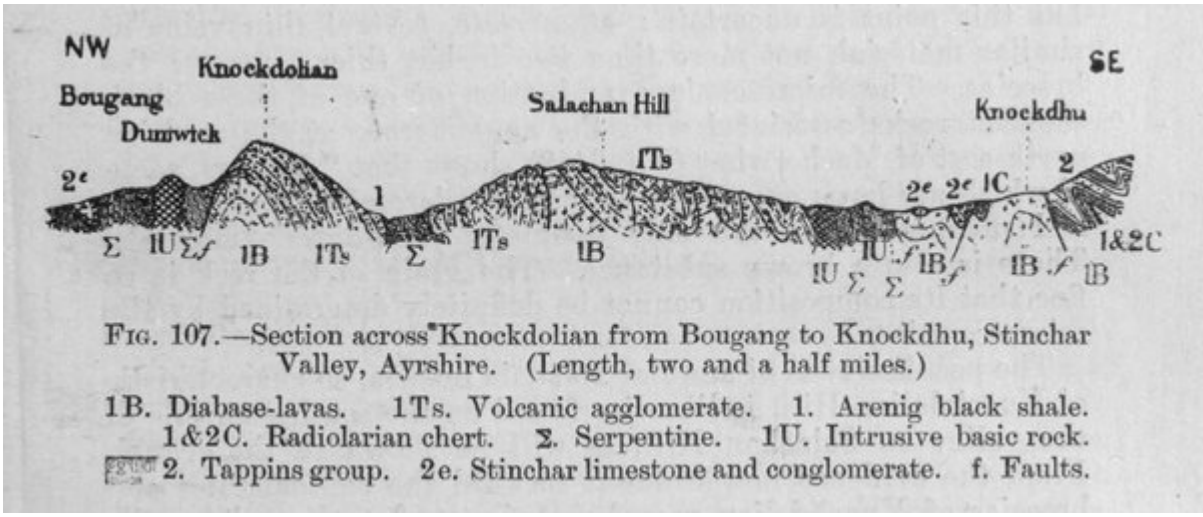


Fig. 107.—Section across Knockdolian from Bougang to Knockdhu, Stinchar Valley, Ayrshire. (Length, two and a half miles.)

1B. Diabase-lavas. 1Ts. Volcanic agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. Σ. Serpentine. 1U. Intrusive basic rock. 2. Tappins group. 2e. Stinchar limestone and conglomerate. f. Faults.

(Figure 107) Section across Knockdolian from Bougang to Knockdhu, Stinchar Valley, Ayrshire. (Length, two and a half miles.) 1B. Diabase-lavas. 1T s. Volcanic agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. 2. Serpentine. 1U. Intrusive basic rock. 2. Tappins group. 2e. Stinchar limestone and conglomerate. f. Faults.

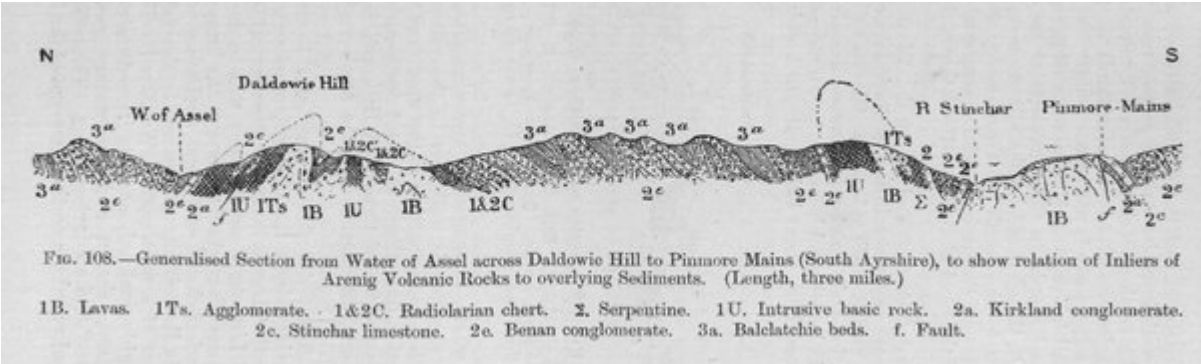


Fig. 108.—Generalised Section from Water of Assel across Daldowie Hill to Pinmore Mains (South Ayrshire), to show relation of Inliers of Arenig Volcanic Rocks to overlying Sediments. (Length, three miles.)

1B. Lavas. 1Ts. Agglomerate. 1&2C. Radiolarian chert. Σ. Serpentine. 1U. Intrusive basic rock. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. f. Fault.

(Figure 108) Generalised Section from Water of Assel across Daldowie Hill to Pinmore Mains (South Ayrshire), to show relation of Inliers of Arenig Volcanic Rocks to overlying Sediments. (Length, three miles.) 1B. Lavas. 1Ts. Agglomerate. 1&2C. Radiolarian chert. Σ. Serpentine. 1U. Intrusive basic rock. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. f. Fault.

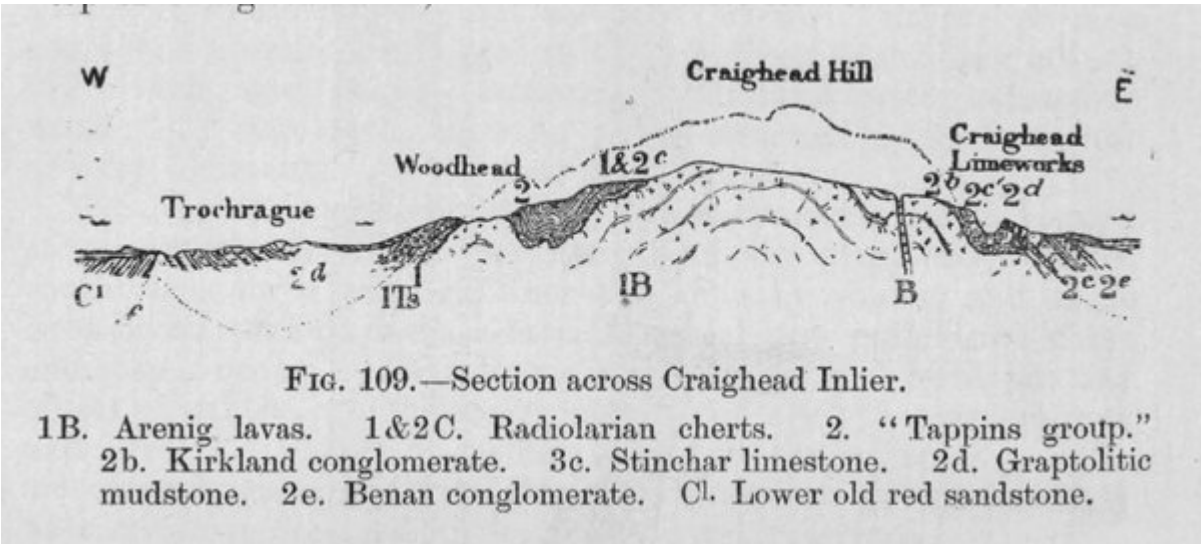


FIG. 109.—Section across Craighead Inlier.

1B. Arenig lavas. 1&2C. Radiolarian cherts. 2. "Tappins group." 2b. Kirkland conglomerate. 3c. Stinchar limestone. 2d. Graptolitic mudstone. 2e. Benan conglomerate. Cl. Lower old red sandstone.

(Figure 109) Section across Craighead Inlier. 1B. Arenig lavas. 1&2C. Radiolarian cherts. 2. "Tappins group". 2b. Kirkland conglomerate. 3c. Stinchar limestone. 2d. Graptolitic mudstone. 2e. Benan conglomerate. CI. Lower old red sandstone.

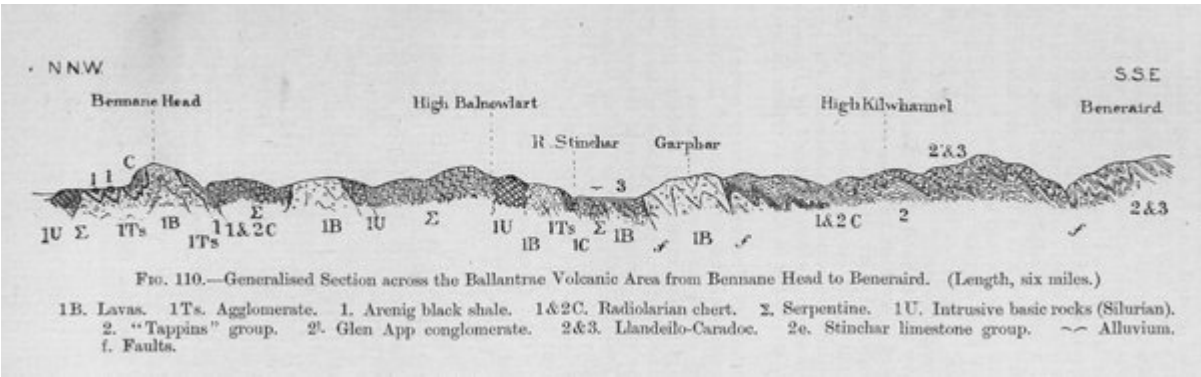


FIG. 110.—Generalised Section across the Ballantrae Volcanic Area from Bennane Head to Beneraird. (Length, six miles.)

1B. Lavas. 1Ts. Agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. Σ. Serpentine. 1U. Intrusive basic rocks (Silurian). 2. "Tappins" group. 2l. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 2e. Stinchar limestone group. ~~ Alluvium. f. Faults.

(Figure 110) Generalised Section across the Ballantrae Volcanic Area from Bennane Head to Beneraird. (Length, six miles.) 1B. Lavas. lTs. Agglomerate. 1. Arenig black shale. 1&2C. Radiolarian chert. Serpentine. 1U. Intrusive basic rocks (Silurian). 2. "Tapping" group. 2I. Glen App conglomerate. 2&3. Llandeilo-Caradoc. 2e. Stinchar limestone group. [symbol] Alluvium. f. Faults.

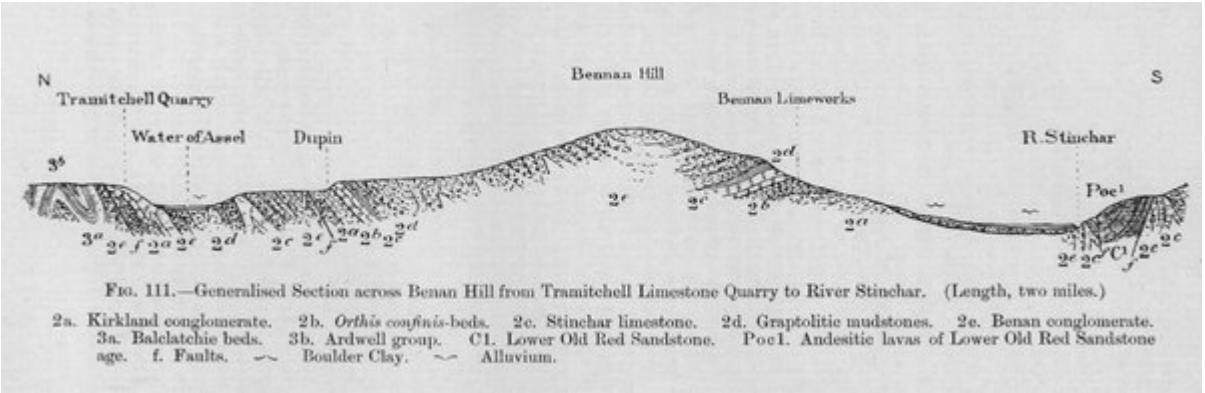


FIG. 111.—Generalised Section across Benan Hill from Tramitchell Limestone Quarry to River Stinchar. (Length, two miles.)

2a. Kirkland conglomerate. 2b. *Orthis confinis*-beds. 2c. Stinchar limestone. 2d. Graptolitic mudstones. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. Cl. Lower Old Red Sandstone. Poc1. Andesitic lavas of Lower Old Red Sandstone age. f. Faults. ~~ Boulder Clay. ~~ Alluvium.

(Figure 111) Generalised Section across Benan Hill from Tramitchell Limestone Quarry to River Stinchar. (Length, two miles.) 2a. Kirkland conglomerate. 2b. Orthis confinis-beds. 2c. Stinchar limestone. 2d. Graptolitic mudstones. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. Cl. Lower Old Red Sandstone. Poc1. Andesitic lavas of Lower Old Red Sandstone age. f. Faults. Boulder Clay. [symbol] Alluvium.

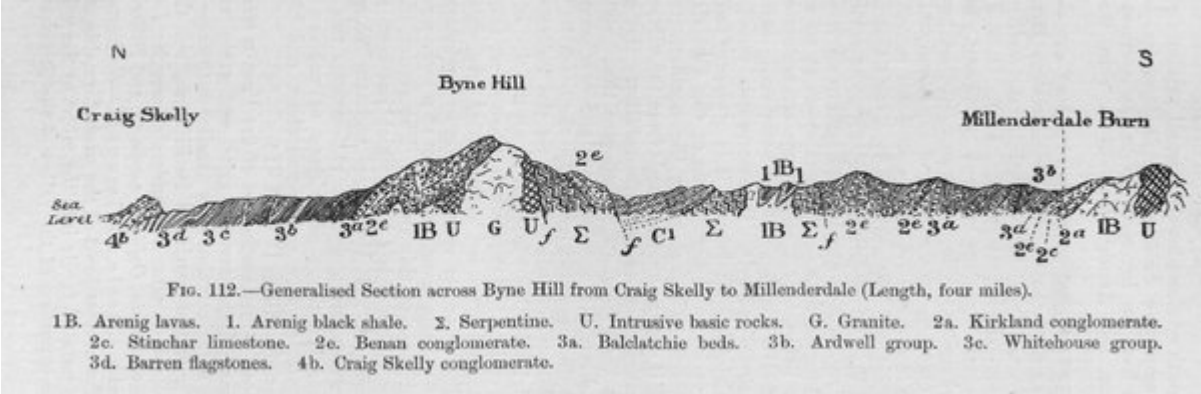


Fig. 112.—Generalised Section across Byne Hill from Craig Skelly to Millenderdale (Length, four miles).

1B. Arenig lavas. 1. Arenig black shale. Σ. Serpentine. U. Intrusive basic rocks. G. Granite. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstones. 4b. Craig Skelly conglomerate.

(Figure 112) Generalised Section across Byne Hill from Craig Skelly to Millenderdale (Length, four miles).1B. Arenig lavas. 1. Arenig black shale. Σ. Serpentine. U. Intrusive basic rocks. G. Granite. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie beds. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstones. 4b. Craig Skelly conglomerate.

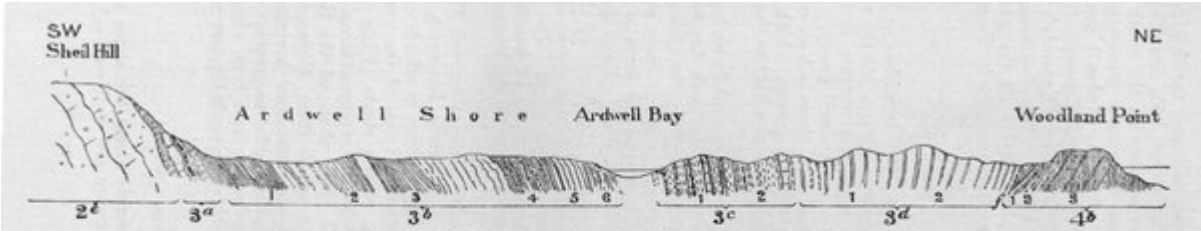


Fig. 113.—Section of the Strata on Ardmillan Shore, Ayrshire (after Lapworth).

4b. Woodland beds (Llandovery).
3. Grits and conglomerates.
2. Carbonaceous shales with *Climacograptus rectangularis*, &c.
1. Lower *Pentamerus* limestone.

3d. Barren flagstones.
2. Flagstones and shales, non-fossiliferous.
1. Shales with *Nematolites*.

3c. Whitehouse beds.
2. Mudstones and flags with *Dicellograptus complanatus*.
1. Shales and calcareous grits with *Leptæna sericea* and *L. transversalis*.

3b. Ardwell beds.
6. Flaggy shales with *Climacograptus caudatus*.
5. Flaggy beds with *Dicranograptus ramosus*.
3 & 4. Splintery iron-stained shales with *Corynoides calycularis*.
2. Hard grey flags and shales with *Diplograptus rugosus*.
1. Iron-stained dark shales with few fossils.

3a. Balclatchie beds.
2e. Benan conglomerate.

(Figure 113) Section of the Strata on Ardmillan Shore, Ayrshire (after Lapworth). 4b Woodland Beds, Llandovery: 3. Grits and conglomerates. 2. Carbonaceous shales with Climacograptus rectangularis &c. 1. Lower Pentamerus limestone; 3d. Barren flagstones: 2. Flagstones and shales, non-fossiliferous. 1. Shales with Nematolites; 3c. Whitehouse beds: 2 Mudstones and flags with Dicellograptus complanatus. 1. Shales and calcareous grits with Leptaena sericea and L. transversalis. 3b. Ardwell Beds: 6. Flaggy shales with Climacograptus caudatus. 5. Flaggy beds with Dicranograptus ramosus. 3 & 4. Splintery iron-stained shales with Corynoides calycularis. 2. Hard grey flags and shales with Diplograptus rugosus. 1. Iron-stained dark shales with few fossils. 3a. Balclatchie beds. 2e. Benan conglomerate.

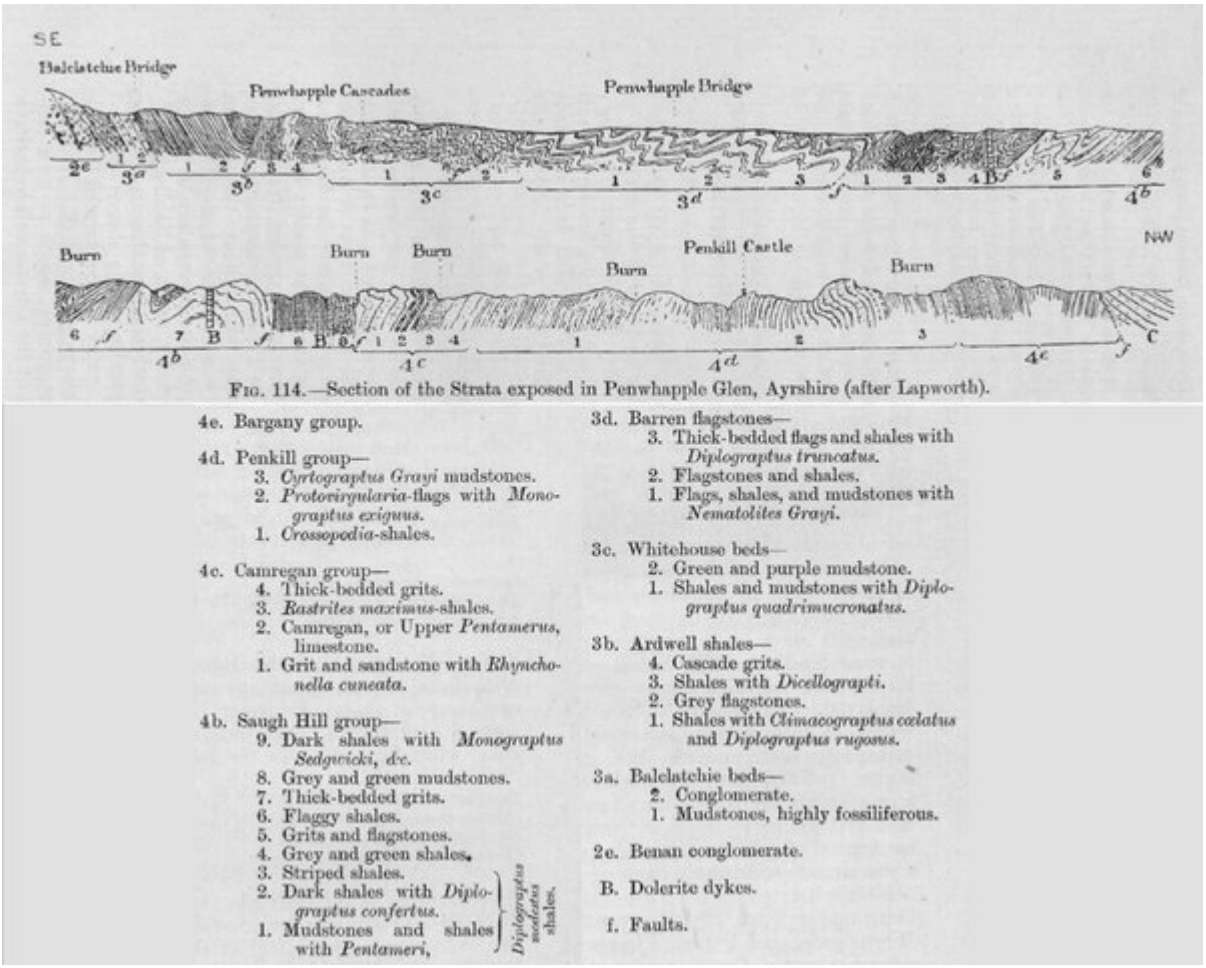


Fig. 114.—Section of the Strata exposed in Penwhapple Glen, Ayrshire (after Lapworth).

(Figure 114) Section of the Strata exposed in Penwhapple Glen, Ayrshire (after Lapworth). 4e. Bargany group. 4d. Penkill group: 3. Cyrtograptus Grayi mudstones. 2. Protovirgularia-flags with Monograptus exiguus. 1. Crossopodia-shales. 4c. Camregan group: 4. Thick-bedded grits. 3. Bastrites maximus-shales. 2. Camregan, or Upper Pentamerus, limestone. 1. Grit and sandstone with Rhynchonella cuneata. 4b. Saugh Hill group: 9. Dark shales with Monograptus Sedgwicki, cf.c. 8. Grey and green mudstones. 7. Thick-bedded grits. 6. Flaggy shales. 5. Grits and flagstones. 4. Grey and green shales. 3. Striped shales. 2. Dark shales with Diplograptus confertus. 1. Mudstones and shales with Pentameri 1, 2, 3 previous Diplograptus modestus shales 3d. Barren flagstones: 3. Thick-bedded flags and shales with Diplograptus truncatus. 2. Flagstones and shales. 1. Flags, shales, and mudstones with Nematolites Grayi. 3c. Whitehouse beds: 2. Green and purple mudstone. 1. Shales and mudstones with Diplograptus guattrimucronatus. 3b. Ardwell shales: 4. Cascade grits. 3. Shales with Dicellograpti. 2. Grey flagstones. Shales with Climacograptus coelatus and Diplograptus rugosus. 3a. Balclatchie beds: 2. Conglomerate. 1. Mudstones, highly fossiliferous. 2e. Benan conglomerate. B. Dolerite dykes. f. Faults.

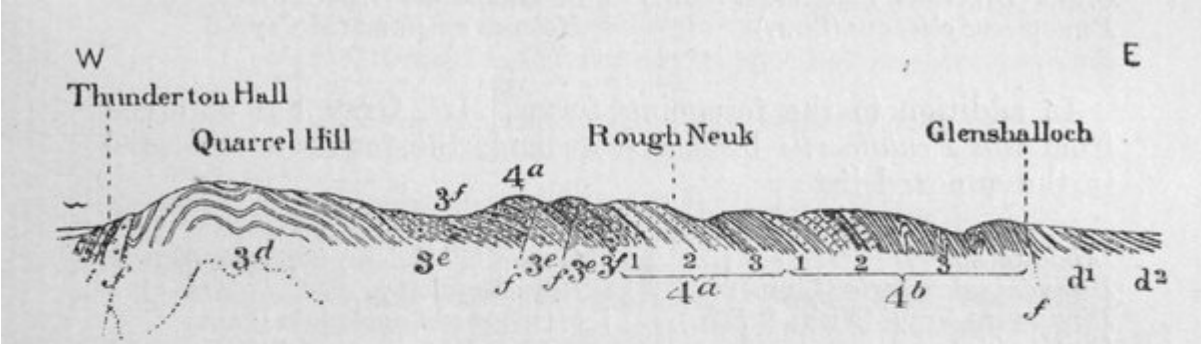


FIG. 115.—Section across Quarrel Hill and Rough Neuk from Thunderton Hall to Glenshalloch.

4b. Saugh Hill Group
3. Glenshalloch shales (*Monograptus gregarius*-zone).
2. *Pentamerus* grits.
1. Pale shale with *Diplograptus acuminatus*.

4a. Mulloch Hill Group
3. *Ptilograptus* shales.
2. Mulloch Hill sandstone.
1. Mulloch Hill conglomerate.

3f. Starfish bed. 3e. Drummuck mudstones. 3d. Barren flagstones.

(Figure 115) Section across Quarrel Hill and Rough Neuk from Thunderton Hall to Glenshalloch. 4b. Saugh Hill Group: 3. Glenshalloch shales (Monograptus gregartus-zone). 2. Pentamerus grits. 1. Pale shale with Diplograptus acuminates. 4a. Mulloch Hill Group: 3. Ptilograptus shales. 2. Mulloch Hill sandstone. 1. Mulloch Hill conglomerate. 3f. Starfish bed. 3e. Drummuck mudstones. 3d. Barren flagstones.

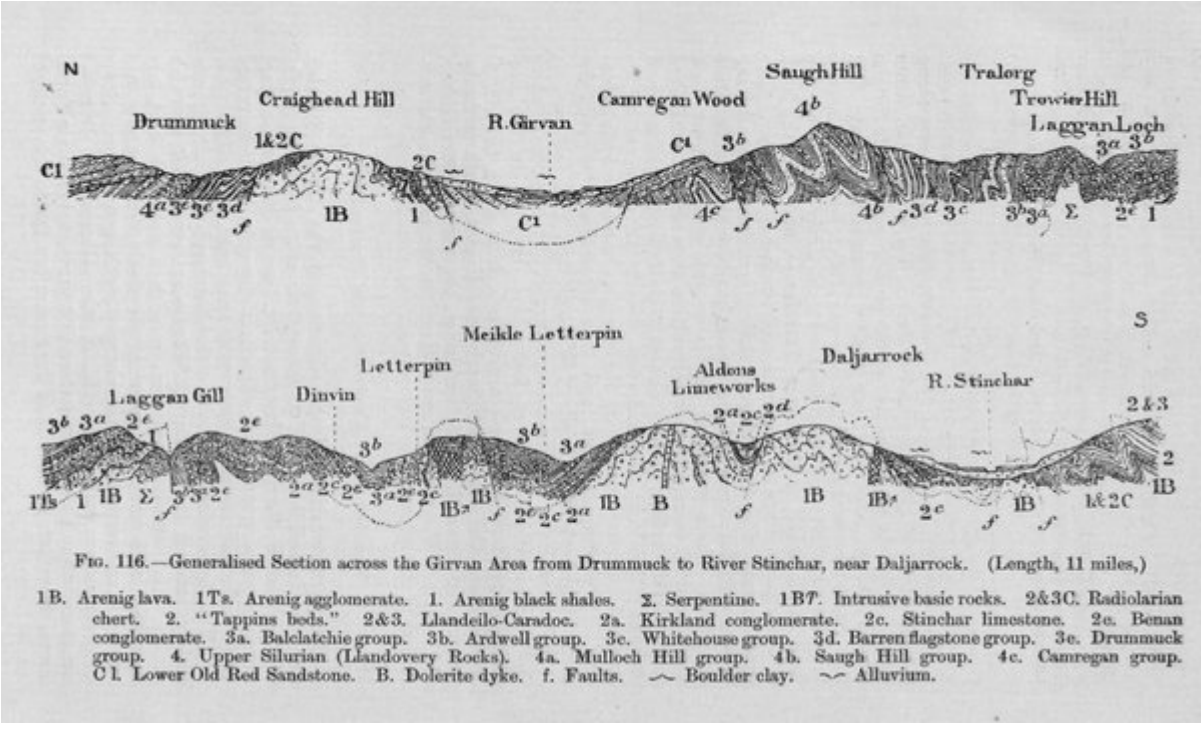


FIG. 116.—Generalised Section across the Girvan Area from Drummuck to River Stinchar, near Daljarrock. (Length, 11 miles,)

1B. Arenig lava. 1Ts. Arenig agglomerate. 1. Arenig black shales. Σ. Serpentine. 1B?. Intrusive basic rocks. 2&3C. Radiolarian chert. 2. "Tappins beds." 2&3. Llandeilo-Caradoc. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie group. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstone group. 3e. Drummuck group. 4. Upper Silurian (Llandovery Rocks). 4a. Mulloch Hill group. 4b. Saugh Hill group. 4c. Camregan group. C1. Lower Old Red Sandstone. B. Dolerite dyke. f. Faults. ~ Boulder clay. ~ Alluvium.

(Figure 116) Generalised section across the Girvan area from Drummuck to River Stinchar, near Daljarrock. (Length, 11 miles,) 1B. Arenig lava. 1 Ts. Arenig agglomerate. 1. Arenig black shales. Σ. Serpentine. 1 B[arrow]. Intrusive basic rocks. 2 & 3 C. Radiolarian chert. 2. "Tappins beds". 2&3. Llandeilo–Caradoc. 2a. Kirkland conglomerate. 2c. Stinchar limestone. 2e. Benan conglomerate. 3a. Balclatchie group. 3b. Ardwell group. 3c. Whitehouse group. 3d. Barren flagstone group. 3e. Drummuck group. 4. Upper Silurian (Llandovery Rocks). 4a. Mulloch Hill group. 4b. Saugh Hill group. 4c. Camregan group. C1. Lower Old Red Sandstone. B. Dolerite dyke. f. Faults. [symbol] Boulder clay. [symbol] Alluvium.

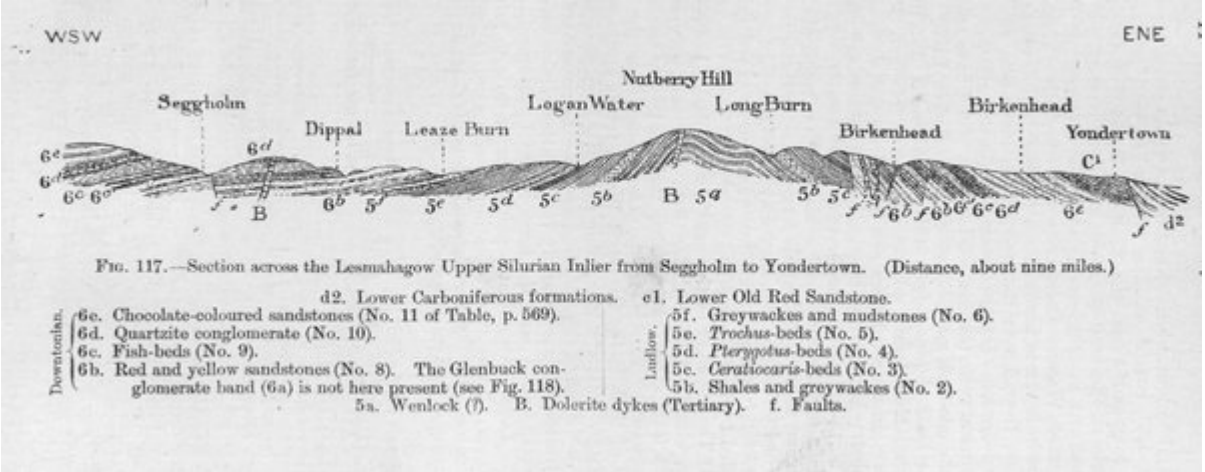


Fig. 117.—Section across the Lesmahagow Upper Silurian Inlier from Seggholm to Yondertown. (Distance, about nine miles.)

d2. Lower Carboniferous formations. c1. Lower Old Red Sandstone.

Downtonian:
- 6e. Chocolate-coloured sandstones (No. 11 of Table, p. 569).
- 6d. Quartzite conglomerate (No. 10).
- 6c. Fish-beds (No. 9).
- 6b. Red and yellow sandstones (No. 8). The Glenbuck conglomerate band (6a) is not here present (see Fig. 118).

Ludlow:
- 5f. Greywackes and mudstones (No. 6).
- 5e. *Trochus*-beds (No. 5).
- 5d. *Pterygotus*-beds (No. 4).
- 5c. *Ceratiocaris*-beds (No. 3).
- 5b. Shales and greywackes (No. 2).

5a. Wenlock (?). B. Dolerite dykes (Tertiary). f. Faults.

(Figure 117) Section across the Lesmahagow Upper Silurian Inlier from Seggholm to Yondertown. (Distance, about nine miles.) d2. Lower Carboniferous formations. c1. Lower Old Red Sandstone. Downtonian 6e. Chocolate-coloured sandstones (No. 11 of Table, p. 569). 6d. Quartzite conglomerate (No. 10). 6c. Fish-beds (No. 9). 6b. Red and yellow sandstones (No. 8). The Glenbuck conglomerate band (6a) is not here present (see (Figure 118)). Ludlow 5f. Greywackes and mudstones (No. 6). 5e. Trochus-beds (No. 5). 5d. Pterygotus-beds (No. 4). 5c. Ceratiocaris-beds (No. 3). 5b. Shales and greywackes (No. 2). 5a. Wenlock (?). B. Dolerite dykes (Tertiary). f. Faults.

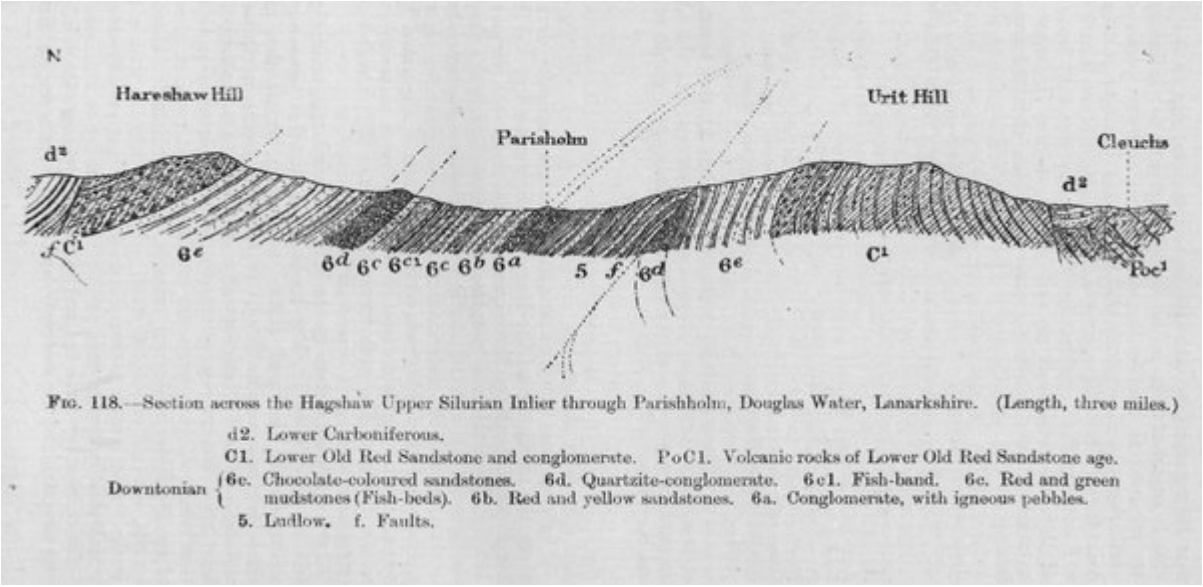


Fig. 118.—Section across the Hagshaw Upper Silurian Inlier through Parishhohn, Douglas Water, Lanarkshire. (Length, three miles.)

d2. Lower Carboniferous.

C1. Lower Old Red Sandstone and conglomerate. PoC1. Volcanic rocks of Lower Old Red Sandstone age.

Downtonian: 6e. Chocolate-coloured sandstones. 6d. Quartzite-conglomerate. 6c1. Fish-band. 6c. Red and green mudstones (Fish-beds). 6b. Red and yellow sandstones. 6a. Conglomerate, with igneous pebbles.

5. Ludlow. f. Faults.

(Figure 118) Section across the Hagshaw Upper Silurian Inlier through Parishhohn, Douglas Water, Lanarkshire. (Length, three miles.) d2. Lower Carboniferous. C1. Lower Old Red Sandstone and conglomerate. PoC1. Volcanic rocks of Lower Old Red Sandstone age. Downtonian: 6e. Chocholate -coloured sandstone. 6d. Quartzite conglomerate. 6c1 Fish-band. 6c. Red and green mudstones (Fish-beds). 6b. Red and yellow sandstones. 6a. Conglomerate with igneous pebbles. 5 Ludlow. f. faults.

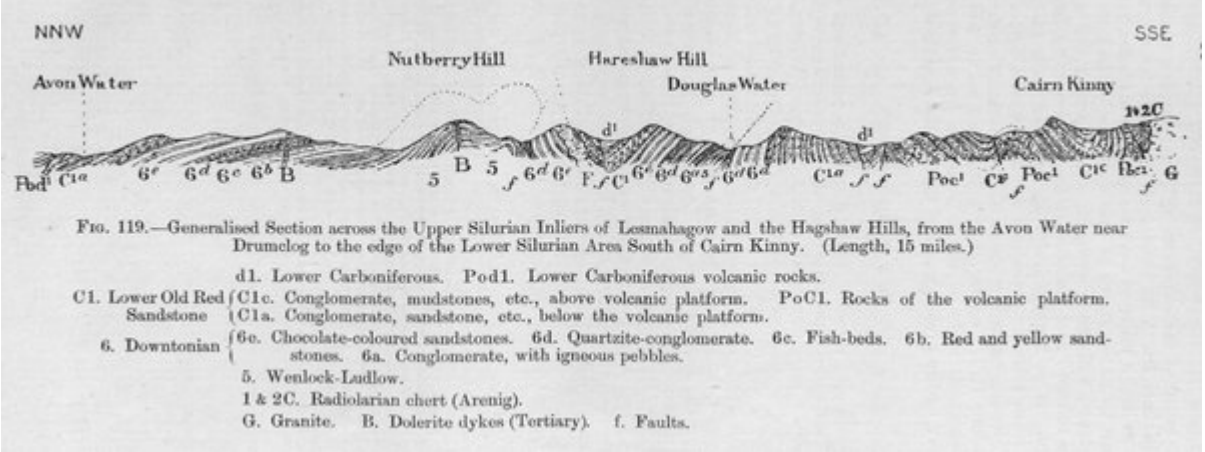


Fig. 119.—Generalised Section across the Upper Silurian Inliers of Lesmahagow and the Hagshaw Hills, from the Avon Water near Drumclog to the edge of the Lower Silurian Area South of Cairn Kinny. (Length, 15 miles.)

d1. Lower Carboniferous. Pod1. Lower Carboniferous volcanic rocks.

C1. Lower Old Red Sandstone: C1c. Conglomerate, mudstones, etc., above volcanic platform. PoC1. Rocks of the volcanic platform. C1a. Conglomerate, sandstone, etc., below the volcanic platform.

6. Downtonian: 6e. Chocolate-coloured sandstones. 6d. Quartzite-conglomerate. 6c. Fish-beds. 6b. Red and yellow sandstones. 6a. Conglomerate, with igneous pebbles.

5. Wenlock-Ludlow.

1 & 2C. Radiolarian chert (Arenig).

G. Granite. B. Dolerite dykes (Tertiary). f. Faults.

(Figure 119) Generalised Section across the Upper Silurian InHers of Lesmahagow and the Hagshaw Hills, from the Avon Water near Drumclog to the edge of the Lower Silurian Area South of Cairn Kinny. (Length, 15 miles.) d1. Lower Carboniferous. Pod1. Lower Carboniferous volcanic rocks. C1. Lower Old Red Sandstone: C1c. Conglomerate, mudstones, etc., above volcanic platform. P C1. Rocks of the volcanic platform. C1a. Conglomerate, sandstone, etc., below the volcanic platform. 6. Downtonian 6e. Chocolate-coloured sandstones. 6d. Quartzite-conglomerate. 6c. Fish-beds. 6b. Red and yellow sandstones. 6a. Conglomerate, with igneous pebbles. 5. Wenlock-Ludlow. 1 & 2C. Radiolarian chert (Arenig). G. Granite. B. Dolerite dykes (Tertiary). f. Faults.

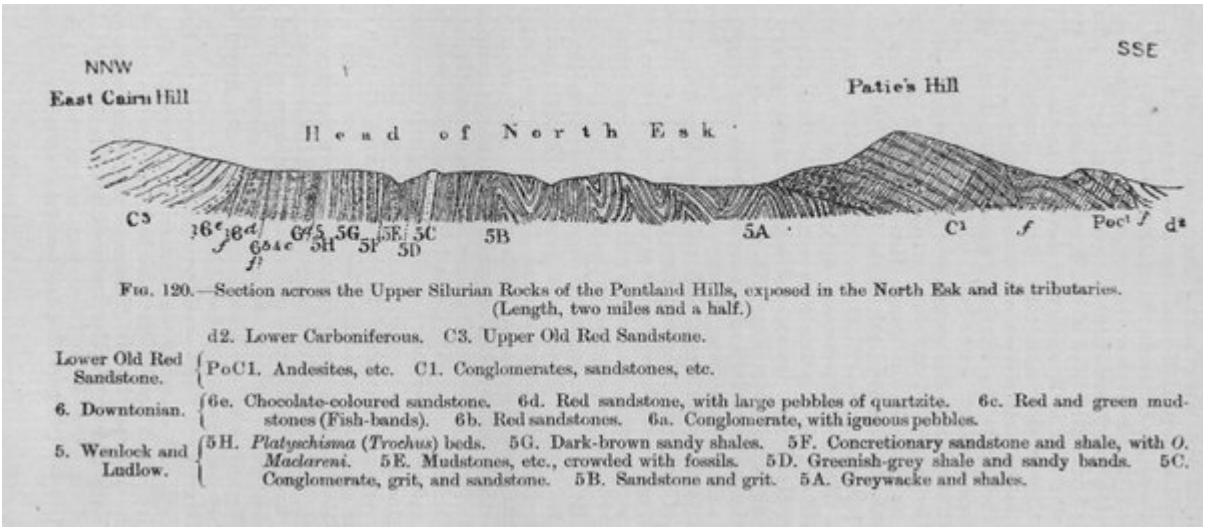


Fig. 120.—Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the North Esk and its tributaries. (Length, two miles and a half.)

d2. Lower Carboniferous. C3. Upper Old Red Sandstone.

Lower Old Red Sandstone. PoC1. Andesites, etc. C1. Conglomerates, sandstones, etc.

6. Downtonian. 6e. Chocolate-coloured sandstone. 6d. Red sandstone, with large pebbles of quartzite. 6c. Red and green mudstones (Fish-bands). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles.

5. Wenlock and Ludlow. 5H. *Platyschisma* (*Trochus*) beds. 5G. Dark-brown sandy shales. 5F. Concretionary sandstone and shale, with *O. Maclareni*. 5E. Mudstones, etc., crowded with fossils. 5D. Greenish-grey shale and sandy bands. 5C. Conglomerate, grit, and sandstone. 5B. Sandstone and grit. 5A. Greywacke and shales.

(Figure 120) Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the North Esk and its tributaries. (Length, two miles and a half.) d2. Lower Carboniferous. C3. Upper Old Red Sandstone. Lower Old Red Sandstone. PoC 1. Andesites, etc. C1. Conglomerates, sandstones, etc 6. Downtonian: 6e. Chocolate-coloured sandstone. 6d. Red sandstone, with large pebbles of quartzite. 6c. Red and green mudstones (Fish-bands). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles. 5. Wenlock and Ludlow: 5H Platyschisma (Trochus) beds. 5G. Dark-brown sandy shales. 5F. Concretionary sandstone and shale, with O. Maclareni. 5E. Mudstones, etc., crowded with fossils. 5D. Greenish-grey shale and sandy bands. 5C. Conglomerate, grit, and sandstone. 5B. Sandstone and grit. 5A. Greywacke and shales.

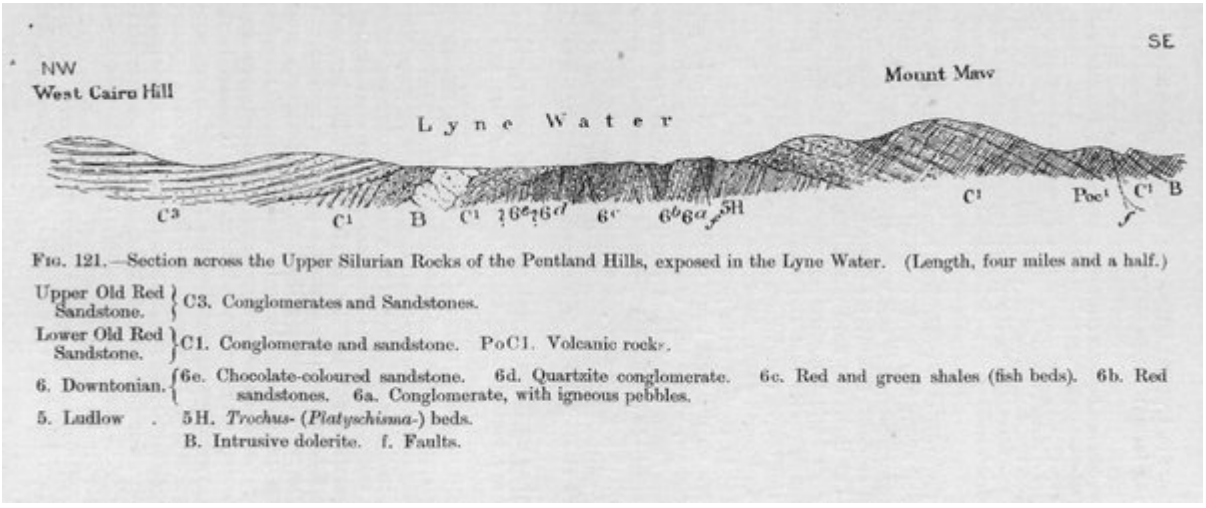


Fig. 121.—Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the Lyne Water. (Length, four miles and a half.)

Upper Old Red Sandstone. C3. Conglomerates and Sandstones.

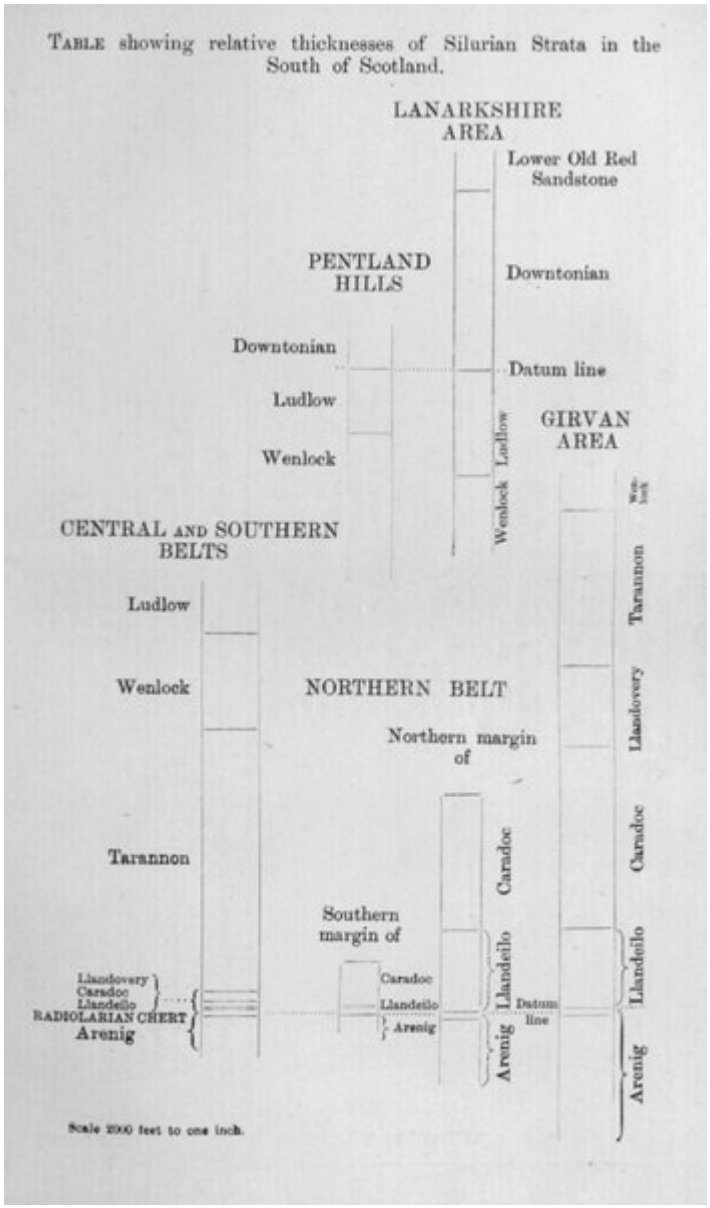
Lower Old Red Sandstone. C1. Conglomerate and sandstone. PoC1. Volcanic rocks.

6. Downtonian. 6e. Chocolate-coloured sandstone. 6d. Quartzite conglomerate. 6c. Red and green shales (fish beds). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles.

5. Ludlow . 5H. *Trochus-* (*Platyschisma-*) beds.

B. Intrusive dolerite. f. Faults.

(Figure 121) Section across the Upper Silurian Rocks of the Pentland Hills, exposed in the Lyne Water. (Length, four miles and a half.) Upper Old Red Sandstone: C3. Conglomerates and Sandstones. Lower Old Red Sandstone. : C1. Conglomerate and sandstone. PoC1. Volcanic rocks. 6. Downtonian. : 6e. Chocolate-coloured sandstone. 6d. Quartzite conglomerate. 6c. Red and green shales (fish beds). 6b. Red sandstones. 6a. Conglomerate, with igneous pebbles. 5. Ludlow. :5 H. Trochus- (Platyschisma-) beds. B. Intrusive dolerite. f. Faults.



(Table 1) [unnumbered p.79]. Table showing relative thicknesses of Silurian strata in the south of Scotland.

UPPER SILURIAN.

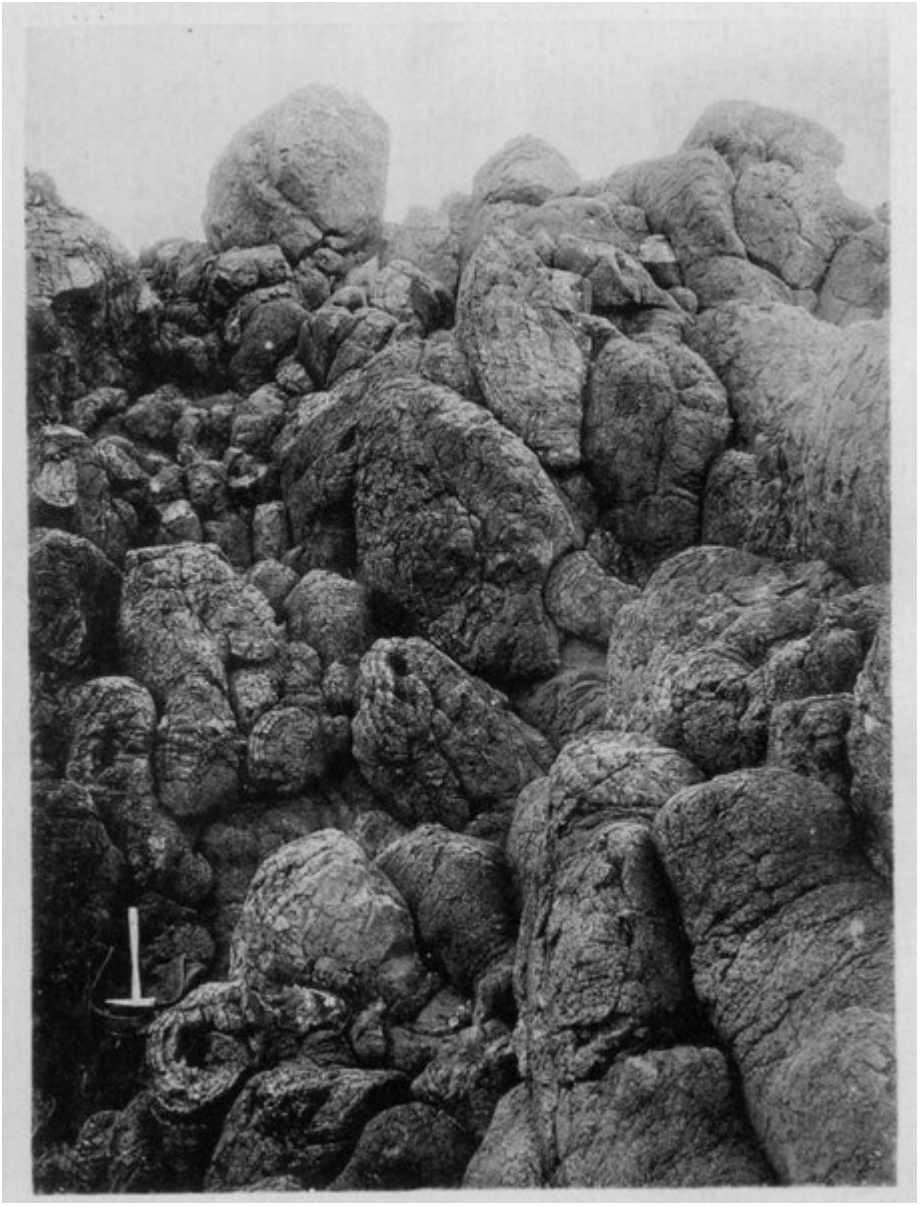
	Central and Southern Belts.	Northern Belt and Inliers of Lanarkshire and Pentland Hills.		Girvan Area.
		Lanarkshire :—	*Pentland Hills :—*	
Downtonian.		(2) Red sandstone, quartzite conglomerate, green and red mudstones (fish bands). Fishes, eurypterids, myriapods, plants, &c. (1) Red and yellow sandstones with basal conglomerate. Total thickness — in Lesmahagow area, 2,700 feet; in Hagshaw Hills, 2,360 feet.	(2) Quartz conglomerate, sandstones, red and green mudstones. Fishes, polyzoa, &c. Thickness uncertain. (1) Red sandstones with basal conglomerate. Thickness, 700 feet.	
	Kirkcudbright Shore and Riccarton :—	*Lanarkshire :—*	*Pentland Hills :—*	
Ludlow.	(2) Raeberry Castle Beds.—Mudstones with limestone nodules and Balmae grits. *Athyris, Atrypa, Orthoceras Etheridgei.* Thickness, 500-750 feet.	(2) Mudstones, sandstones, greywacke, and flaggy shales. *Platyschisma helicites, Orthoceras dimidiatum.* Phyllopods, eurypterids, scorpion, fishes. Thickness, 1,480 feet.	(2) Concretionary mudstone, sandstone, andshales. *Platyschisma simulans.* Thickness, 800 feet.	
Wenlock.	(1) Riccarton Beds.—Burrow Head, Kirkcudbright Shore, Dumfriesshire, Riccarton, and Cheviots.—Conglomerates, grits, greywackes, shales, and mudstones. *Cyrtograptus Murchisoni, Monograptus communis, M. priodon.* Thickness, 1000-1500 feet.	(1) Greywacke and shales. Thickness, 1200 feet. Base not seen.	(1) Concretionary mudstones, grits, conglomerates, shales. Brachiopods, lamellibranchs, eurypterids, scorpions. *Cyrtograptus, Monograptus.* Thickness, 2200 feet. Base not seen.	Blair and Straiton Beds.—Conglomerates, grits, flags, and shales. *Beyrichia Klodeni, Cardiola interrupta, Orthoceras Maclarani.* Thickness, 500 feet.
Tarannon.	Hawick Rocks, Ardwell Beds. Brown and grey greywackes and shales. *Protovirgularia.* Queensberry Group. Grieston Shales.—Grits and shales. *Cyrtograptus, Monograptus convolutus, M. priodon, Retiolites geinitzianus.* Buckholm Grits and Abbotsford Flags.—Massive conglomerates, flags, shales, and red mudstones *Monograptus exiguus, M. crispus, M. turriculatus.* Approximate maximum thickness, 3000-4000 feet.			Drumyork Flags, Bargany Group.—Flagstones and shales. *Cyrtograptus Grayi, Monograptus priodon,* &c. Thickness, 1100 feet. Penkill Group.—Grits, flagstones, and purple shales. *Monograptus exiguus, Crossopodia, Protovirgularia,* &c. Thickness, 1000 feet.
Llandovery.	Birkhill Shale Series. Upper. Thickness, 46 feet. { 3. *Rastrites maximus*-zone. 2. *Monograptus spinigerus*-zone. 1. *Cephalograptus cometa*-zone. Lower. Thickness, 52 feet. { 3. *Monograptus gregarius*-zone. 2. *Diplograptus vesiculosus*-zone. 1. *Diplograptus acuminatus*-			Camregan Group.—Grits, limestones, and shales. *Rastrites maximus, Pentamerus.* Thickness, 200 feet. Saugh Hill Group.—Flagstones and shales. *Monograptus spinigerus, Rastrites peregrinus.* Thickness, 500 feet. Mulloch Hill Group.—Conglomerates, sandstones, and shales. *Diplograptus acuminatus, Meristella angustifrons, Atrypa.* Thickness, 350 feet.

(Table 2) Upper Silurian — general description

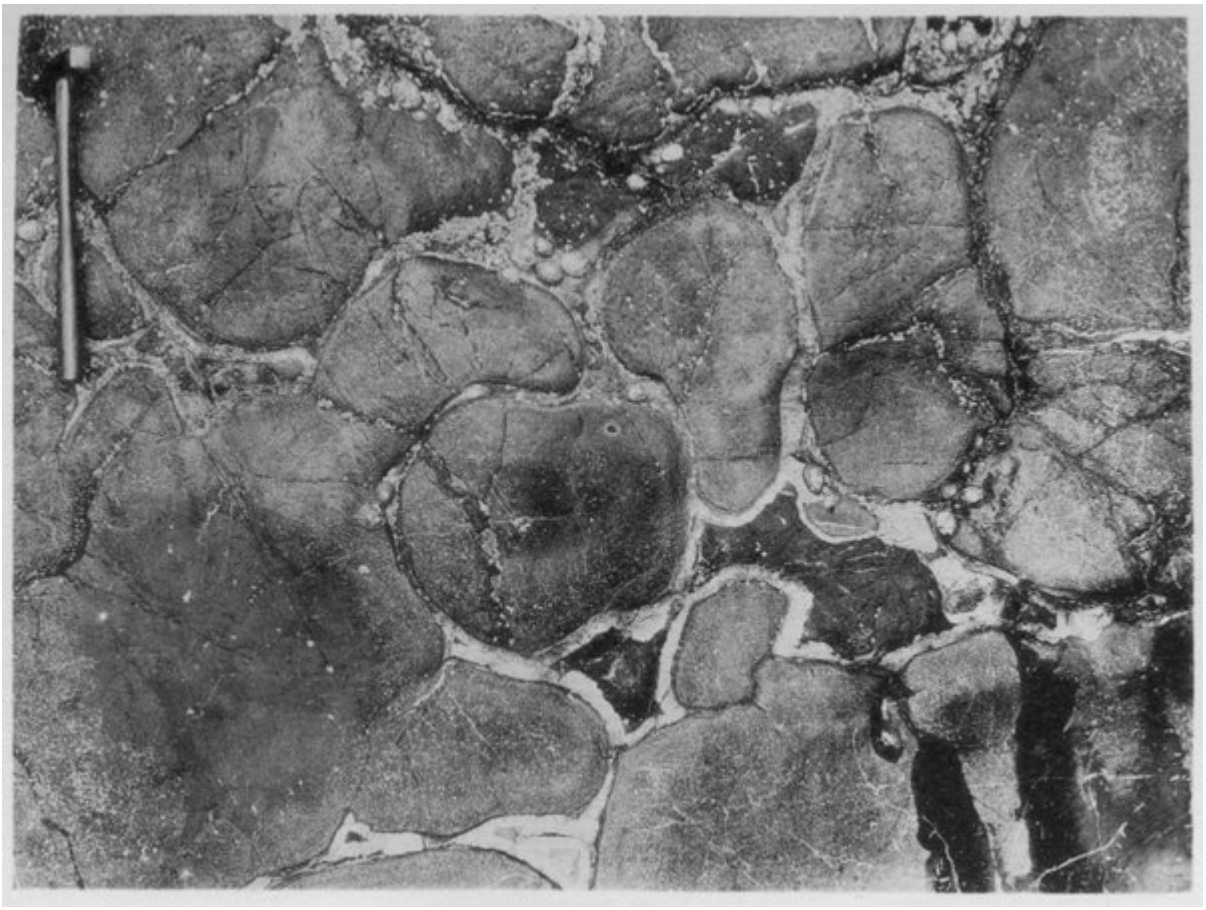
LOWER SILURIAN.

	Central and Southern Belts.	Northern Belt.	Girvan Area.	
Caradoc.	**Hartfell Shale Series.** Upper or Barren Mudstone. Thickness about 60 feet. Mudstones with thin seams of black shales, thin tuffs, and agglomerate. 2. *Dicellograptus anceps*-zone. 1. *Dicellograptus complanatus*-zone. *Diplograptus socialis.* Lower. Thickness about 40 feet. Black flaggy graptolite shales. 3. *Pleurograptus linearis*-zone. 2. *Dicranograptus Clingani*-zone. 1. *Climacograptus Wilsoni*-zone. *Buthograptus laxus.*	**Lowther Shales** (Wrae, Glencotho, Winkston).—Grey and blue micaceous shales with conglomerates and limestones. Trilobites, brachiopods, cephalopods, &c. Volcanic rocks—felsitic lavas and tuffs (Wrae, Glencotho, Hamilton Hill, Winkston). Thickness about 800 feet. Black shales and flinty bands with Lower Hartfell graptolites (40 feet) passing laterally into greywackes and shales and calcareous conglomerates with Lower Caradoc fossils. Brachiopods, trilobites (Wallace's Cast, Dunterclough, Kilbucho). Local unconformabilities in the districts of Channelkirk, Leadhills, Crawfordjohn, Sanquhar, and Shinnel Water. Volcanic rocks in lowest beds (Sanquhar district). Thickness about 1000 feet.	**Ardmillan Series.** Drummuck Group (Green Mudstones).—*Palæaster, Dicellograptus anceps, Trinucleus seticornis.* 400 feet. Barren Flagstone Group.—*Diplograptus truncatus, Nematolites Grayi.* Thickness, 800 feet. Whitehouse Group.—*Dicellograptus complanatus, Pleurograptus linearis, Diplograptus*, trilobites. Thickness, 300 feet. Ardwell Group.—Flagstones and shales. *Climacograptus caudatus, Dicranograptus ramosus.* Thickness, 1,200 feet. Balclatchie Group.—Mudstones, grits, and conglomerates. *Glossograptus Hincksi, Climacograptus bicornis.* Trilobites, brachiopods, &c., abundant. Thickness, 100 feet.	
	Glenkiln Shale Series.		Area S. of the Stinchar Valley.	Area N. of the Stinchar Valley. **Barr Series.**
	4. Thin black shales underlying *Climacograptus Wilsoni*-zone. *Dicranograptus zic-zac, Climacograptus calatus* var. *antiquus, C. peltifer, Lasiograptus binucronatus.* Thickness about 2 feet.	Black shales with cherty bands (8 to 12 feet). *Didymograptus superstes, Cænograptus gracilis, Lasiograptus binucronatus, Dicranograptus zic-zac, Dicellograptus divaricatus.*	4. Boulder conglomerate (Glenapp, Corsewall). Approximate thickness, 500 feet.	4. Benan conglomerate, about 500 feet thick.
Llandeilo.	3. Orange coloured mudstones, radiolarian cherts, and fine volcanic tuffs. Thickness at Dobb's Linn, 4 feet.	Black shales pass towards the north and west into grits, greywackes, and shales. Approximate thickness, 900-1200 feet.	3. Unfossiliferous mudstones and grits ("Tappins group"). Thickness about 500 feet.	3. Graptolitic mudstones. *Didymograptus superstes.* Thickness, 30 feet.
	2. Glenkiln Shales.—Black shales with cherty ribs. *Cænograptus gracilis, Didymograptus superstes.* Thickness, 8-12 feet.	Volcanic rocks are associated with the passage beds between the Llandeilo and Caradoc divisions in the Sanquhar district.	2. Fossiliferous mudstones, *Didymograptus superstes, Cænograptus, Dendrograptus*, 6 feet thick (Portandea).	2. Stinchar Limestone group, 60 feet thick.
	1. Radiolarian cherts, mudstones, and volcanic tuffs.	Radiolarian cherts and mudstones.	1. Mudstones and radiolarian cherts, passing conformably downwards into Arenig cherts and volcanic rocks.	1. Kirkland group, sandstones and conglomerates, *Orthis confinis* beds, 240 feet thick. Local unconformability.
Arenig.	Radiolarian cherts and mudstones with volcanic tuffs (Castle-Douglas district, &c.). Thickness about 150-200 feet at Trowdale, Castle-Douglas (Arenig and Lower Llandeilo cherts, &c.). Base not seen.	3. Radiolarian cherts. Thickness, 70 feet (Arenig and Lower Llandeilo cherts). 2. Mudstones with thin dark seams. *Obolella, Lingulella, Tetragraptus, Caryocaris Wrighti.* Thickness, 4 feet. 1. Volcanic series, comprising lavas, tuffs, agglomerates, and intrusive igneous rocks. Approximate thickness about 500 feet (Sanquhar). Base not seen.	Radiolarian cherts, mudstones, and volcanic tuffs. About 70 feet thick (Arenig and Lower Llandeilo cherts). Bennane Head black shales (*Tetragraptus bryonoides*) interleaved with volcanic agglomerate, 3-4 feet. Volcanic rocks, lavas, and tuffs, with fossiliferous intercalations yielding Middle Arenig graptolites. Approximate thickness, 1500 feet. Base not seen.	

(Table 3) Lower Silurian — general description



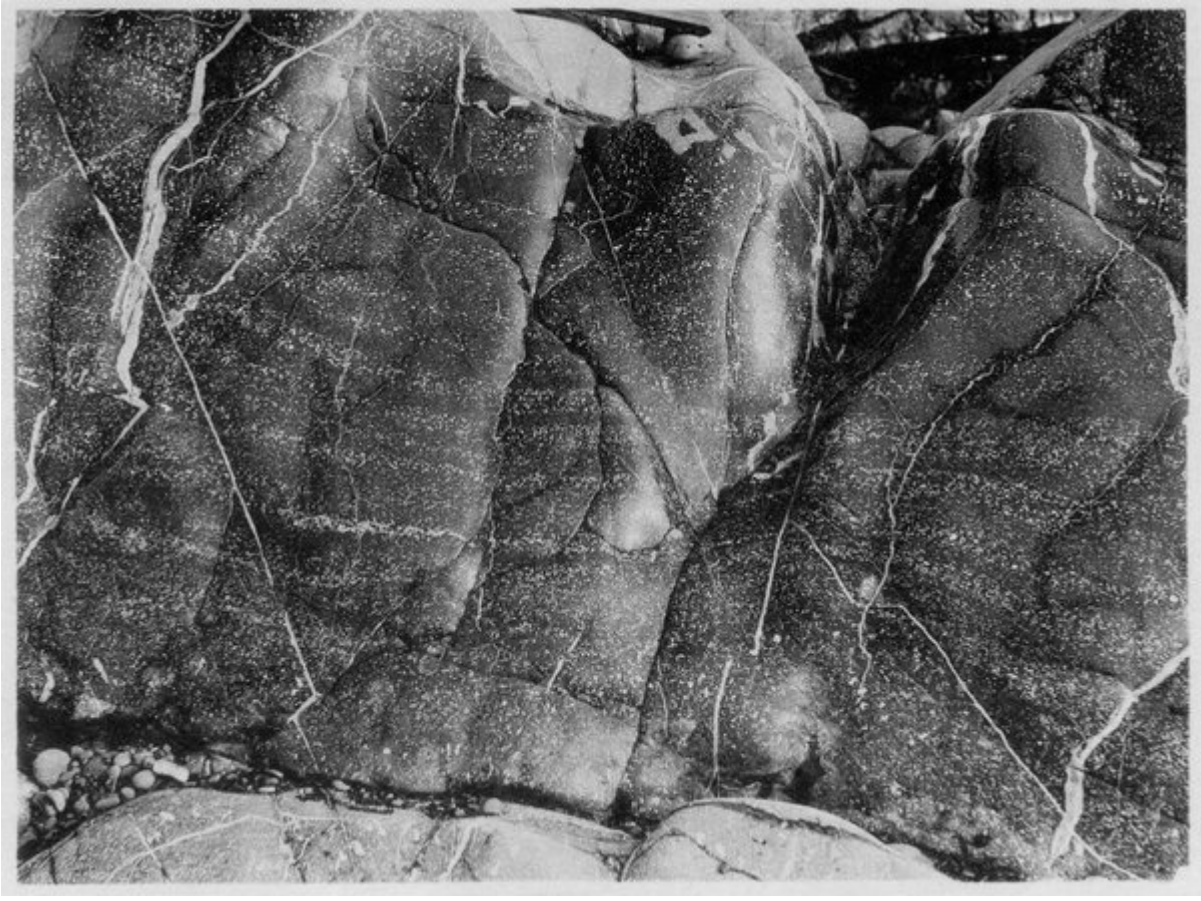
(Plate 1) Sack-like pillow-form structure in Diabase Lava on shore ¾-mile south of Downan Point 2½ miles south of Balantrae.



(Plate 2) Limestone filling spaces between pillow-form masses of lava exposed near beach near Downan, 1½ miles south of Ballantrae.

(Plate 3) Isoclinal folds in green greywackes, mudstones and shales (Tappins series), Currarie Port, 3 miles south of Ballantrae.

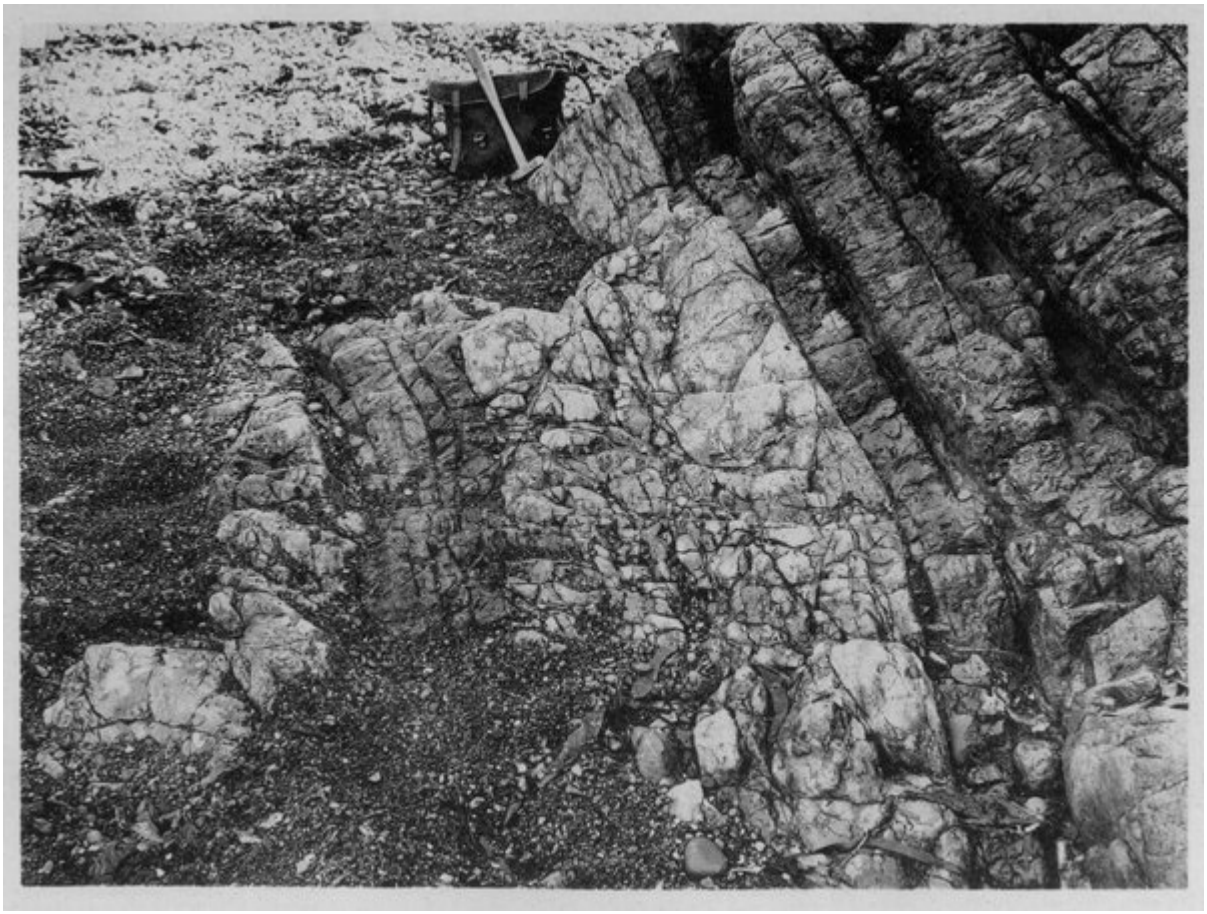
(Plate 4) Limestone filling spaces between pillow-form masses of lava, on shore near Downan, 1½ miles south of Ballantrae.



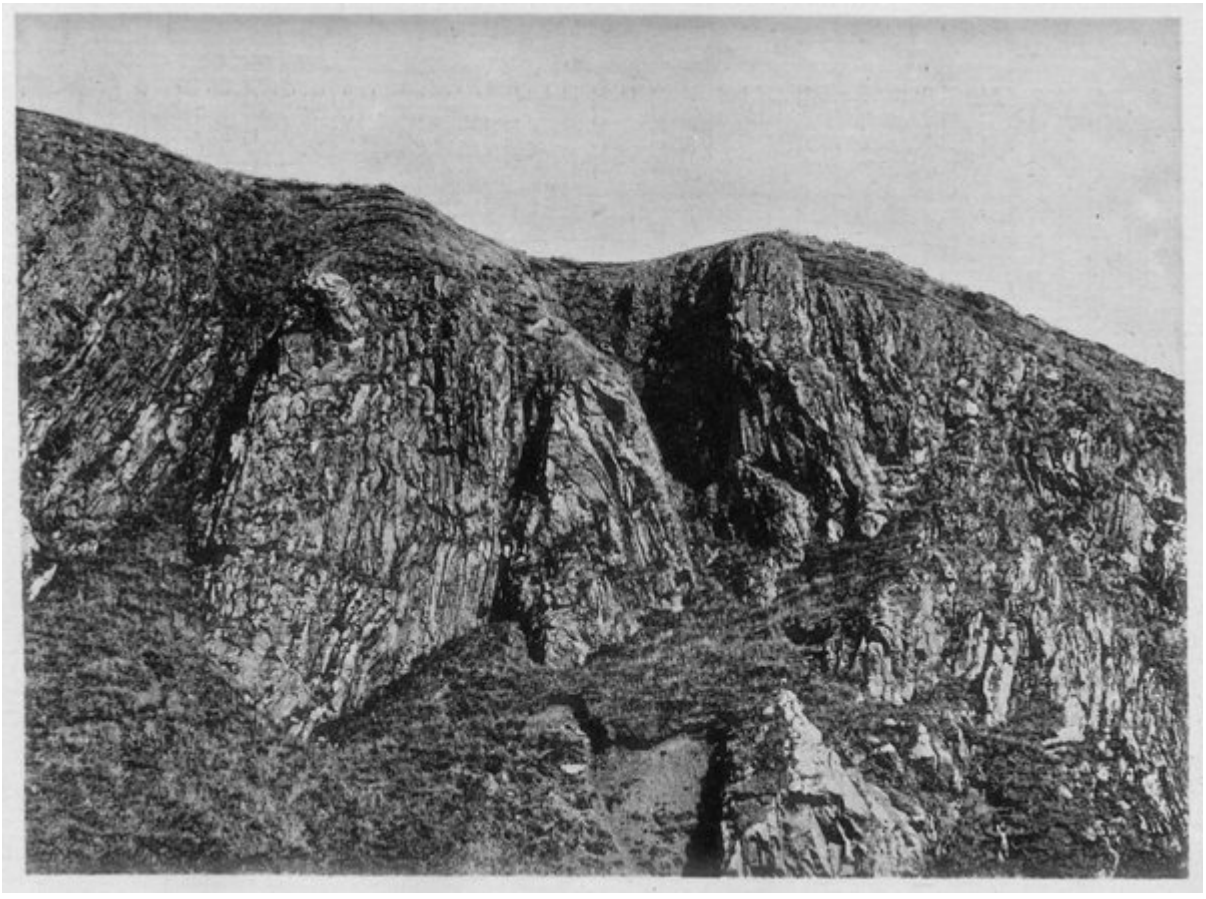
(Plate 5) Vesicular structure in pillow-form mass of lava, on beach near Downan, one mile south of Ballantrae.

(Plate 6) Radiolarian chert filling spaces between pillow-form masses of lava, on shore at Portandea, five miles south-west of Ballantrae.

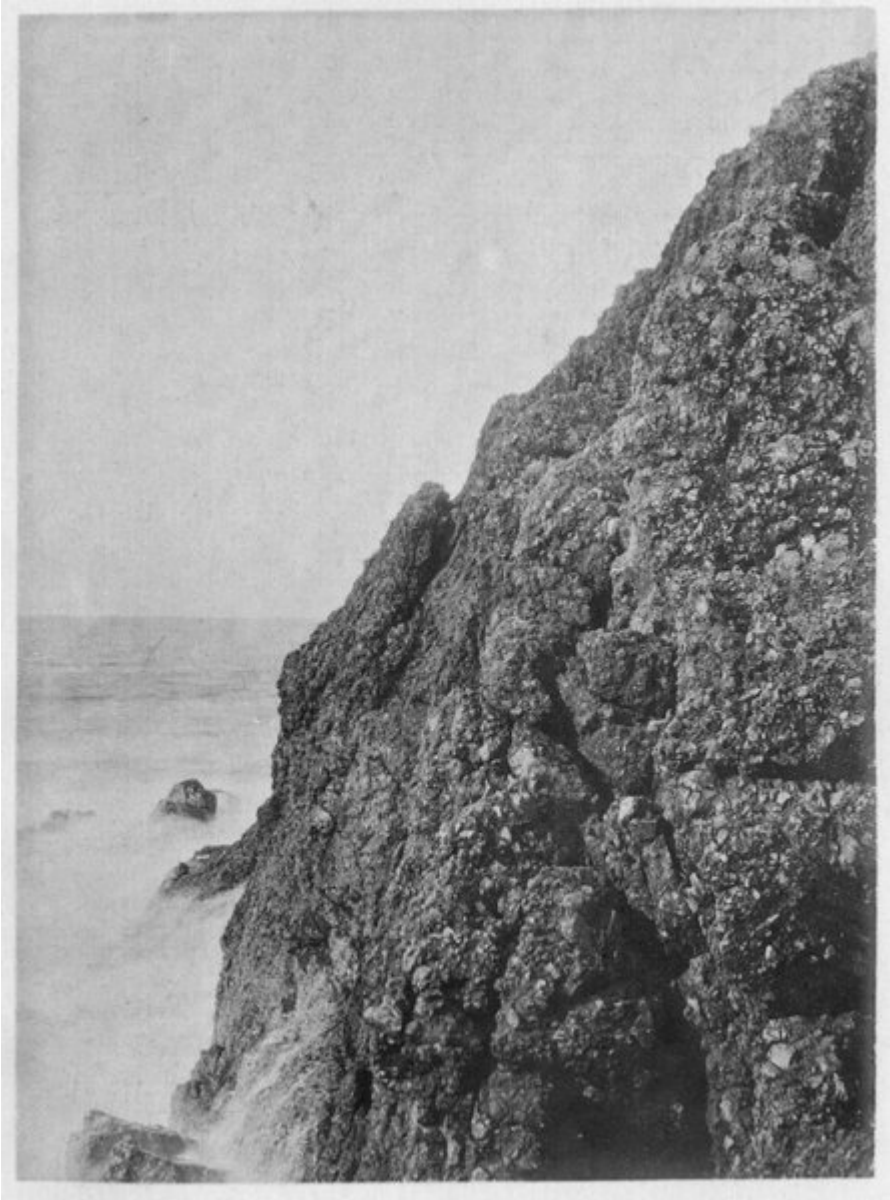
(Plate 7) Folds in Radiolarian chert, stack on shore at Benanne Cave, two miles north of Ballantrae.



(Plate 8) Alternation of tuff (lighter bands) and Radiolarian chert (darker bands), on shore at Bennane Cave, two miles north of Ballantrae.



(Plate 9) Folded Radiolarian chert and tuff, cliff south of Bennane Cave, two miles north of Ballantrae.

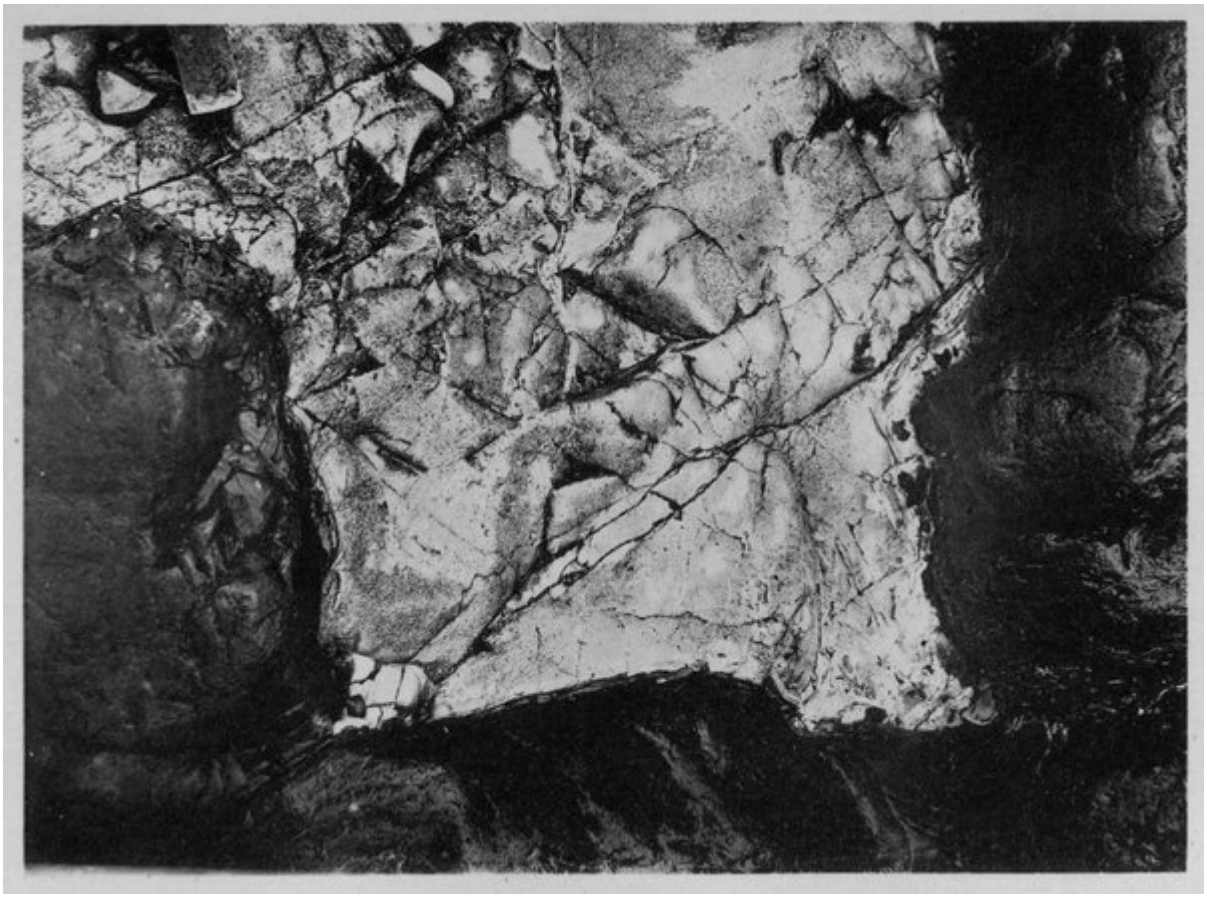


(Plate 10) Volcanic agglomerate in vertical beds, Bennane Head, 2½ miles north of Ballantrae.

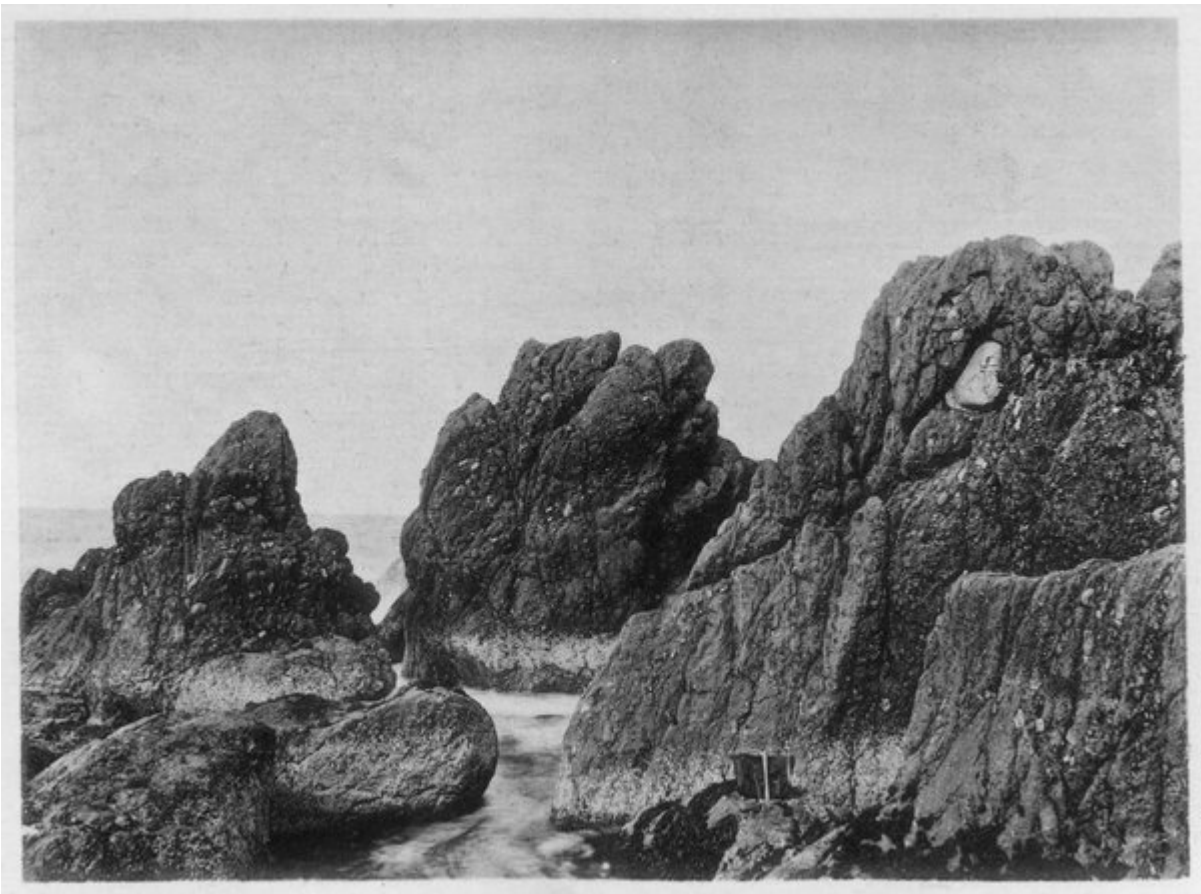
(Plate 11) Ashy mudstone and chert with graptolites, adhering to pillow-form surface of lava, shore near Balcreuchan Port, 3½ miles north of Ballantrae.

(Plate 12) Volcanic agglomerate, Stockenray Bay, 1¼ miles north of Lendalfoot.

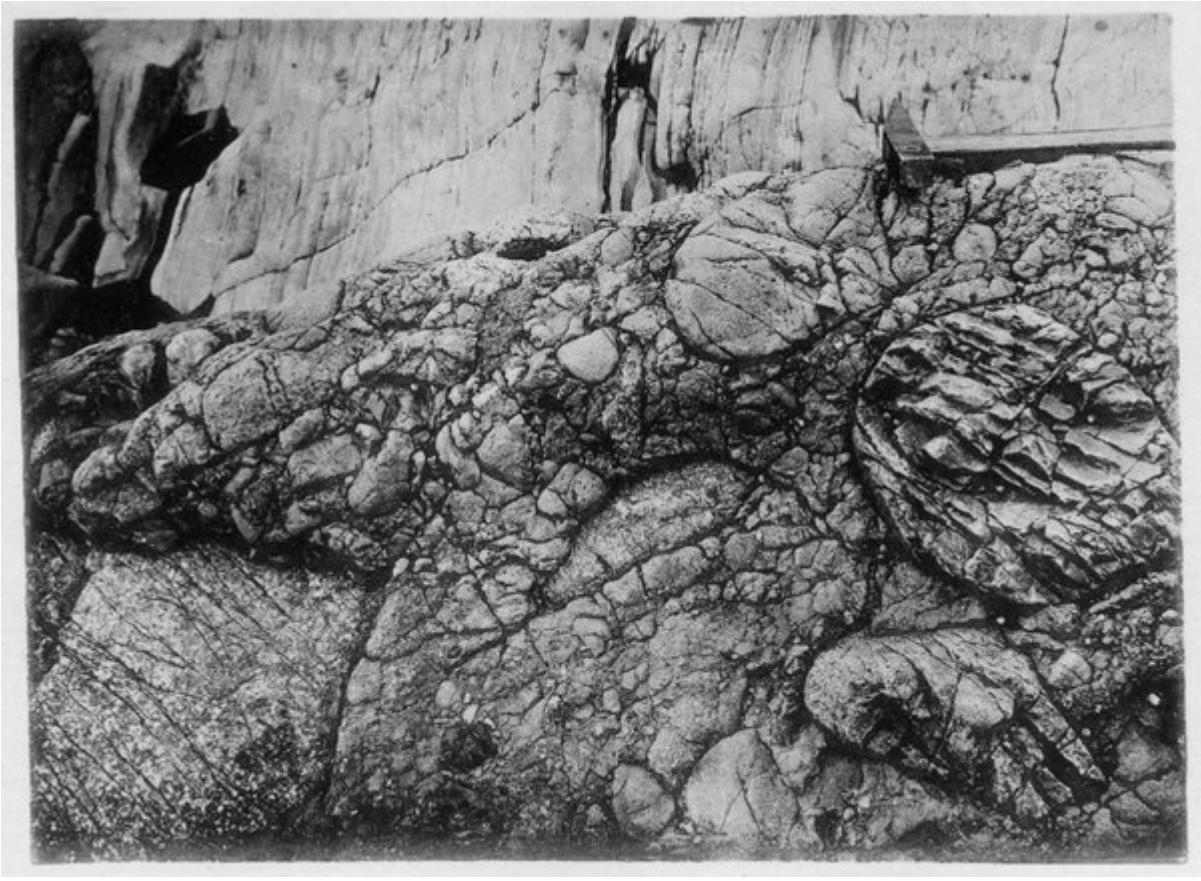
(Plate 13) Porphyritic lava, "Diabase porphyrite," Stockenray Bay, 1■ miles N of Lendalfoot.



(Plate 14) Junction of Dolerite dyke (light coloured mass) with Serpentine (darker mass), stack on shore 300 yards north of Lendalfoot.

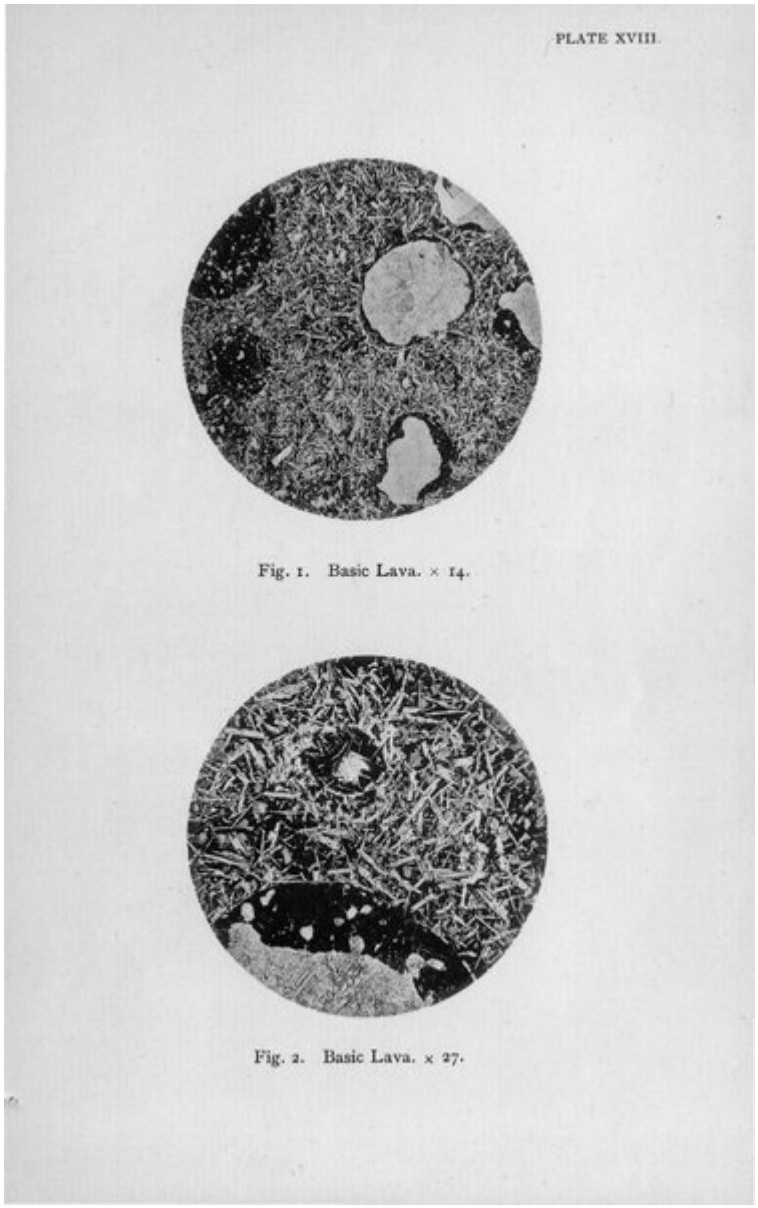


(Plate 15) Benan conglomerate; shore at Kennedy's Pass, four miles south of Girvan.

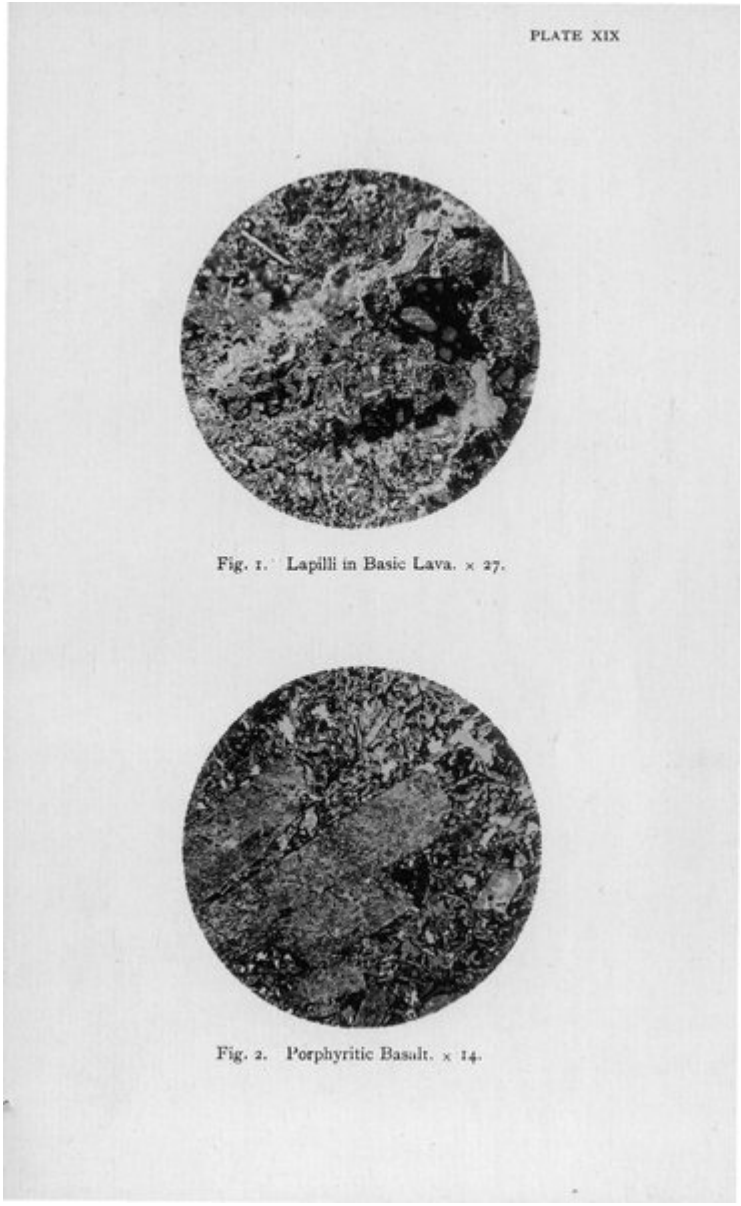


(Plate 16) Benan conglomerate, shore four miles south of Girvan.

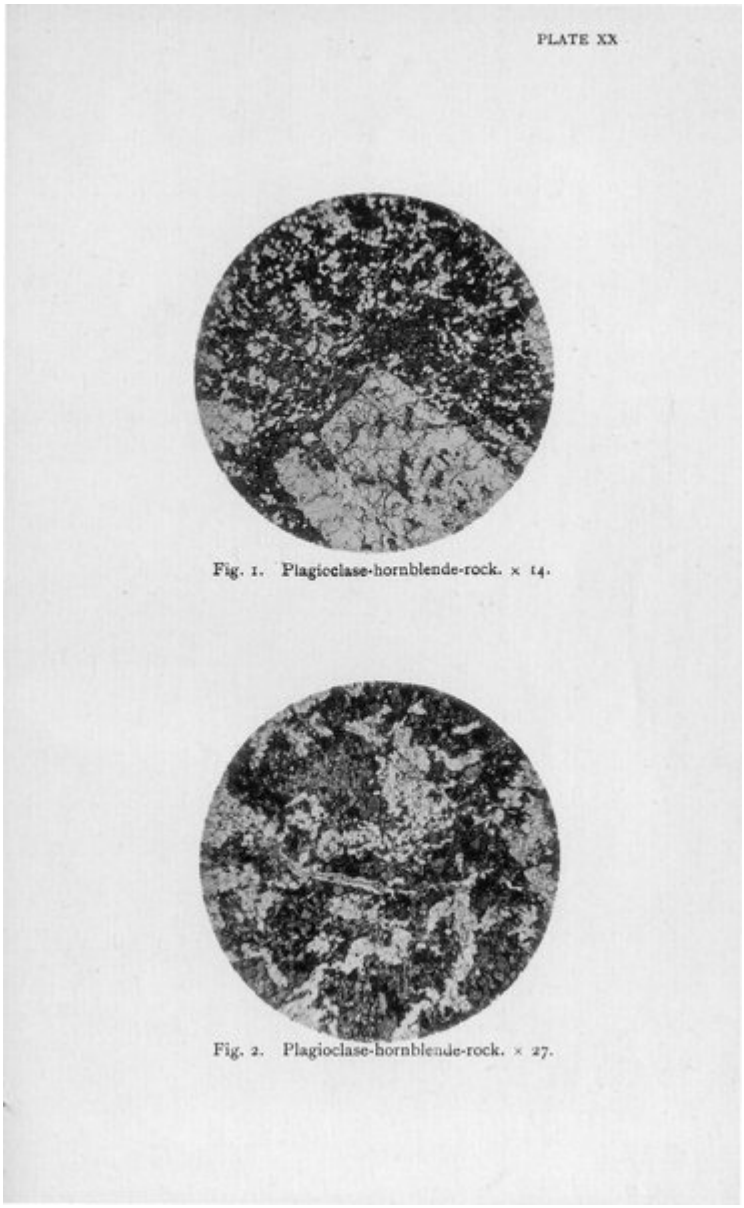
(Plate 17) Folded flagstones and shales (Ardmillan Series), shore 3¾ miles south of Girvan. ***8. Description of micro-photographs (Plates 18 to 25).***



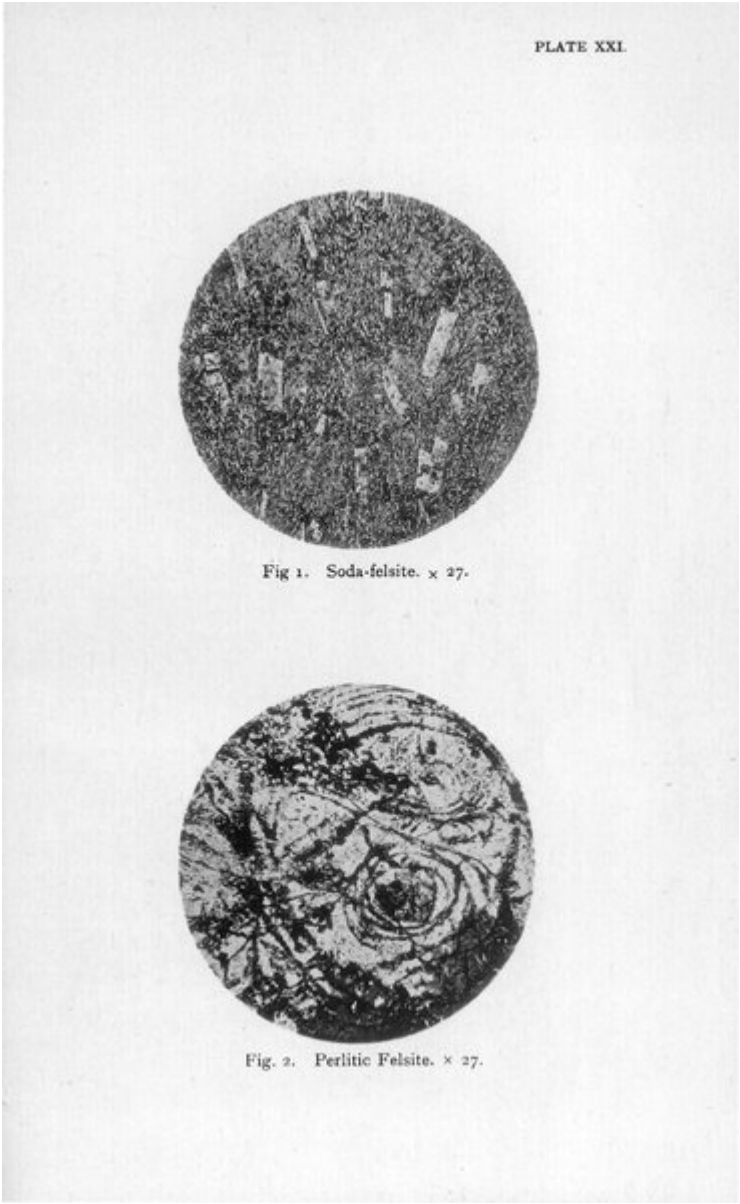
(Plate 18) 1. (S6415) Basic lava; slaggy margin of pillow-shaped mass. 350 yards N. of Port Vad, Ballantrae. Magnified 14 diameters. The large amygdaloid is mainly filled with calcite. A little interstitial matter may be seen round the margin. The irregular cavity below contains both calcite and interstitial matter. At the upper left-hand margin is seen a portion of a large amygdaloid entirely filled with interstitial matter. The main mass of the rock is formed of microlitic felspars, augite-granules, chlorite, magnetite, and interstitial matter. The microiltic felspars only can be clearly recognised in the figure. 2. (S6415) Another portion of the same slide. Magnified 27 diameters. Fig. 1. Basic Lava. x 14. Fig. 2. Basic Lava. x 27.



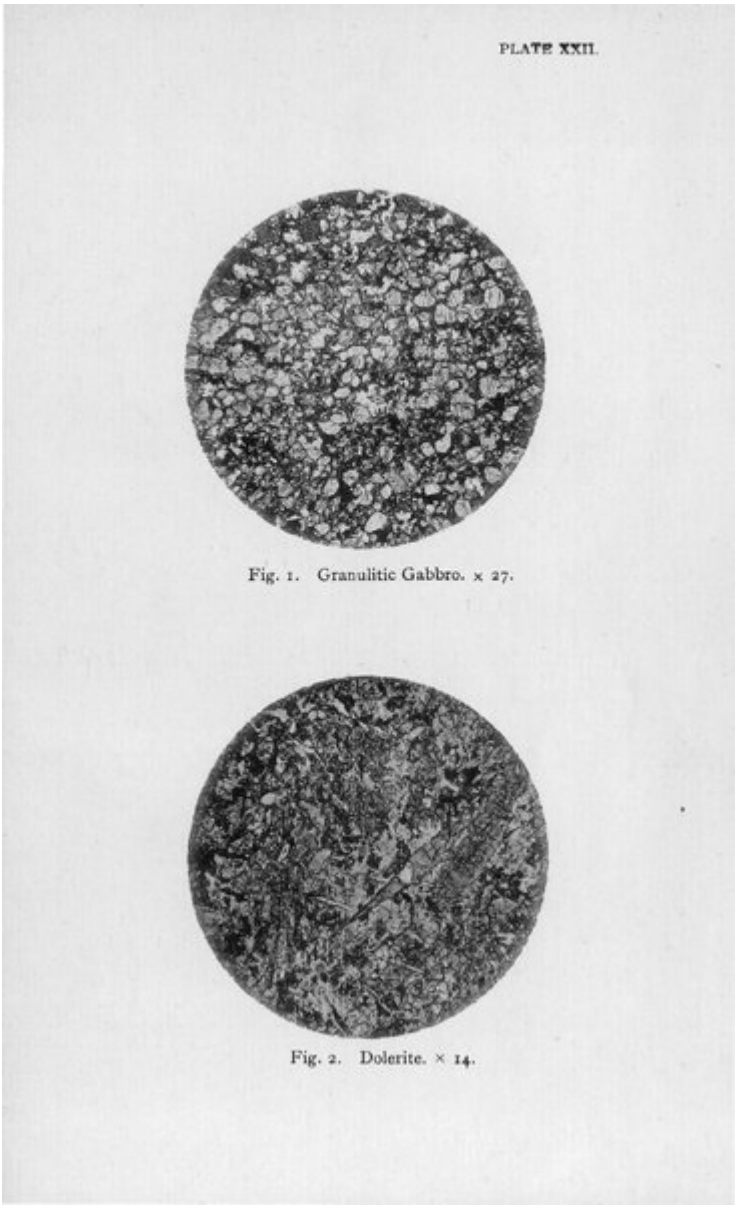
(Plate 19) 1. (S6416) Core of one of the pillow-shaped masses. Magnified 27 diameters. The portion of the slide represented in the figure contains vesicular lapilli; other portions of the same slide are similar to the main mass of the amygdaloidal rocks. 2. (S6419) Porphyritic lava. On shore 400 yards S. of fifth milestone from Girvan. Magnified 14 diameters. Large phenocrysts of basic plagioclase in a ground-mass of small felspars, chlorite, small augites, and a little interstitial matter. Fig. 1. Lapilli in Basic Lava. x 27. Fig. 2. Porphyritic Basalt. x 14.



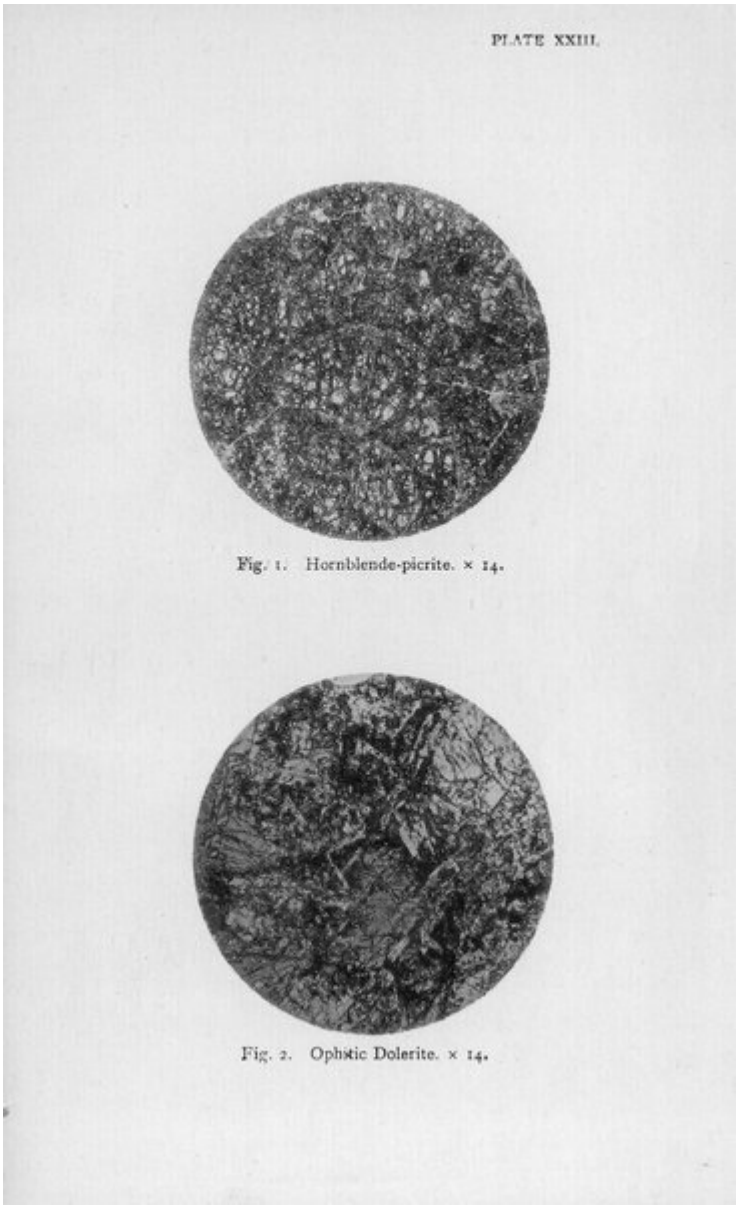
(Plate 20) 1. (S5927) Littleton Hill, Colmonell. Mass surrounded by serpentine. Magnified 14 diameters. Portion of a large phenocryst of plagioclase containing inclusions of brown hornblende in a ground-mass of brown hornblende, granulitic plagioclase, and iron ore. 2. (S6495) From boss near sheepfold, half a mile due W. of Balhamie Hill. Magnified 27 diameters. The dark patches are aggregates of brown hornblende; the white patches are aggregates of granulitic felspar. It will be observed that some of the patches of granulitic felspar show decided traces of a lath-shaped form. It is probable that the original rock was a dolerite. Fig. 1. Plagioclase-hornblende-rock. x 4. Fig. 2. Plagioclase-hornblende-rock. x 27.



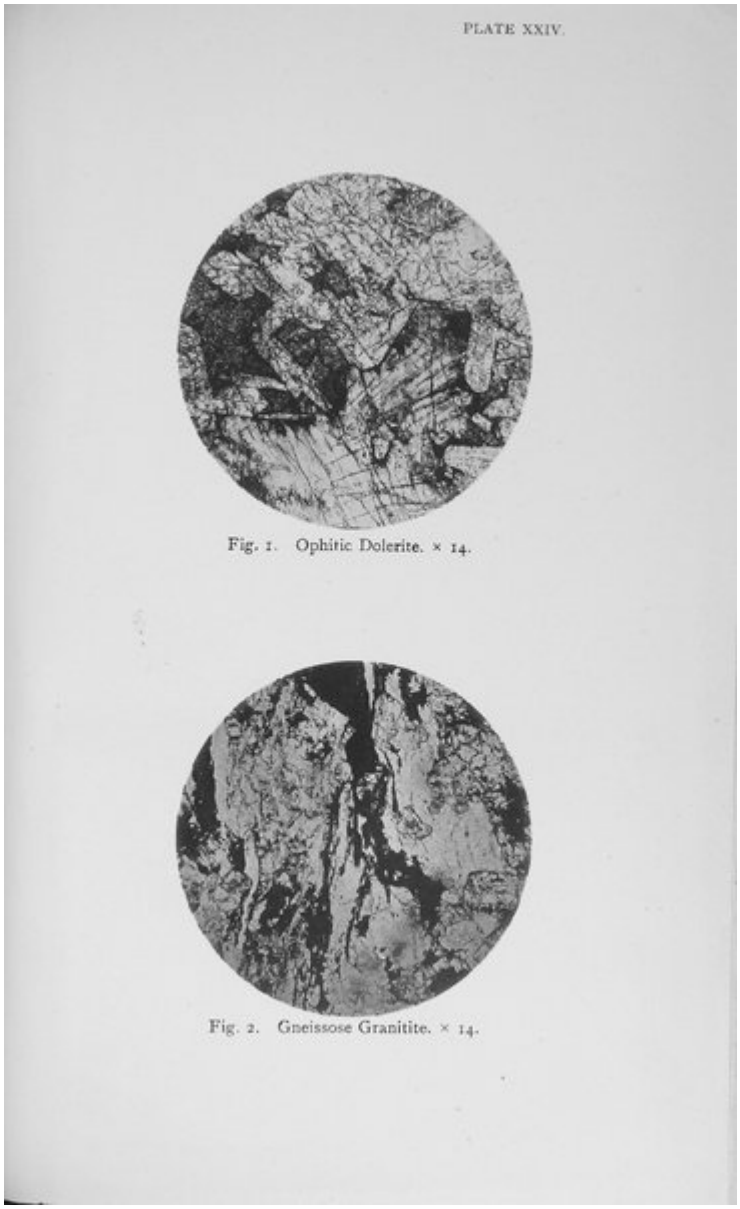
(Plate 21) 1. (S7510) Crest of Hamilton Hill, Peeblesshire. Soda-felsite. Magnified 27 diameters. Small phenocrysts of alkali-felspar in a ground-mass mainly composed of microlitic felspars (specimen analysed). 2. (S7152) Winkston Hill. Two miles N. of Peebles. Perlitic felsite. Magnified 27 diameters. The perlitic cracks are stained with ferric oxide. In the lower part of the figure the dark space represents a portion of a mass of carbonate which appears to replace the felsite, and through which the perlitic cracks pass without interruption. Fig 1. Soda-felsite. x 27. Fig. 2. Perlitic Felsite. x 27.



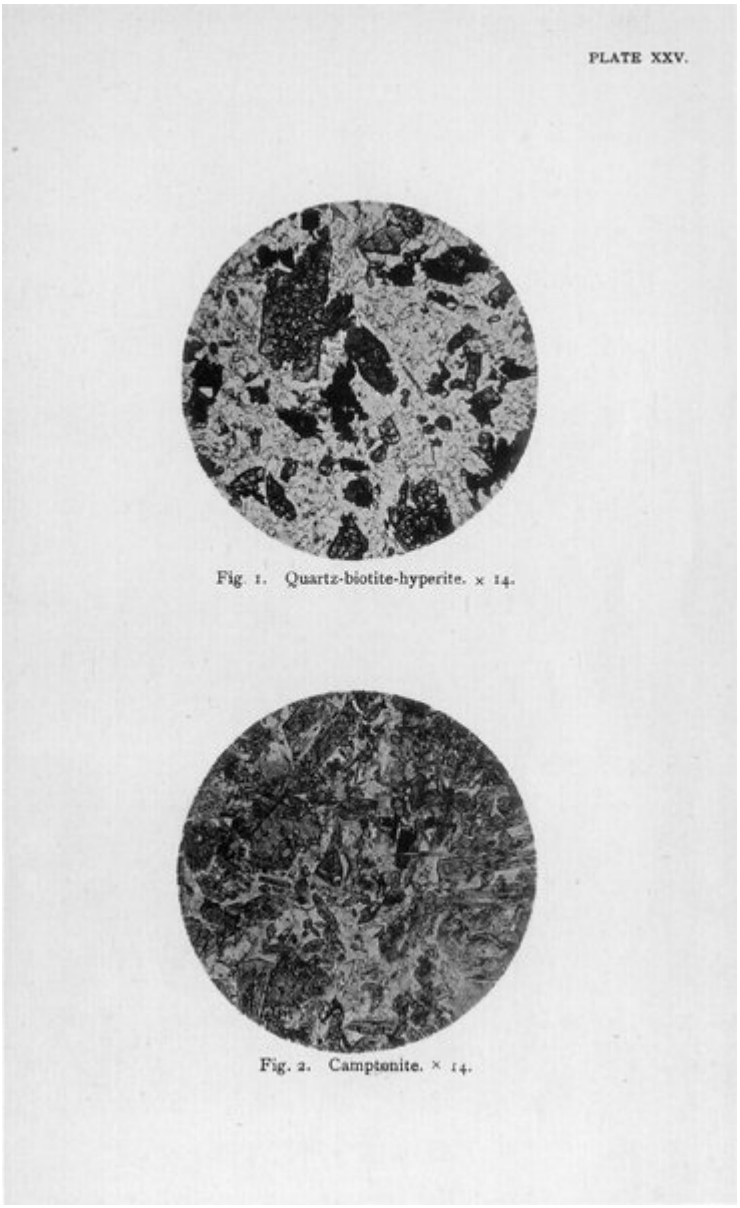
(Plate 22) 1. (S6494) Near old loch, Craig Hill. One mile N.B. of Garnaburn. Magnified 27 diameters. Banded granulitic rock composed of malacolite, felspar, brown hornblende, and iron ores. The greater portion of the figure represents a band of malacolite, felspar, and iron ore; at the top and slightly to the left is a small portion of a band formed of hornblende and felspar. This rock is the beer-bachite of Chelius. 2. (S6453). —Dolerite from centre of dyke, Lendalfoot. Magnified 14 diameters. The minerals represented are augite, more or less altered plagioclase, and magnetite. The augite shows a marked tendency to elongation in the direction of the vertical axis. Fig. 1. Granulitic Gabbro. x 27. Fig. 2. Dolerite. x 14.



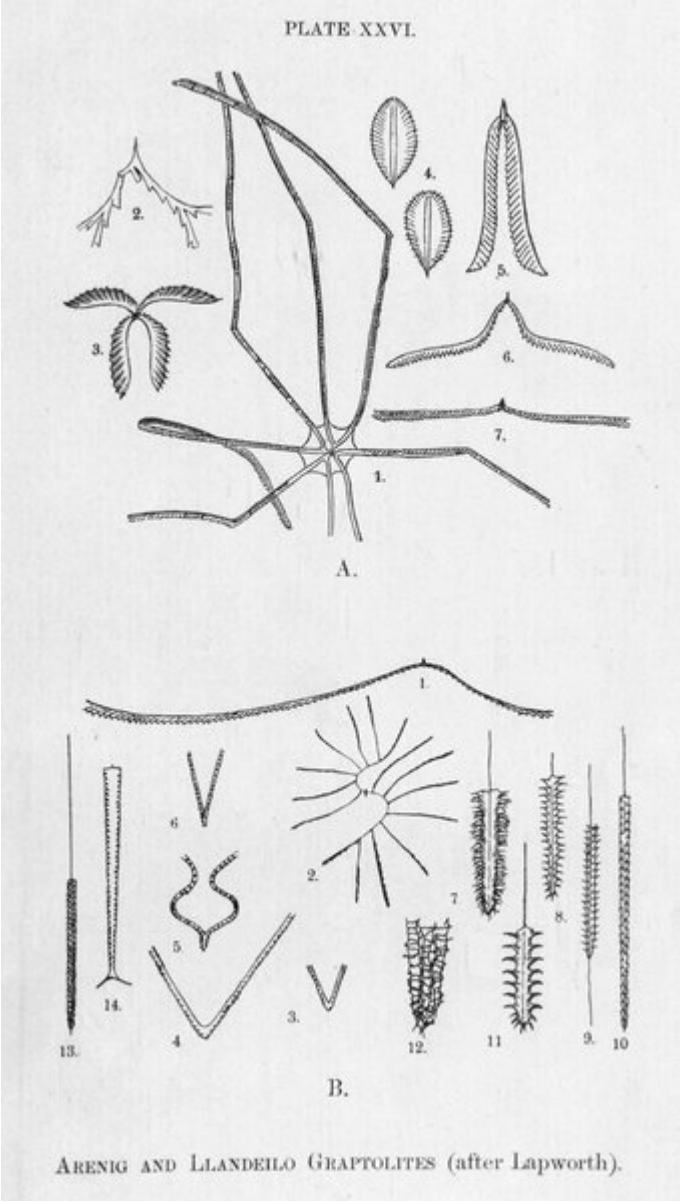
(Plate 23) 1. (S6432) Hornblende-picrite. Thin dyke-like vein in serpentine, 200 yards west of Balhamie Burn. Magnified 14 diameters. The dominant mineral is olivine, occurring in large grains, and traversed by the usual anastomosing veins, along which magnetite has been deposited. The spaces between the grains are now occupied by brown hornblende and alteration products after felspar. The amount of felspar originally present must have been very small. 2. (S6470) Coarse-grained ophitic dolerite, east side of Byne Hill, 6 yards from edge of mass. Magnified 14 diameters. The conspicuous patch near the centre represents an allotriomorphic grain of olivine. The other minerals art augite and more or less turbid plagioclase. A lobe of the olivine grain is seen in contact with augite in the lower or south-east quadrant, and the latter mineral is moulded on the former. As the olivine is clearly allotriomorphic with respect to the felspar, the order of consolidation in this rock has been basic plagioclase, olivine, augite. Fig. 1. Hornblende-picrite. x 14. Fig. 2. Ophitic Dolerite. x 14.



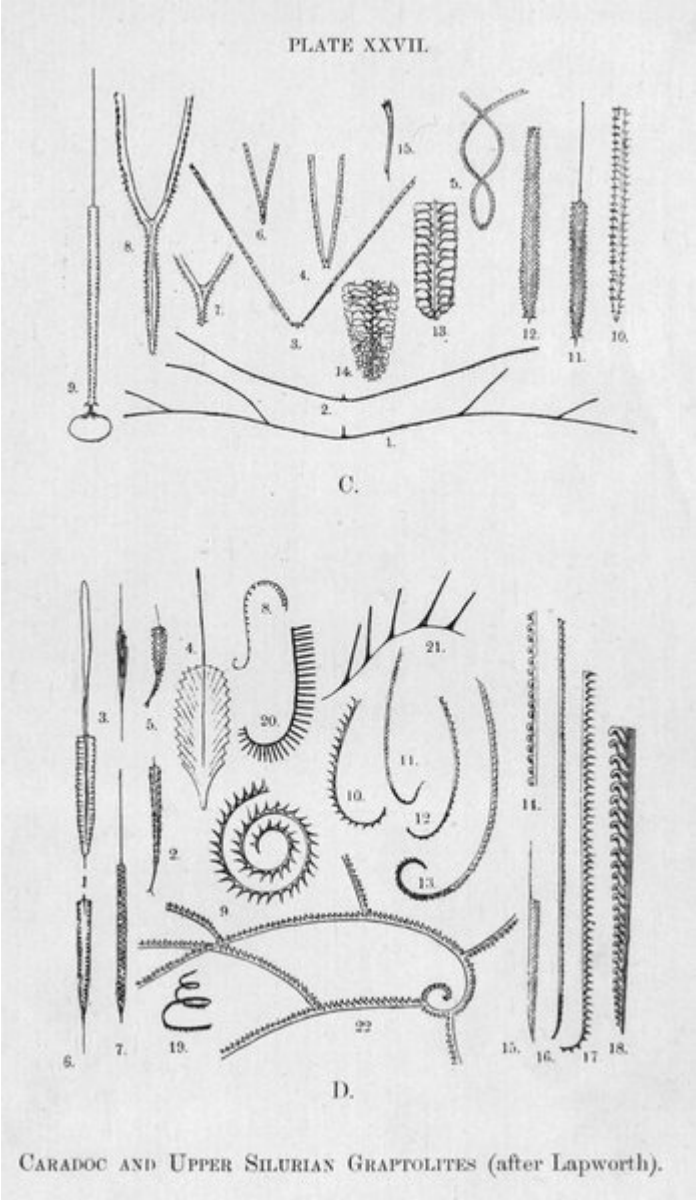
(Plate 24) 1. (S6470). Another portion of the same slide.



(Plate 25) 1. (S7050) Quartz-biotite-hyperite. Black Laggan, Loch Dee. Magnified 14 diameters. The minerals represented are hypersthene, biotite, felspar, and quartz. A large crystal of hypersthene occurs in the north-west quadrant, and there are several smaller grains of the same mineral in other parts of the figure. The opaque patches represent biotite, and the colourless portions felspar and quartz. 2. (S7047) Camptonite, Black Gairy Hill. Five miles S.W. of Loch Dee. Magnified 14 diameters. Idiomorphic pale brown hornblende in a felspathic matrix. Under crossed nicols the matrix breaks up into an aggregate of large grains, which mutually interfere with each other. The felspar belongs to the oligoclase-andesine section. Fig. 1. Quartz-biotite-hyperite. x 14. Fig. 2. Camptimite. x 14.



(Plate 26) ***A. Arenig and Lower Llandeilo graptolites.*** *1. Dichograptus octobrachiatus (Halt.) x ½ 2. Bryograptus Kjerulfi (Lapw.) x 2. 3. Tetragraptus bryonoides (Hall.) 4. Phyllograptus typus (Hall.) x ½ 5. Didymograptus Murchisoni (Barr.) 6. Didymograptus fractus (Salt.) 7. Didymograptus nitidus (Hall).* ***B Upper Llandeilo (Glenkiln) graptolites.*** *1. Didymograptus superstes (Lapw.) 2. Caenograptus gracilis (Hall.) 3. Dicellograptus sextans (Hall.) 4. Dicellograptus divaricatus (Hall.) 5. Dicranograptus zic-zac (Lapw.) 6 Dicranograptus formosus (Hopk.) 7 Lasiograptus bimucronatus (Nich.) 8. Diplograptus mucronatus (Hall.) 9. Diplograptus Whitfieldi (Hall.) 10. Diplograptus angustifolius (Hall.) 11. Glossograptus Hincksi (Hopk.) 12. Clathrograptus cuneiformis (Lapw.) x 3 13. Climacograptus Scharenbergi 14. Climacograptus bicornis (Hall.) Arenig and Llandeilo graptolites (after Lapworth).*



(Plate 27) ***C. Caradoc (Hartfell) Graptolites.*** *1. Pleurograptus linearis (Carr.) 2. Leptograptus flaccidus (Hall.) 3. Dicellograptus complanatus (Lapw.) 4. Dicellograptus Morrisi (Hopk.) 5. Dicellograptus caduceus (Lapw.) 6. Dicranograptus Clingani (Hopk.) 7. Dicranograptus Nicholsoni (Hopk.) 8. Dicranograptus ramosus (Hall.) 9. Climacograptus Wilsoni (Lapw.) 10. Diplograptus quadrimucronatus (Hall.) 11. Diplograptus foliaceus (Mwrch.) 12. Diplograptus truncatus (Lapw.) 13. Lasiograptus margaritatus (Lapw.) 14. Neurograptus fibratus (Lapw.) 15. Corynoides calycularis (Nich.)* ***D. Upper Silurian Graptolites*** *1. Diplograptus vesiculosus (Nich,.) 2. Diplograptus acuminatus (Nich.) 3. Cephalograptus cometa (Geinitz.) 4. Petalograptus folium (His.) 5. Dimorphograptus Swanstoni (Lapw.) 6. Climacograptus rectangularis (M'Coy.) 7. Climacograptus normalis (Lapw.) 8. Monograptus crispus (Lapw.) 9. Monograptus spiralis (Iteinitz.) 10. Monograptus triangulatus (Harkn.) 11. Monograptus exiguus (Nich.) 12. Monograptus gregarius (Lapw.) 13. Monograptus cyphus (Lapw.) 14. Monograptus lobiferus (M'Coy.) 15. Monograptus colonus (Barr.) 16. Monograptus jaculum (Lapw.) 17. Monograptus Sedgwicki (Portl.) 18. Monograptus priodon (Bronn.) 19. Monograptus turriculatus (Barr.) 20. Rastrites perigrinus (Barr.) 21. Rastrites maximus (Carr.) 22. Cyrtograptus Murchisoni (Carr.) Caradoc and Upper Silurian graptolites (after Lapworth).*