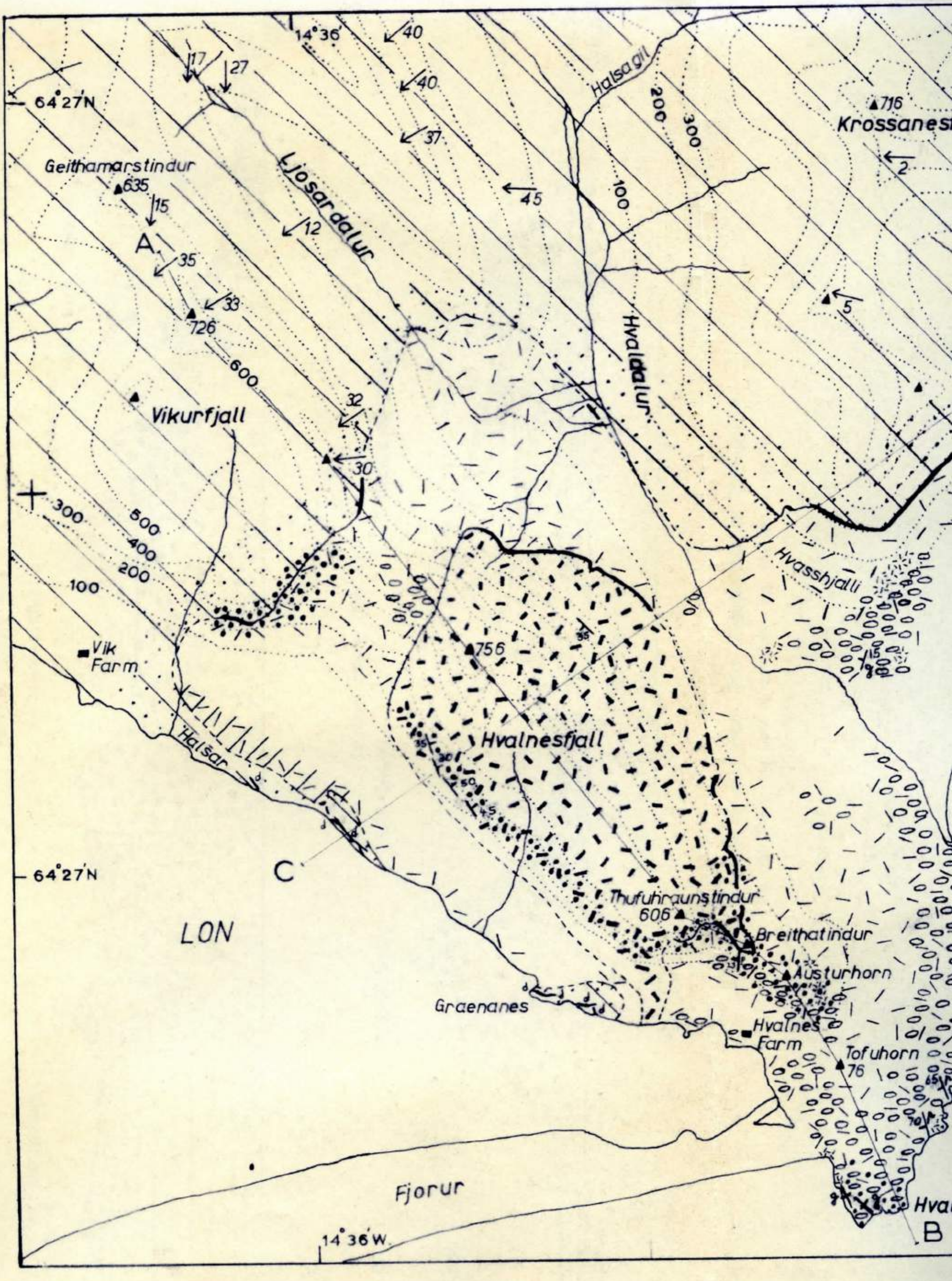

14°36'
64°27'N
Halsagil
Krossanes
Geithamarstindur
635
Ljosardalur
Hvaldalur
726
Vikurfjall
Hvasshjalli
756
Vik
Farm
Halsar
Hvalnesfjall
C
64°27'N
LON
Thufuhraunstindur
606
Breithatindur
Austurhorn
Graenanes
Hvalnes
Farm
Tofuhorn
76
Fjorur
14°36'W
B

14°30'W.
Hlaupgeiri
Halsagil
716
Krossanesfjall
D
Krossanes
Krossaneslaekur
Hvalnesskridur
Hvaldalur
Hvasshjalli
Hlidarsandur
756
Hvalnesfjall
Olneshofn
N
Thufuhraunstindur
606
Breithatindur
Austurhorn
Graenanes
Hvalnes Farm
Tofuhorn
76
Hvalnes
B
A
Sc
1
0
14°30'W.

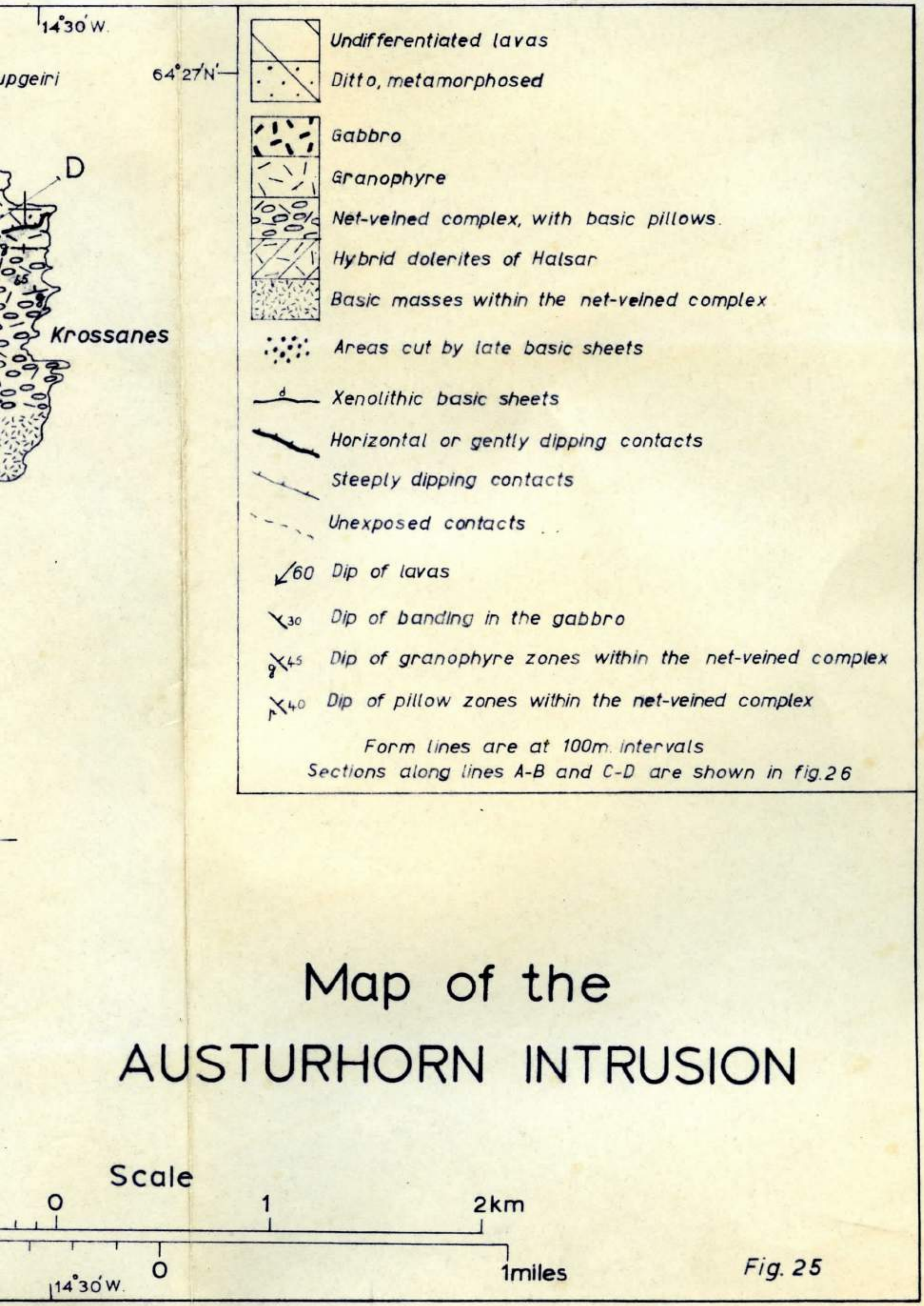

14°30'W.
64°27'N
upgeiri
D
Krossanes
Undifferentiated lavas
Ditto, metamorphosed
Gabbro
Granophyre
Net-veined complex, with basic pillows.
Hybrid dolerites of Halsar
Basic masses within the net-veined complex
Areas cut by late basic sheets
Xenolithic basic sheets
Horizontal or gently dipping contacts
Steeply dipping contacts
Unexposed contacts
Dip of lavas
Dip of banding in the gabbro
Dip of granophyre zones within the net-veined complex
Dip of pillow zones within the net-veined complex
Form lines are at 100m. intervals
Sections along lines A-B and C-D are shown in fig.26
Map of the
AUSTURHORN INTRUSION
Scale
0
1
2km
0
1miles
14°30'W.

Fig. 25

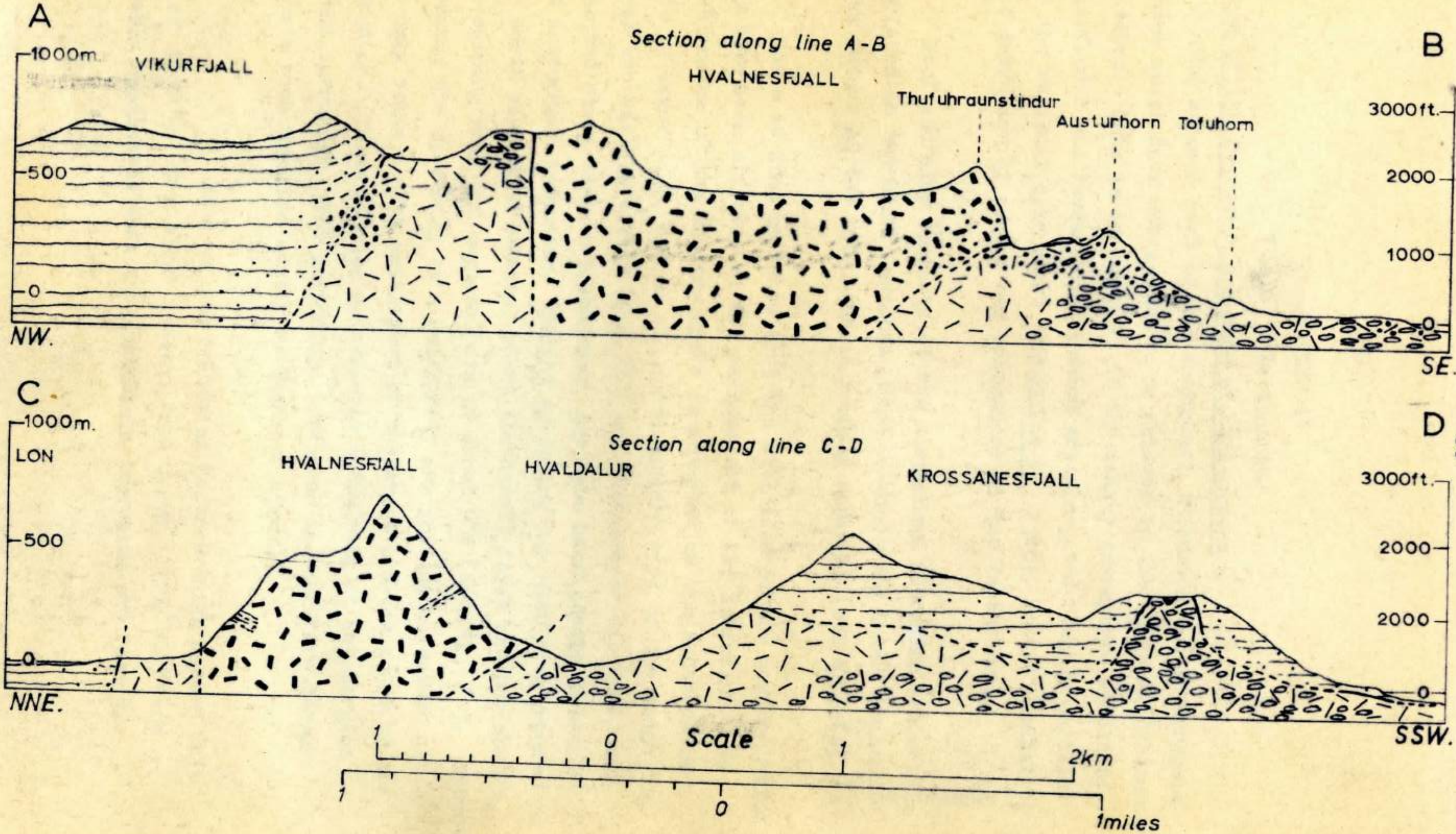


Fig. 26 **Sections across the Austurhorn Intrusion**

Section lines and key to symbols are shown in fig.25

CHAPTER 11

Field Relationships

1. Form of the Intrusion and Mode of Emplacement

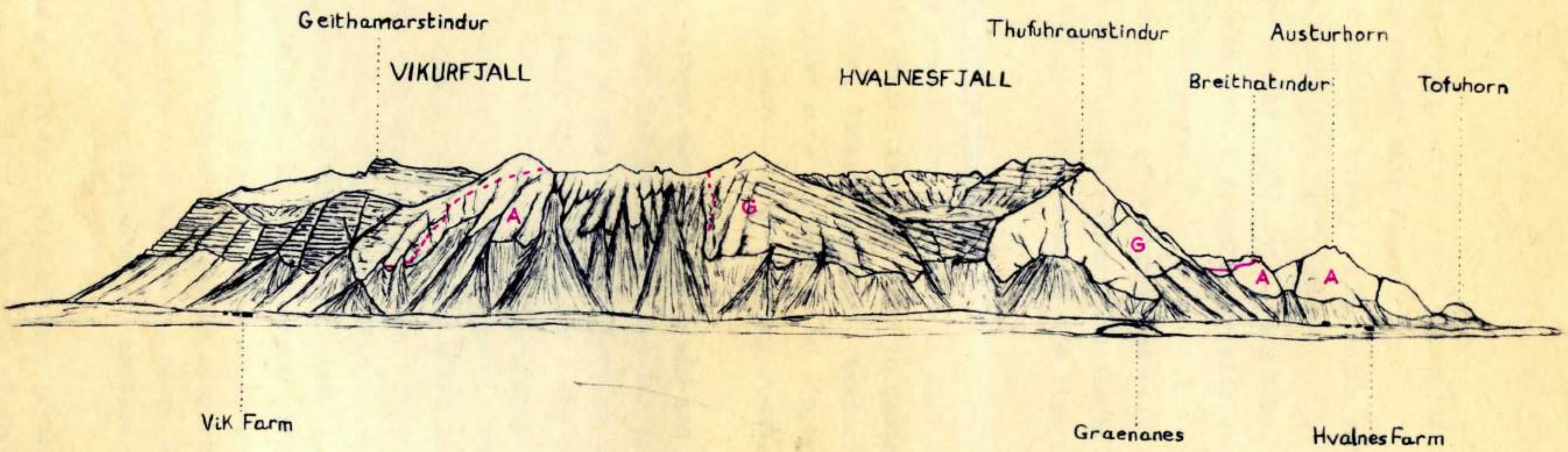
The exposed part of the Austurhorn intrusion has an irregular shape which does not appear to be related to the regional tensional pattern. This is in contrast to the nearby granophyre stocks of Slaufrudal and Reydaratindur, which are elongated roughly parallel to the regional dyke swarm (Cargill et al, 1928), but is similar to the intrusion of gabbro and granophyre at the Vesturhorn.

Roof and side contacts of the Austurhorn intrusion are well displayed in the cliff sections (figs27&28)and from these the stock-like nature of the intrusion is readily apparent (see also fig. 26).

There is some evidence that the attitudes of the country rocks may have been affected by the emplacement of the intrusion. No disturbance of the country rocks is apparent on the south-western side of Vikurfjall, but on the north-eastern side of the ridge the lavas are visibly tilted (fig. 26) and the steeper dip here, and also the steep dips on Ljoshamrar, may have been partly caused by the Austurhorn intrusion. Slight up-doming may also have occured on the north side of Krossanes, where the basalt lavas are horizontal, contrasting with the regional dip of about 7^{o}W (see fig. 2). Generally however, the up-doming is a relatively insignificant feature and can only solve a very small part of the space problem posed by the intrusion. There is also no evidence of faulting at the margins of the intrusion. The Austurhorn intrusion is therefore thought to have been emplaced mostly by overhead stoping.

Most of the following factors which appear to favour stoping by a magma (quoted from Grout, 1935, p.2) were probably applicable when the Austurhorn intrusion was formed.

Fig. 27



The Austurhorn Ridge —

from the Lonfjörur.
length of cliff 5·5Km.

G=gabbro A=granophyre

"1. Shallow depth, where rocks are brittle and where they fracture rather than flow.
2. A broad surface underlain by magma rather than injection into a small pipe or fracture.
3. A magma thinly fluid for a long time.
4. Wall rocks with a specific gravity very different from that of the magma.
5. An oscillation of pressure and relaxation which might loosen roof blocks rather than simply raise them; the magma being passive much of the time rather than aggressive."

2. **External** Contacts of the Intrusion

Although the Austurhorn intrusion is made up largely of gabbro and granophyre the gabbro is never seen in contact with the country rocks, and everywhere, except at Halsar, east of Vik farm, where the marginal intrusive rock appears to be a hybrid dolerite, only granophyre occurs adjacent to the country rocks.

The contact between the granophyre and the basalt lavas of the country rocks is sharp and is often irregular in detail (fig28b) with many thin veins of granophyre penetrating the basalt. In places - in Ljosardalur and at Krossanes - the contact basalt has been brecciated during the intrusion of the granophyre, the cracks so formed now being infilled by the granophyre. Besides the breccia veining, longer and more sinuous veins, often less than 1cm. thick, also penetrate the adjacent basalt lavas. These veins may extend inwards for many metres, as in Ljosardalur, where thin acid veins are found up to 200m. away from the nearest visible contact. Other sinuous veins are shorter, tapering to zero within one or two metres of the contact; such veins often occur in flame-like groups, as above Hvalnesskridur. Thicker dyke-like apophyses of granophyre are sometimes associated with the veins, as on Hvasshjalli, Vikurfjall and near the stream Krossaneslaekur at the base of Krossanesfjall.

The thinness and irregularity of many of the veins indicate that the acid magma was very fluid at the time of their formation (as also

Fig.28a. The roof contact of the granophyre with basalt country rocks, exposed at 490m. on the north-east side of Vikurfjall.

Fig.28b. The south-east side of Krossanesfjall showing the contact (-c-) of the granophyre with the country rocks. The small gabbro mass (g) within the net-veined complex on Hvasshjalli is also shown.

suggested by Hawkes). They are almost always composed of leucocratic granophyre, and often contain angular fragments of locally derived basalt. Some of the acid veins on Vikurfjall cut the marginal granophyre as well as the basalt and must have been formed after the contact granophyre had partly crystallised.

Generally the granophyre shows little or no chilling against the country rocks. Drusy cavities, which are widely distributed in the granophyre, often persist right up to the contact, as on Hvasshjalli and at Krossanes. Non-drusy granophyre, with abundant small and partly acidified basic inclusions, occurs at the contact in Ljosardalur and along much of the contact on the south side of Vikurfjall, while on Hvalnesskridur the net-veined complex occurs alongside the country rocks.

On the southern side of Vikurfjall many basic, occasional acid and rare composite sheets cut both the granophyre and the country rocks, and locally occur along the actual contact. The acid sheets and the central component of the composite sheets are formed of porphyritic felsite. This felsite is frequently cut by granophyre veins and locally appears to grade into normal granophyre, against which it is never seen to be marginally chilled.

3. Contact of the Hvalnesfjall gabbro with the granophyre

The Hvalnesfjall gabbro is almost completely surrounded by granophyre and granophyre is the only rock seen in contact with the gabbro. The contact is particularly well exposed on the southern side of Breithatindur, above Hvalnes Farm, where the dark gabbro irregularly overlies the paler granophyre (fig.29a). The approximate inclinations of the contact are shown in fig 25.

At its eastern exposures the contact is sharp and irregular and neither the gabbro nor the granophyre show any signs of chilling. Numerous thin and irregular acid veins cut the gabbro within a metre or so of the contact, and apophyses of granophyre project upwards into

Fig.29a. The contact between the gabbro (G) and granophyre (A) on the south-west side of Breithatindur, above Hvalnes Farm.

Fig.29b. The vertical gabbro-granophyre contact (c) on the west side of Hvalnesfjall, from the south-west. G = gabbro, A = granophyre.

the gabbro. The thin acid veins are often less than a centimetre thick, again indicating a very mobile magma. The granophyre also cuts across what appears to be banding within the gabbro and there seems to be little doubt here that the granophyre is later than the gabbro.

The north-western section of the gabbro-granophyre contact. is somewhat different in character. In the lower exposures, where both the granophyre and gabbro show flaggy weathering, the contact between the two rocks is gradational over a distance of approximately one metre, normal coarse-grained gabbro passingthrough a transitional "mixed" zone into a greyish granophyre. Above 300m. the contact is marked by a breccia zone of similar thickness in which gabbro fragments lie in a matrix of granophyre. The granophyre close to the breccia zone is very rich in basic inclusions which give the rock a spotted appearance; the gabbro, on the other hand, appears to be quite normal. Here again the granophyre appears definitely later than the gabbro.

4. Minor Intrusive Sheets Associated with the Austurhorn Intrusion

Although the regional dyke swarm does not appear to cut the Austurhorn intrusion, a large number of irregular basaltic sheets (figs.26&30a) intrude the gabbro and granophyre south and west of the Hvaldalur river. These sheets are most abundant outside the net-veined complexes. Many are porphyritic and almost all are less than a metre thick, with markedly chilled margins. Generally the sheets are steeply dipping and they frequently cut each other, as is plainly visible on the cliffs of the Austurhorn above Hvalnes Farm (the "anastomosing dykes" of Hawkes). Often, too, the sheets form the sites of crevices and gullies, being more readily eroded than the gabbro or granophyre, and many of the extensive gabbro rock faces appear to be formed along the planes of the sheets.

Other basic sheets, some of which are probably related to those cutting the Austurhorn intrusion, intrude basalt lavas along the coast between Hvalnes and Vik farms. A number of the sheets here (the Differentiated Sheets, p. 75) contain gabbroic crystal clots and inclusions of granophyre and of porphyritic felsite(similar to that cutting the granophyre of Vikurfjall).

In addition to the basic sheets, rare acid minor intrusions cut the Austurhorn intrusion and a number of acid sheets cut the basalt lavas along the shore between Hvalnes and Vik farms. Some of these may be connected with the main Austurhorn intrusion.

Fig.30a. Thin basic sheets cutting granophyre on the west side of Austurhorn, above Hvalnes Farm. The deep cleft in the cliff is formed along a basic dyke.

Fig.30b. Granophyre showing a platy jointing parallel with the topography, Ljosardalur.

CHAPTER 12

The Granophyre

Field Description

A variety of acid rocks occur within the Austurhorn intrusion, and though generally termed granophyre they also include granites. The rocks are usually pale in colour and commonly contain many small inclusions which appear to be partly digested basic xenoliths. The commonest type of acid rock is the pale pinkish drusy granophyre which occurs on Krossanesfjall, on parts of Vikurfjall and Breithatindur, and on Tofuhorn. Small white feldspar phenocrysts are frequently visible on fresh and weathered surfaces of this granophyre, but, quartz, which is largely confined to the matrix, is seldom visible in the hand specimen. The ferro-magnesian minerals often form acicular crystals, usually less than one centimetre in length though rarely as much as 7cms., as in the granophyre below the gabbro on Breithatindur. In any one spot all the acicular crystals tend to be the same size and they never seem to show any preferred orientation. Drusy cavities, up to 5cm. in diametre, are widespread: they are particularly characteristic of the most leucocratic pink granophyres, and are usually lined with small euhedral feldspar, quartz and magnetite crystals.

Much of the granophyre west of the Hvalnesfjall gabbro on Vikurfjall and also in Ljosardalur, Hvaldalur and along the coast south-east of Vik farm is white or greenish rather than pink (the greenish tinge is due to locally abundant epidote). This type differs from the pink granophyre in that feldspar phenocrysts are generally more abundant while drusy cavities are either absent or very small and ferromagnesian minerals only rarely form acicular crystals. In addition small basic inclusions, some of them partly digested, are more numerous. Another type of granophyre found locally on Vikurfjall and Breithatindur is more basic and has a colour index greater than 10.

The contacts between the different varieties of granophyre are sometimes gradational, but sharp contacts are more common, andit is a general rule that where one variety cuts another, the paler (or pinker) and more acid of the two is the later. The latest granophyre of all forms thin leucocratic veins which cut across all other granophyres (and across the basic inclusions within the net-veined complex) and also penetrate the country rocks and the Hvalnesfjall gabbro mass.

The granophyre normally shows a platy jointing developed roughly parallel to the present topography. This is particularly well displayed to the north-west of the Hvalnesfjall gabbro along and on either side of the main ridge and in Ljosardalur (fig. 30). The granophyre slabs produced by this jointing are often extremely thin, ranging down to a centimetre in thickness.

Petrography

The granophyres are composed essentially of quartz and alkali feldspar, commonly with the addition of plagioclase. Dark minerals usually make up less than 10% of the rock: besides iron ore, which is always present, they may include augite, ferroaugite, aegirine-augite, fayalite and/or hornblende. Allanite, apatite, epidote and zircon are normal minor constituents, biotite, calcite, chlorite, sphene and colourless amphibole are rather less common, while fluorite, iddingsite and sericite are occasionally present. In the drusy cavities the chief minerals are quartz and alkali feldspar, often with epidote, amphibole, magnetite and calcite; garnet and laumontite have also been found in druses.

The majority of the granophyres are porphyritic, with generally euhedral phenocrysts of either plagioclase or alkali feldspar and commonly of one or more ferromagnesian mineral. The phenocrysts lie in a groundmass made up almost entirely of quartz and alkali feldspar which typically form micrographic intergrowths, though all gradations occur between micrographic and granitic textures. These groundmass textures have been described in detail by Hawkes (Cargill et al, 1928, p.528), and they are similar to those of the Skye granophyres (Harker, 1904, p.161). Not uncommonly micrographic patches or grains occur within a general granitic (or micrograniti c) texture. The proportion of groundmass to phenocrysts varies considerably - see modal analyses, table5. A photomicrograph of a typical granophyre is shown in fig. 31.

Plagioclase phenocrysts are most abundant in the white and green granophyres, while those of alkali feldspar are confined to granophyres in which plagioclase is absent. Of the ferromagnesian minerals ferroaugite, aegirine-augite and fayalite only occur in the more acid granophyre, while augite and hornblende are characteristic of the more basic types. Crystals of aegirine-augite have only been found in granophyres containing phenocrysts of alkali feldspar.

Most of the grey granodioritic granophyres are probably hybrid rocks. They contain phenocrysts of strongly zoned plagioclase (with andesine or sodic labradorite cores) and have greenish brown hornblende as the chief ferromagnesian mineral. Partly altered augite is usually present, with green hornblende and chlorite as common secondary minerals, often with associated brown (rarely green) biotite. Granular iron ore and needles of apatite are characteristically abundant in such rocks.

The rock forming the transition zone between the gabbro and the more normal granophyre on the west side of Hvalnesfjall is also hybrid in character. In this rock the plagioclase occurs as euhedral crystals surrounded by irregular mantles of perthitic alkali feldspar. These mantles may be micrographically intergrown with quartz, the micrographic fret being vermiform instead of the usual angular type. Anhedral crystals of alkali feldspar, with very irregular mutual boundaries, locally take the place of the plagioclase phenocrysts.

Fig.31. Photomicrograph of a typical granophyre (H304) from the Austurhorn intrusion. Phenocrysts of ferroaugite and euhedral plagioclase (with margins of turbid alkali feldspar) lie in a micrographic groundmass of quartz and alkali feldspar. X20. Ordinary light.

The ferromagnesian minerals are interstitial to the larger feldspar crystals: they consist of either pale greenish-brown hornblende, as granular anhedral poikilitic crystals which often have cores of augite; or brown biotite, as small granular crystals in irregular poikilitic aggregates. Both the hornblende and biotite are associated with granular iron ore: the ore is often surrounded by thin rims of sphene. Quartz and alkali feldspar, sometimes microgranitic, sometimes in fine-grained vermiform micrographic frets, form a generally sparse matrix. The texture of the rock is suggestive of partial recrystallisation as well as of hybridisation (Joplin, 1935).

The later aplitic veins which cut the other granophyres are non-porphyritic and composed almost entirely of micrographic quartz and alkali feldspar.

The partly digested basic inclusions within the granophyre sometimes form prominent clots composed of aggregates of hornblende, biotite, ore and feldspar (plagioclase and/or alkali feldspar). At other times they are represented by finer-grained non-porphyritic and non-granophyric feldspathic patches containing small scattered crystals of hornblende and ore.

Alkali feldspar is almost always turbid. It forms interstitial grains, micrographic intergrowths with quartz, mantles around plagioclase phenocrysts and, in some pink granophyres, euhedral phenocrysts. The phenocrysts are usually either less than 1mm. or more than 2mm. in length, and are sometimes markedly elongate. Much of the alkali feldspar is micro- or cryptoperthite, except for the larger phenocrysts, which usually show the characteristic complex twinning of anorthoclase. Such phenocrysts are often zoned, with comparatively clear centres of anorthoclase passing outwards into turbid perthitic margins.

Quartz never occurs as phenocrysts and is euhedral only in drusy cavities. Elsewhere it occurs as anhedral interstitial crystals and in micrographic frets; sometimes quartz crystals form small "pools" with irregular intergrowths of alkali feldspar around their margins.

Plagioclase usually forms clear euhedral phenocrysts, 2 - 5 cm. long, which commonly have an elongate primatic habit. The phenocrysts are invariably zoned, typically with cores of oligoclase-andesine (An 30-35) passing outwards into more sodic margins which merge into mantling turbid alkali feldspar: this turbid border, which is in crystallographic continuity with the plagioclase host, often has a very irregular outer contact. In the basic granophyres the plagioclase cores are more calcic (e.g. An60 in specimen H187). Usually the plagioclase appears little altered, though sericite, calcite, epidote and chlorite occasionally occur as secondary products. Sometimes the phenocrysts appear corroded and may show partial replacement by alkali feldspar and quartz.

The three varieties of pyroxene found in the granophyres generally form sub-hedral crystals containing inclusions of iron-ore. Colourless or very pale brownish augite is found in the basic granophyres, where it commonly shows alteration to uralitic hornblende and sometimes also to biotite, calcite and limonite. Often the augite appears to be xenocrystic. A very pale greenish augite, always unaltered, also occurs in some of the basic granophyres.

Ferroaugite forms greyish green or brownish green, generally elongate, crystals which are sometimes more than 7mm. long. Most crystals are weakly pleochroic and often appear to be irregularly zoned, as indicated by patchy colour and variations in 2V and refractive indices; some crystals also have irregular outer zones of bright green pyroxene (probably aegirine-augite), 2V of different crystals varies between 62° and 53°, average 59°, with a maximum range of 8° in any single crystal ; the higher values are found where the colour is most intense: refractive indices are also variable, with $\beta=1.735\pm0.01$. The ferroaugite may show marginal alteration to uralitic greenish-blue amphibole. The values of 2V and β are generally higher than for the ferroaugites of Icelandic and British Tertiary acid glasses (Carmichael, 1960) and more comparable with the hedenbergite (ferrohedenbergite) of the late-stage granophyres of the Skaergaard intrusion (Brown and Vincent, 1963; Muir, 1951; Wager and Deer, 1939), In the Austurhorn granophyres the ferroaugite probably ranges in composition between ferroaugite and ferrohedenbergite end members.

Aegirine-augite is the chief ferromagnesian mineral in the granophyre above Hvalnesskridur and it also occurs in a granophyre from the east side of Tofuhorn. The crystals are acicular and brightly, sometimes intensely, coloured, with a marked pleochroism: X and Y = deep grass green, Y = brownish or yellowish green. 2V varies from $82^{\circ} - 66^{\circ}$, $\beta = 1.740 \pm 0.005$ (H324).

Fayalite occurs as subhedral or anhedral honey-coloured crystals associated with ferroaugite in granophyres on Breithatindur, at Hvalnes and at Krossanes. Optical determinations, $2V = 52^{\circ} - 49^{\circ}$, $\beta = 1.848 \pm 0.005$, indicate a probably composition near Fa_{90} (Carmichael, 1960). The crystals are sometimes rimmed and veined by opaque ore and usually show alteration to bright red iddingsite and to deep brownish or bluish-green amphibole.

Hornblende is present in many acid and all basic granophyres, where it commonly forms green or greenish-brown euhedral or subhedral prismatic crystals, sometimes with cores of colourless augite. Such crystals are rarely acicular. The hornblende is strongly pleochroic: Z = greenish brown to green, Y = brownish-green to pale green, X = pale brownish yellow to yellow, $Z > Y > X$. Occasionally the crystals have rhythmically banded overgrowths of colourless and pale green amphibole developed at their ends, probably of tremolite-actinolite. Pale green amphibole also occurs in interstitial ragged crystal aggregates in many of the more basic granophyres.

Small euhedral to anhedral equant crystals of opaque ore - magnetite - occur in all granophyres, and secondary iron ores - limonite and hematite - are also often present. Sometimes the ore occurs in acicular aggregates pseudomorphing either pyroxene or, less likely, amphibole. Pyrite has been found in a granophyre on Vikurfjall.

Of the accessory minerals epidote, which is particularly abundant in the greenish granophyres, is pleochroic from lime yellow to colourless, with 2V(-) near 90^{o}, $\beta = 1.744 - 1.759$. Allanite occurs as isolated crystals and also forms the cores of some epidotes: it is intensely pleochroic from very deep brown to pale yellowish-brown. Apatite forms minute acicular crystals which are particularly abundant in the more basic granophyres. Zircon is commonly euhedral and is often associated with magnetite, as also is pale pink or colourless sphene. Brown biotite usually forms very small and extremely thin plates but sometimes occurs as small tabular crystals, often partly altered to chlorite. Fluorite occurs as interstitial anhedral crystals in some of the most acid granophyres.

Chemistry

Chemical and normative analyses of Icelandic granophyres are given in table 6 (the norms have been calculated according to the rules given by Holmes, 1921). From these analyses it can be seen that the Austurhorn granophyres differ from other Icelandic granophyres in having diopside instead of corundum in their norms, due to their higher soda content and correspondingly higher $Na_2O:K_2O$ ratios.

The compositions of the Icelandic granophyres are comparable to those of Icelandic Tertiary acid lavas (Carmichael 1962). The Icelandic acid rocks contain phenocrysts of one feldspar only (either plagioclase or alkali feldspar), unlike those of the British Tertiary, which commonly contain phenocrysts of two different feldspars in the same rock. The normative salic constituents of some

Icelandic acid rocks and of two-feldspar rhyolites are plotted in fig 32. From a consideration of feldspar crystallisation in acid magmas Carmichael (1963) comes to the conclusion that the Icelandic acid rocks are most probably the products of fractionation of tholeiitic magma, while the British and other two-feldspar acid rocks result either from direct fusion of sialic material or by fractional crystallisation of tholeiitic magma modified by sialic contamination.

Key to Tables 5 and 6

H187	Basic granophyre, 125m, south-west side of Breithatindur.
H217	Fayalite - granophyre, 300m.,south-west side of Breithatindur.
H304	Ferroaugite - granophyre, 92m., near intrusion contact on south side of Krossanesfjall.
H308	Pink granophyre, from centre of apophyse intruding basalt lavas, Krossanelaekur waterfall.
H313	Hornblende-granophyre from within net-veined complex, Hvasshjalli.
H324	Aegirine-augite-granophyre, 274m., Hvalnesskridur.
H416	Granite from within net-veined complex, on west side of Hvalnes.
H644	Epidotic granophyre, shore west of Graenanes.
H680	Pink drusy granophyre, Krossanes.
H681	Pink granophyre, Krossanes.
H683	Ferro-augite-granophyre, 30cm. from side contact of the intrusion at 100m., south side of Krossanesfjall.
H684	Ferro-augite-granophyre, 2m. from side contact at 100m., south side of Krossanesfjall.
H687	Pink granophyre, roof contact at 390m. on south side of Krossanesfjall.
130(A)	Graphic hornblende granodiorite from ridge above Vik (Cargill et al, 1928).
74(V)	Hornblende-granophyre, from the Vesturhorn intrusion (Cargill et al, 1928).
S6	Granophyre from the Slaufrudal intrusion (Cargill et al, 1928)
S98	Leucogranite from the Slaufrudal intrusion (Cargill et al, 1928)
K	Albite-granophyre, Ketillaugarfjall, (Tyrrell, 1949).
Sn	Magnetite-granophyre, Snaefellsnaes (Tyrrell, 1949)

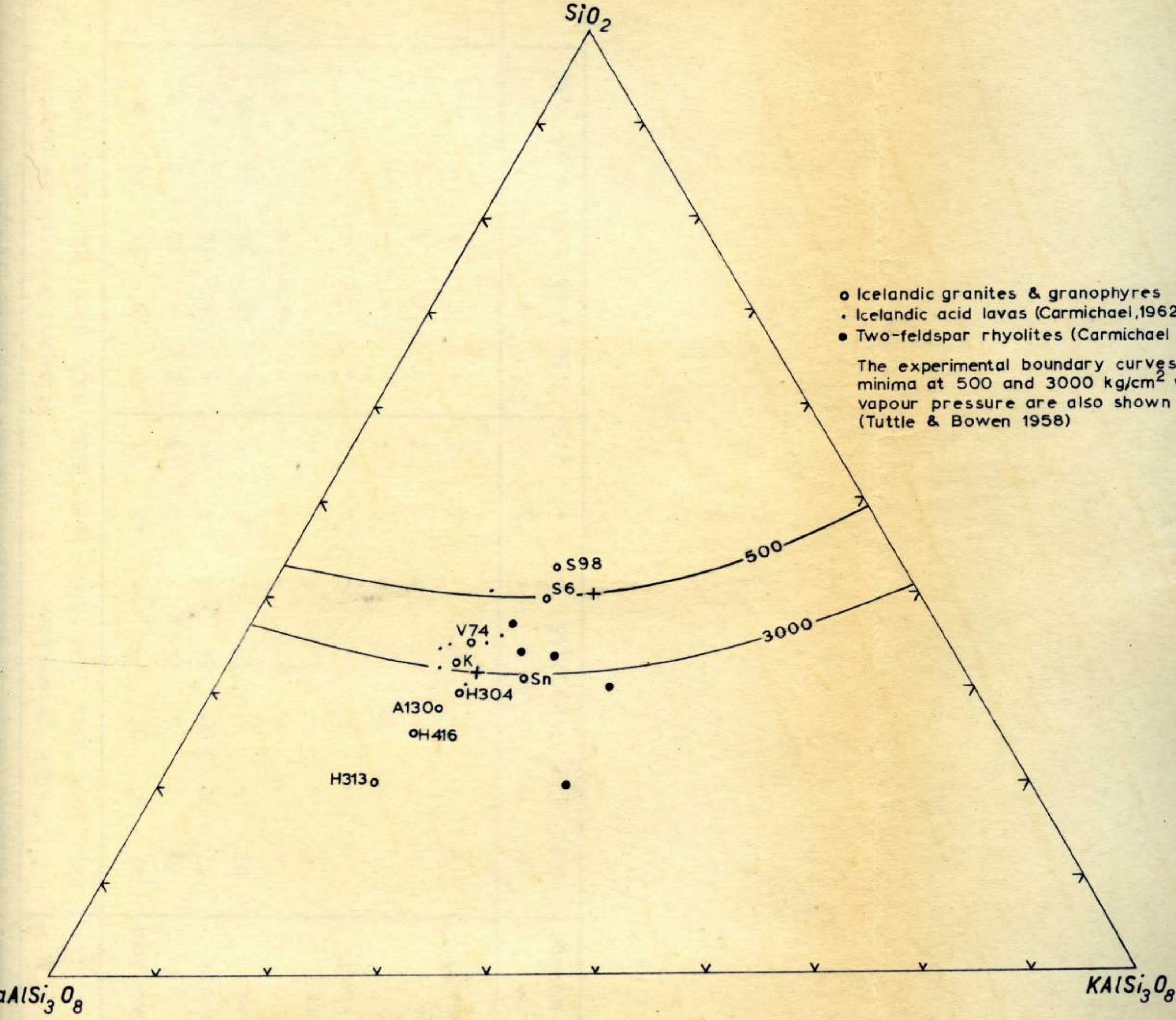


Fig.32 The Normative Salic Constituents (less Anorthite) of Icelandic Acid Rocks Plotted in the System $NaAlSi_3O_8$–$KAlSi_3O_8$–SiO_2

Table 5 Modal analyses (vol.%) of granophyres from the Austurhorn intrusion

	Pink Granophyres							White and Greenish Granophyres					Basic Granophyres
	H217	H308	H324	H416	H680	H681	H687	H304	H313	H644	H683	H684	H187
Micrographic fret	49	63	52	-	93	48	71	70	39	31	64	70	14
Quartz	3	7	3	22	1	4	5	3	4	13	2	2	6
Alkali feldspar	17	27	39	54	5	7	11	9	6	16	4	6	7
Plagioclase	23	-	-	20	-	36	9	14	43	32	25	17	46
Augite	-	-	-	-	-	-	-	-	0.5	4	-	-	6
Ferroaugite	3	-	-	-	-	2	-	1	-	-	1	2	-
Aegirine-augite	-	-	5	-	-	-	-	-	-	-	-	-	-
Fayalite	1	-	-	-	-	1	-	-	-	-	-	-	-
Magnetite	1	2	1	2	1	1	3	2	1.5	3	3	2	9
Hornblende, etc.	3	1	-	2	-	1	1	1	7	1	1	1	12
Colour Index	8	1	9	4	1	5	4	4	9	8	5	5	27
Specific Gravity	2.67	2.55	2.65	2.58	-	-	2.54	2.54	2.65	2.53	2.57	2.56	2.80

Table 6 Chemical Analyses and norms of Icelandic granophyres

	H304	H313	H416	130(A)	74(V)	S6	S98	K	Sn
SiO_2	72.1	66.5	70.9	66.66	70.36	71.25	74.50	70.83	70.80
Al_2O_3	12.7	15.2	14.3	14.89	14.85	14.81	12.77	13.08	14.79
Fe_2O_3	2.4	2.1	2.1	2.74	2.34	0.84	0.92	2.91	2.82
FeO	1.6	3.1	1.5	3.22	2.36	1.52	1.45	1.58	1.39
MgO	0.15	0.78	0.29	1.04	0.44	0.92	0.79	0.19	0.37
CaO	1.26	2.63	1.21	3.22	1.82	1.87	1.10	1.09	0.70
Na_2O	5.1	5.7	5.7	4.44	4.25	3.33	3.21	4.86	4.19
K_2O	3.6	2.7	3.2	2.72	2.91	3.63	3.75	3.24	4.17
H_2O^+	0.8	0.4	0.3	0.37	0.21	0.40	0.35	1.16	0.45
H_2O^-	0.05	0.05	0.1	0.16	0.11	0.55	0.30	0.38	0.35
TiO_2	0.35	0.59	0.34	0.25	tr	0.27	0.24	0.18	tr
P_2O_5	0.12	0.38	0.06	0.18	0.05	0.11	0.08	tr	0.06
MnO	0.16	0.13	0.04	tr	0.18	-	-	0.04	tr
CO_2	-	-	-	-	-	-	-	0.59	tr
Total	100.3	100.2	99.9	99.87	99.88	99.49	99.46	100.13	100.09
SpGr.	2.54	2.65	2.58	2.689	2.626	2.621	2.611		

	H304	H313	H416	130(A)	74(V)	S6	S98	K	Sn
Quartz	26.84	16.38	22.92	21.36	28.92	32.52	37.50	29.46	28.20
Orthoclase	21.13	16.12	19.46	16.12	17.24	21.13	22.24	18.90	25.02
Albite	42.97	48.21	47.68	37.73	35.63	27.77	27.25	40.87	35.63
Anorthite	1.39	7.78	3.89	12.51	8.90	8.34	4.73	1.63	3.06
Corundum	-	-	-	-	1.43	2.45	1.63	1.02	2.14
Diopside	1.86	2.10	0.89	2.07	-	-	-	-	-
Hypersthene	-	4.14	0.80	4.74	4.00	3.88	3.45	0.63	1.03
Magnetite	3.48	3.02	3.02	3.94	3.25	1.16	1.39	4.18	4.18
Ilmenite	0.76	1.06	0.61	0.46	-	0.61	0.46	0.46	-
Apatite	0.34	1.01	0.34	0.34	-	0.34	0.34	-	0.20
Wollastonite	0.70	-	-	-	-	-	-	-	-
Calcite	-	-	-	-	-	-	-	1.40	-

Analyses: H304, H313, H416 D.H.Blake
130(A), 74(V), 56, 598, K,Sn, W.H.Herdsman

CHAPTER 13

The Hvalnesfjall Gabbro

Field Description

The Hvalnesfjall Gabbro is a medium to coarse-grained rock made up of plagioclase feldspar, pyroxene and iron ore; olivine is also sometimes present and epidote is locally abundant, especially on some joint surfaces. Though the grain-size is somewhat variable the gabbro is generally coarse-grained and pegmatitic patches in which individual crystals attain more than 2.6 cm. in length are common: no sign of a fine-grained chilled margin has been seen. Dark minerals normally make up 30% to 40% of the rock, but anorthositic and melanocratic varieties also occur; a typical melano-gabbro, which is notably rich in olivine, (called a "gabbro peridotite" by Hawkes), overlies the granophyre on Breithatindur. Ophitic and sub-ophitic textures are common, and the gabbro frequently has a mottled appearance caused by largeand irregular ophitic crystals up to 5cm. in diameter.

From a distance the gabbro appears distintly layered (fig33a), the layers each being about 10m. thick, but close up this layering is not apparent, although mineralogical variations are common. At two localities, one on either side of Hvalnesfjall, a conspicuously banded gabbro is present, with alternating light and dark bands dipping inwards towards the centre of the gabbro mass.
The separate bands, which can sometimes be traced for several metres along their strike, are often less than a centimetre thick, Large rounded boulders of this banded gabbro lie at the base of the scree slopes on the south-west side of Hvalnesfjall (fig.33b).

The gabbro is traversed by numerous thin and irregular fine-grained feldspathic veins, some of which are followed by major joints. These veins, 1cm. to 5cm. thick, are sometimes drusy, and the drusy cavities are lined with euhedral feldspar, quartz and epidote crystals. Besides these veins, which were probably formed during or just after the crystallisation of the gabbro, the gabbro

Fig.33a. Apparent layering, brought out by weathering, in the gabbro on the south-west side of Hvalnesfjall. Granophyre occurs to the north-west of the gabbro. Photograph taken from the Lon Fjorður.

Fig.33b. Mineral banding in a fallen block of gabbro on the shore below Hvalnesfjall.

is also cut by several dyke-like intrusions of xenolithic granophyre containing numerous angular basalt and gabbro fragments. The xenolithic granophyre intrusions vary considerably in width and have irregular indeterminate margins, the bordering gabbro being veined by the granophyre; they are found only in the eastern part of the gabbro mass, within a hundred metres of the gabbro contact.

The jointing of the gabbro is very variable. Some joints follow veins, others are formed parallel to the banding of the banded gabbro, while on the north-west side of Hvalnesfjall the gabbro has developed a platy jointing roughly parallel to the topography, similar to that of the adjacent granophyre.

Petrography

Most of the gabbros of south-eastern Iceland are of similar type, and the petrography of the gabbro of Hvalnesfjall is comparable to that of the Vesturhorn gabbro, described by Hawkes (Cargill, et al 1928, p.517), and to the gabbro of some of the other major intrusions, described by Tyrrell (1949).

The essential minerals of the Hvalnesfjall gabbro are plagioclase, augite and iron ore, sometimes with olivine and hypersthene (both of which are usually pseudomorphed). Apatite is almost the only accessory mineral, and interstitial quartz and alkali feldspar have only been found in one gabbro specimen. Secondary minerals include hornblende, tremolite, biotite, chlorite, serpentine, bowlingite, epidote, albite and calcite. The gabbro is generally coarse-grained (average grain-size 2 - 4 mm.), with a hypidiomorphic granular texture: pegmatitic and ophitic types are common local variants. The colour index varies from less than 10 to more than 70, with an average of around 40. Secondary alteration is most marked in the coarsest varieties. Alteration is also seen in the gabbros close to the granophyre contact, where the calcic cores of the plagioclase crystals are cloudy and the augite crystals patchily dusky, due to the presence of minute inclusions. This cloudiness differs from the turbid alteration of alkali feldspar in the granophyres, and is probably due to slight thermal metamorphism of the gabbro by the granophyre (MacGregor, 1931; Poldervaart and Gilkey, 1954).

Modal, chemical and normative analyses are given in tables 8 and 9.

The plagioclase tends to form sub-hedral crystals with a prismatic and often elongate habit. The crystals commonly show weak to moderate zoning (table 7), generally with unzoned cores of bytownite or labradorite passing outwards into a marginal zone, often itself zoned, of more sodic plagioclase. This zoning, which is of euhedral type, is primary (Vance, 1961, p.1099), and not to be confused with a secondary patchy zoning which is also sometimes developed. Slight internal alterations of the plagioclase may be shown by epidote and by irregular veins of chlorite and/or albite.

Augite, the most abundant and often the only pyroxene, occurs as very pale pinkish-brown anhedral crystals, sometimes showing simple twinning, with β=1.693-1.697, $2V(+)= 44^{\circ}-52^{\circ}$. The crystals are commonly sub-ophitic and locally prominently ophitic. The augite invariably shows slight internal alteration, with the development of small brown biotite specks, and sometimes the augite crystals are also marginally altered to uralitic green, rarely brown, hornblende. Hypersthene is always subordinate to augite. It occurs as pleochroic pale pink crystals when unaltered, though usually each hypersthene crystal is completely pseudomorphed by a single crystal of chlorite, sometimes with associated colourless or pale green amphibole; the pseudomorphing chlorite characteristically has a patchy birefringence.

<u>Olivine</u> when present, is often surrounded by hypersthene and/or augite. It occurs as colourless anhedral crystal (optically(+), 2V near 90°) rimmed by opaque ore and charged with ore granules which are commonly arranged in irregular cross-cutting veins. Usually the olivine is completely pseudomorphed by chlorite, serpentine, bowlingite and/or calcite.

Opaque <u>ore</u> forms anhedral and sometimes skeletal crystals, often mantled by thin reaction rims of brown biotite. In the ophitic gabbros ore sometimes ophitically encloses plagioclase crystals.

Key to tables:

H164 Hvalnesfjall gabbro, shore, 600m. west of Hvalnes Farm.

H206 Hvalnesfjall gabbro, south-west side of Hvaldalur, 2.5 Km. east of Vik Farm.

H221 Ophitic Hvalnesfjall gabbro, 200m., south side of Thufuhraunstindur.

H223 Ophitic Hvalnesfjall gabbro, scree, south side of Thufuhraunstindur.

H231 Melanocratic Hvalnesfjall gabbro, 244m., 1.4Km. north-north-west of Graenanes.

H232 Banded Hvalnesfjall gabbro, 240m., 1.4Km. north-north-west of Graenanes.

H292 Hvalnesfjall gabbro at granophyre contact, 262m., north side of Breithatindur.

H625 Hvalnesfjall gabbro, scree, 800m. north of Graenanes.

A Light Hvalnesfjall gabbro, Breithatindur (Cargill <u>et al</u>, 1928).

B Olivine-gabbro, north face of Brunnhorn, Vesturhorn (Cargill <u>et al</u>, 1928).

C Olivine-gabbro, Medalfell, Hornafjordur (Tyrrell, 1949).

D Bytownite-gabbro, Midhyrna, Snaefellsnaes (Tyrrell, 1949).

H310 Krossanesfjall gabbro, Austurhorn area.

Table 7 Zoning of plagioclase crystals*, Hvalnesfjall gabbro.

	Cores	Inner Margins	Outer Margins
H164	An70	An60	An40
H206	An85	An65	An65
H221	An85	An70	An43
H223	An85	–	An85
H231	An80	An65	An45
H232	An83	An75-70	An55-40
H292	An65	–	An42
H625	An80	An65	An48
A	An75	–	An62
B	An70	–	An58

* An content of crystals was obtained from extinction angle measurements of combined Carlsbad-albite twins on sections normal to (010) using the determinative curves of F.E. Wright (in Kerr, 1959).

Table 8 Modal analyses of the Hvalnesfjall gabbro

67	H164	H206	H221	H223	H231	H232	H292	H625	A	B
plagioclase	53	67	70	60	27	61	35	35	77	21
augite	27	23	20	36	41	24	48	43	22	30
hypersthene	(6)*	(2)	(2)	(1)	3	(5)	–	7	–	10
olivine	–	(1)	(1)	–	20	–	–	9	–	28
iron ore	12	6	6	3	4	9	16	4	1	11
accessories	2	1	1	–	5	1	1	2	–	–
specific gravity	–	3.06	2.86	2.92	3.20	2.95	3.25	3.17	2.84	3.30

* () = pseudomorphed

Table 9 Chemical analyses and norms of Icelandic gabbros

	H164	H232	A	B	C	D	H310
SiO_2	40.4	45.4	47.30	39.35	48.38	45.94	47.8
Al_2O_3	12.4	19.6	25.04	8.74	16.88	17.63	18.1
Fe_2O_3	7.1	5.6	0.93	3.63	2.31	1.67	3.6
FeO	11.0	6.1	3.41	14.85	6.10	5.24	7.1
MgO	7.3	4.3	4.00	19.57	7.28	8.05	4.2
CaO	12.4	12.3	15.92	8.94	13.64	16.26	9.8
Na_2O	1.8	2.7	1.56	0.76	2.36	1.67	3.3
K_2O	0.3	0.4	0.42	0.08	0.19	0.24	0.85
H_2O^+	1.3	0.9	0.54	0.65	0.88	1.40	2.1
H_2O^-	0.2	0.1	0.12	0.50	0.35	0.50	0.1
TiO_2	6.10	2.30	0.58	3.10	1.26	0.82	2.45
P_2O_5	0.10	0.17	0.10	0.05	0.06	0.07	0.28
MnO	0.22	0.12	-	0.28	0.04	0.37	0.19
V_2O_5	-	-	-	0.05	-	-	-
CO_2	-	-	-	-	0.38	-	-
Total	100.6	100.0	99.92	100.55	100.11	99.86	100.0

Norms

	H164	H232	A	B	C	D	H310
Or	1.67	2.22	2.22	0.56	1.11	1.10	5.00
Ab	14.67	23.06	13.10	4.72	19.91	8.38	27.77
An	25.30	40.03	60.05	20.02	35.03	40.03	31.97
Ne	-	-	-	0.85	-	3.12	-
Di	27.50	16.07	14.55	18.97	23.48	32.31	11.99
Hy	1.56	1.60	3.89	-	8.18	-	8.57
Ol	5.56	3.13	2.50	42.77	4.51	8.74	1.76
Mt	10.21	8.12	1.39	5.34	3.25	2.55	5.34
Il	11.55	4.41	1.22	5.93	2.43	1.52	4.71
Ap	0.34	0.58	0.34	0.34	0.20	0.24	0.67
Ca	-	-	-	-	0.90	-	-

Analyses: H164, H232, H310, D.H.Blake
A, B, C and D, W.H. Herdsman

CHAPTER 14

The Net-veined Complex

Introduction

The eastern part of the Austurhorn intrusion is formed almost entirely of an intimate association of acid and basic rocks in which the basic rocks form inclusions enclosed in and veined by granophyre. This part of the intrusion is referred to as the "net-veined complex". The present outcrop of the complex varies in height from sea-level around the coast to over 200m. on Austurhorn and over 300m. on Krossanesfjall, and it covers a total area of some 3Km^2 (fig. 35). It is particularly well exposed along the coast between Hvalnes Farm, Hvalnes and Olneshofn; along the base of the scree slopes behind Hlidarsandur; and at Krossanes (fig. 36a). At these exposures the rock surfaces have been cleaned by wave and wind erosion, enabling the relationships between the different rock types to be observed in detail.

The relative proportions of basic and acid rocks within the complex vary over a wide range, as all gradations occur from basic rock cut by occasional acid veins, to xenolithic granophyre with less than 5% of basic fragments, and even to non-xenolithic granophyre. Rock types present include basalt, dolerite, gabbro, diorite, hybridised dolerites and granophyres and normal granophyre, the more basic rocks forming angular to rounded inclusions within an acid matrix. The inclusions, many of which have an irregular pillow-like form, range in size up to more than 10m. in diameter Their contacts with the enclosing granophyre may be either sharp or diffuse and are often very irregular. Many inclusions within the granophyre themselves contain inclusions of more basic rock, and sometimes the basic pillows are separated from the enclosing granophyre by an irregular mantle of more basic granophyre (fig. 45).

Basic Pillows

One of the most striking features of the net-veined complex is the common occurrence of rounded pillow-like basic inclusions within the granophyre. A number of such pillows are shown in figs. 34 - 45

Fig.34a. Shore exposures of the net-veined complex at Krossanes, looking northwards.

Fig.34b. A basic pillow enclosed in granophyre, showing the highly irregular crenulate contact between the acid and basic rocks, Krossanes.

The pillows are very variable in shape and are commonly amoeboid. They occur in all sizes from less than a metre to more than ten metres in diameter, the smaller pillows being the more common. Though they sometimes occur singly, isolated within granophyre, the pillows more commonly form groups or clusters which are often very similar in appearance to normal pillow lavas erupted under water (fig. 37b). Many of the larger irregular pillows possess long lobes separated by deep indentations and it is often impossible to tell whether such pillows are groups of individual pillows or connected parts of a single large pillow. "Hollow" pillows also occur (figs. 35, 41b).

When closely spaced the pillows usually appear to accommodate themselves, with bulges of one pillow fitting into a corresponding depression in an adjacent pillow (figs37,42a), the individual pillows being separated from each other by acid layers of varying thicknesses. Very occasionally individual pillows have been found actually touching each other (fig. 39)

Most of the pillows appear to be tholeiitic, although they often show varying degrees of acidification. There are also some olivine-basalt pillows, at Krossanes, and their very dark colour and coarse grain-size makes them particularly conspicuous. Many of the tholeiitic pillows are porphyritic, with feldspar phenocrysts making up to 10% of the rock, and large biotite and hornblende crystals are not uncommon in the smaller pillows. The feldspar phenocrysts, which are often less abundant at the pillow margins, tend to maintain a constant size, and lose their prominence in the doleritic centres of the larger pillows. Porphyritic, and non-porphyritic pillows may occur next to each other, but all pillows within a particular group are usually of the same type.

The basic pillows are texturally zoned, typically with dense fine-grained margins grading inwards into coarser basalt, and, in the case of the larger pillows, into dolerite. The dense marginal zone varies from less than 0.5cm. to 2cm. in thickness, and the thickness is generally constant in any one pillow. This zone is usually particularly well marked where the contact between the pillow and the adjacent granophyre is sharp , while it is often absent where this contact is diffuse. The grain size of the pillows, however, always increases towards their centres. At Krossanes occasional examples have been found of dense pillow margins which are vesicular, the vesicles being infilled with granophyre. Also at Krossanes there is a small area where the separate pillows are unusual in having dense marginal zones of irregular width.

In the larger tholeiitic pillows the interior is formed of coarse ophitic dolerite, often with local feldspathic clots up to more than one metre in diameter. These clots have diffuse margins across which grow elongate ferro-magnesian and feldspar crystals; irregular ferro-magnesian aggregates also occur inside the larger clots , where patches of granophyre may also be present.

The contacts between the pillows and surrounding granophyre are usually highly irregular, and are characteristically cumulose or crenulate, with rounded protuberances of basic rock alternating with pointed embayments of the acid (figs. 34b, 41a). Also the contacts vary from sharp to diffuse, even within a few centimetres along the contact of a single pillow. Convex pillow surfaces tend to have sharper contacts than concave surfaces and deep embayments. Sometimes embayments of acid rock pass inwards into ill-defined feldspathic patches within the pillow centre.

The basic pillows are cut by various acid veins, as shown in figs 42b &43. These veins, some of which cut right across the pillows, are commonly irregular and may be either sinuous or angular. The sinuous veins often occur in parallel groups while the angular veins frequently form an angular "breccia" net-work. Usually the veins have roughly parallel, but not necessarily matching, sides and they vary in thickness from less than 1mm. to more than 50cm. The very thin veins which cut the larger doleritic pillows commonly connect up pegmatitic clots within the dolerite in "string of beads" fashion. Many of the larger pillows are cut by roughly horizontal "sheet" veins; these veins have non-matching sides, with finger-like projections protruding outwards. The veins may be bounded by fine-grained basalt, especially near the pillow margins, and their contacts may be sharp or diffuse, commonly being diffuse in the pillow centres. Many pillows are partially or completely broken up by the veins, and all stages are seen from pillows cut by occasional acid veins to completely fragmented pillows which are now represented by isolated but still recognisable fragments scattered throughout the granophyre. Any of the acid veins may pass inwards into the ill-defined feldspathic clots which often occur within pillow interiors.

All the types of acid veins described are continuous with the granophyre adjacent or nearly adjacent to the pillows, but other, later, aplitic veins also occur which cut across both pillows and the neighbouring granophyre. These veins probably represent the last and most acid magma of the intrusion to crystallise and are identical to the leucocratic veins cutting the granophyre outside the net-veined complex.

Not to be confused with acid veins cutting pillows are acid layers between closely spaced pillows. These layers may be roughly parallel-sided, though they always have non-matching walls (figs 38,39,44), and either of their contacts with the adjacent pillows may be sharp or diffuse. The acid layers between tabular pillows, here termed "sheet layers", often have finger-like projections, similar to those of the sheet veins. Both the sheet layers and the sheet veins are similar in appearance to the "sheet veins" of the Guernsey net-veined complex (Elwell, et al, 1962).

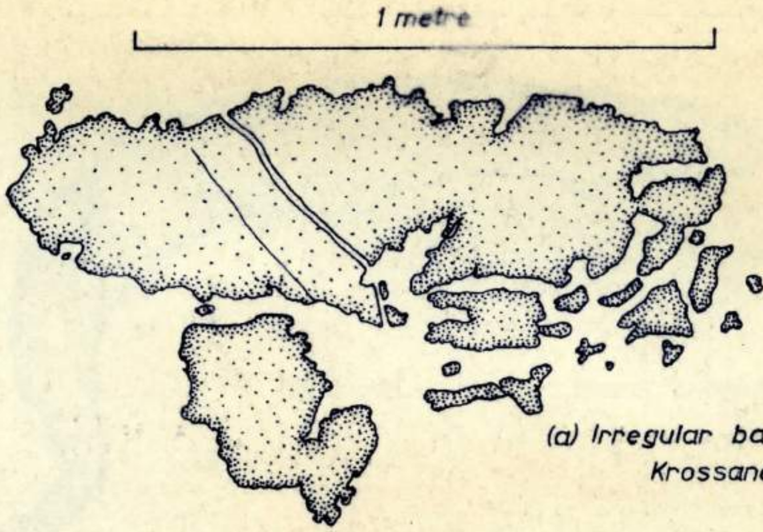
The pillows and other basic inclusions within the net-veined complex normally appear quite haphazard in their distribution and orientation, but there are a few features which give some regularity to the general disorderliness. For instance a rude banding of pillows is sometimes apparent, as on the south side of Breithatindur where a westerly dipping pillow-rich zone, 10m. thick, is overlain and underlain by granophyre containing very few basic inclusions, and at Hvalnes, where zones of small pillows are sandwiched between zones of larger pillows. A somewhat similar effect is given by sheet-like zones of pink granophyre, usually with few basic inclusions, which cross the net-veined complex at various localities. Also it is probably significant that the sheet veins cutting pillows, the sheet layers between closely spaced tabular pillows, and the tabular pillows themselves invariably have low inclinations (usually less than 10° from horizontal).

Large basic masses

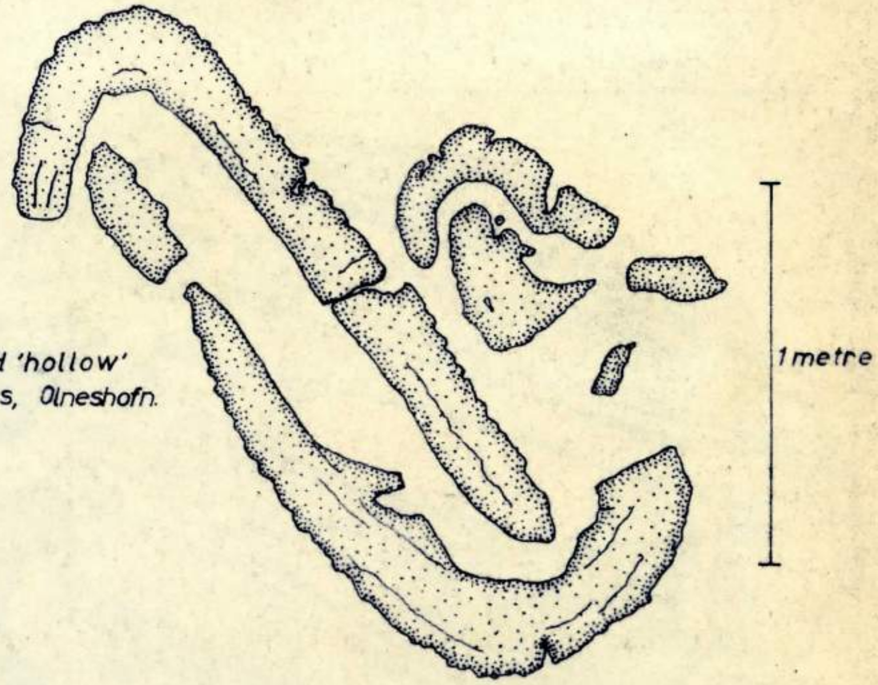
Within the net-veined complex there are a number of large basic masses, each covering an area of tens of square metres (fig. 35). One such example is the large mass of gabbro which forms a prominent ledge at 130m. on Hvasshjalli (fig. 28a). The gabbro, of similar type to that of Hvalnesfjall, becomes progressively veined and broken up by granophyre towards its margins, and appears to pass insensibly outwards in all directions into typical net-veined rock, with basic pillows: no chilled facies of this gabbro has been seen. The mass is possibly a very large pillow with a much brecciated outer zone, perhaps a basic intrusion from which smaller basic pillows were spawned out into the surrounding acid magma, though the apparent absence of any textural zoning may mean that the mass is a large xenolith, perhaps at one time connected with the Hvalnesfjall gabbro.

Another example is the mass of medium-grained diorite, containing occasional dark fine-grained inclusions, which outcrops on the west side of Hvalnes. The diorite is cut by dyke-like zones of xenolithic and net-veining granophyre with which the diorite has sharp unchilled contacts similar to its external contacts with the surrounding granophyre. It seems probable that the diorite had already solidified in its present position before the surrounding granophyre was intruded: i.e. the net-veined complex here intrudes the diorite.

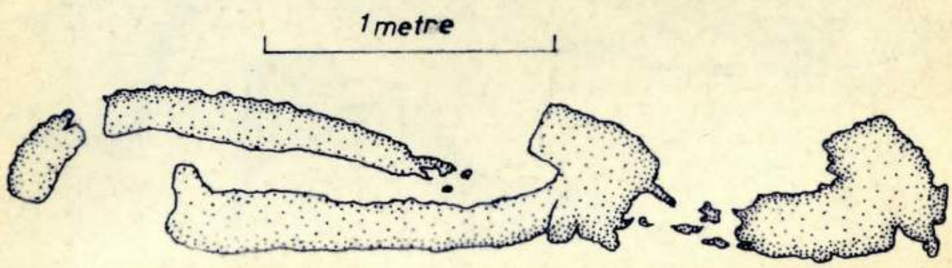
Fig. 35



(a) Irregular basalt pillow, Krossanes.



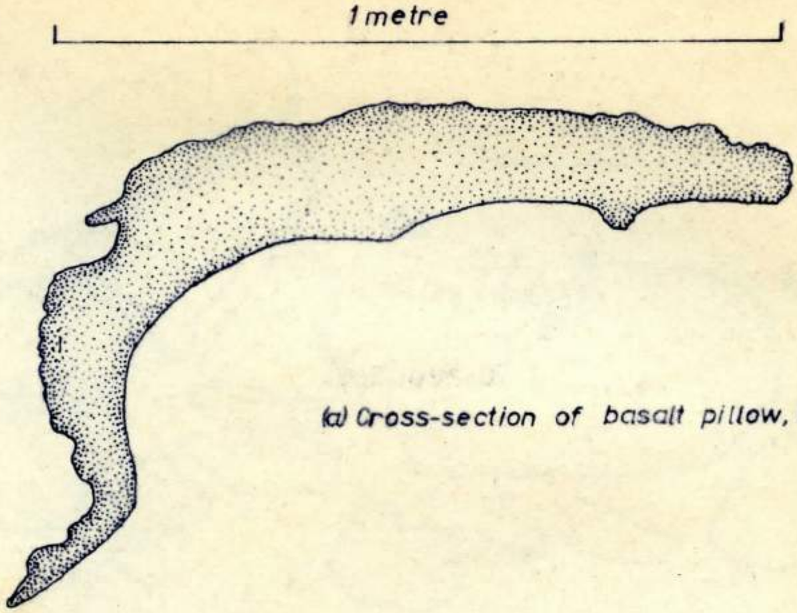
(b) Dismembered 'hollow' basalt pillows, Olneshofn.



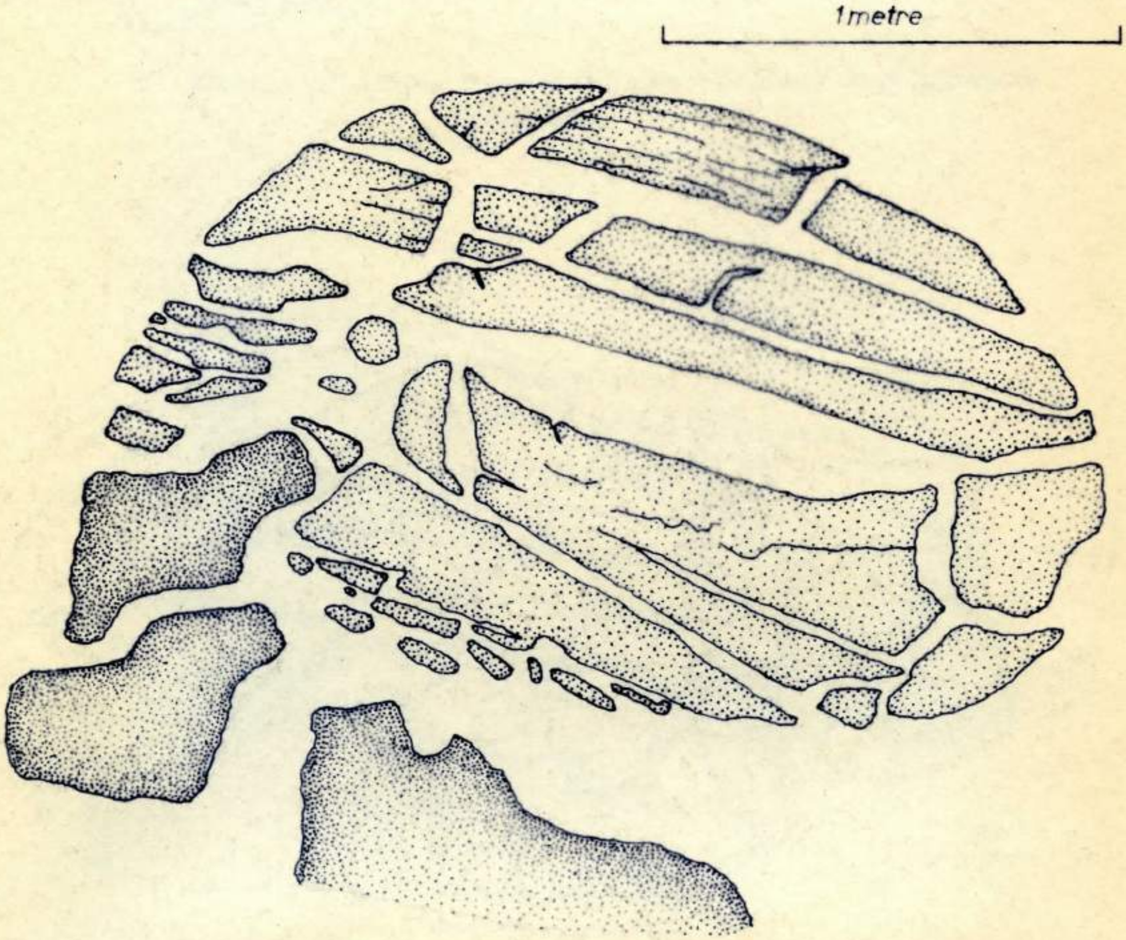
(c) Dismembered 'hollow' basalt pillow, Olneshofn.

In figs 35-40 the decrease in grain-size of the basic rock is shown by an increase in the intensity of the stipple.

Fig. 36

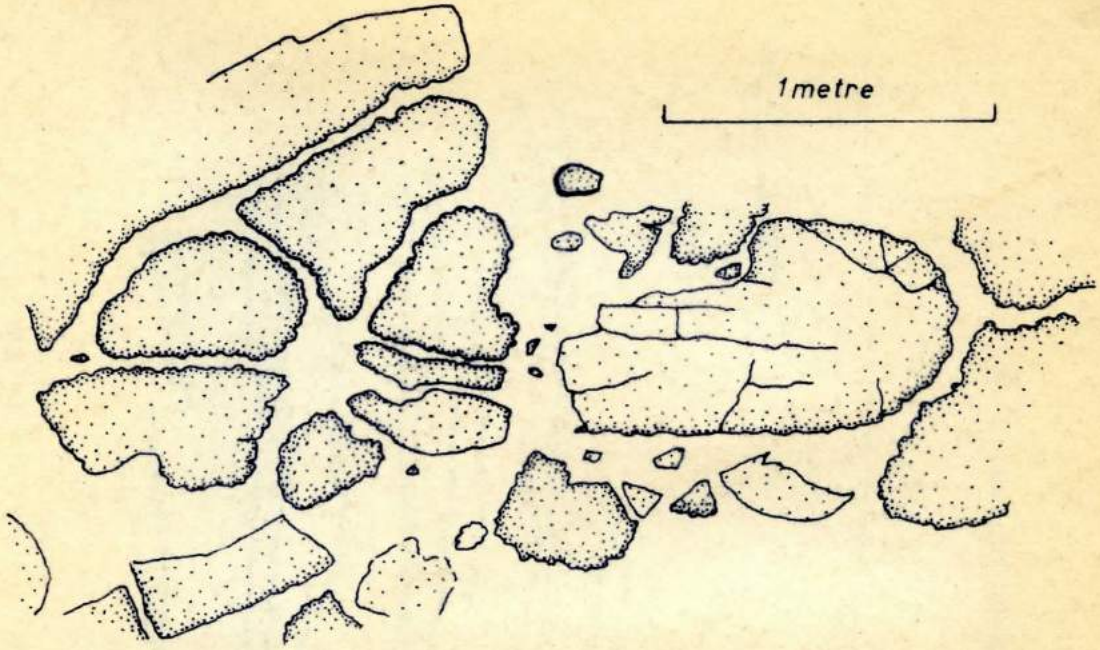


(a) Cross-section of basalt pillow, Krossanes.

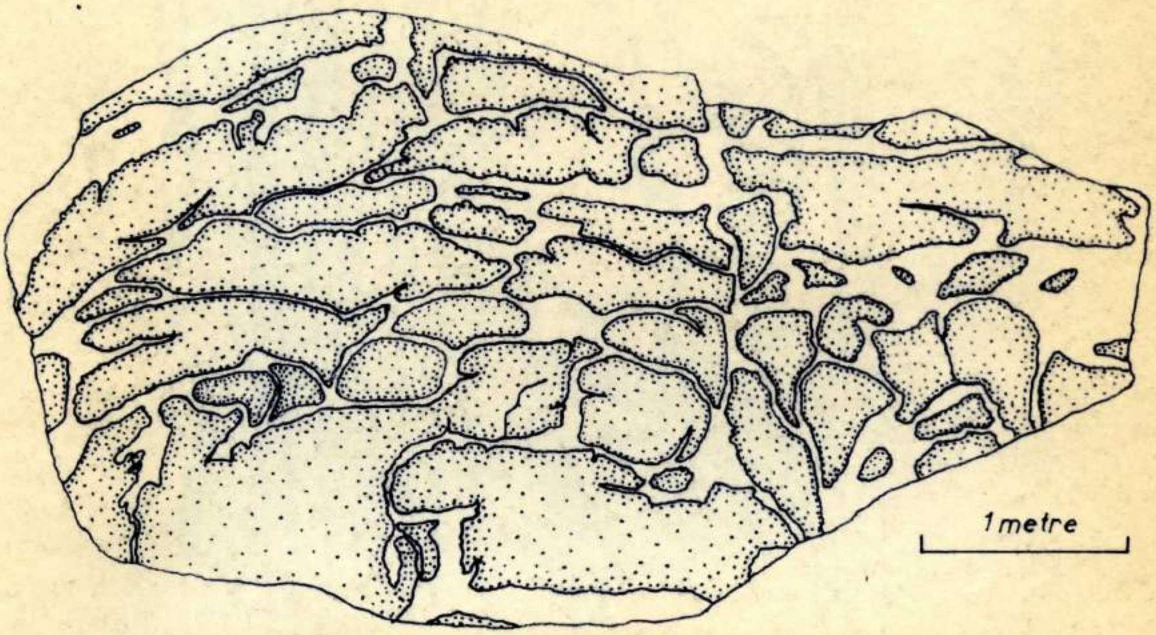


(b) Three basalt pillows alongside a 'skeletal' basalt pillow of different composition, Krossanes.

Fig. 37

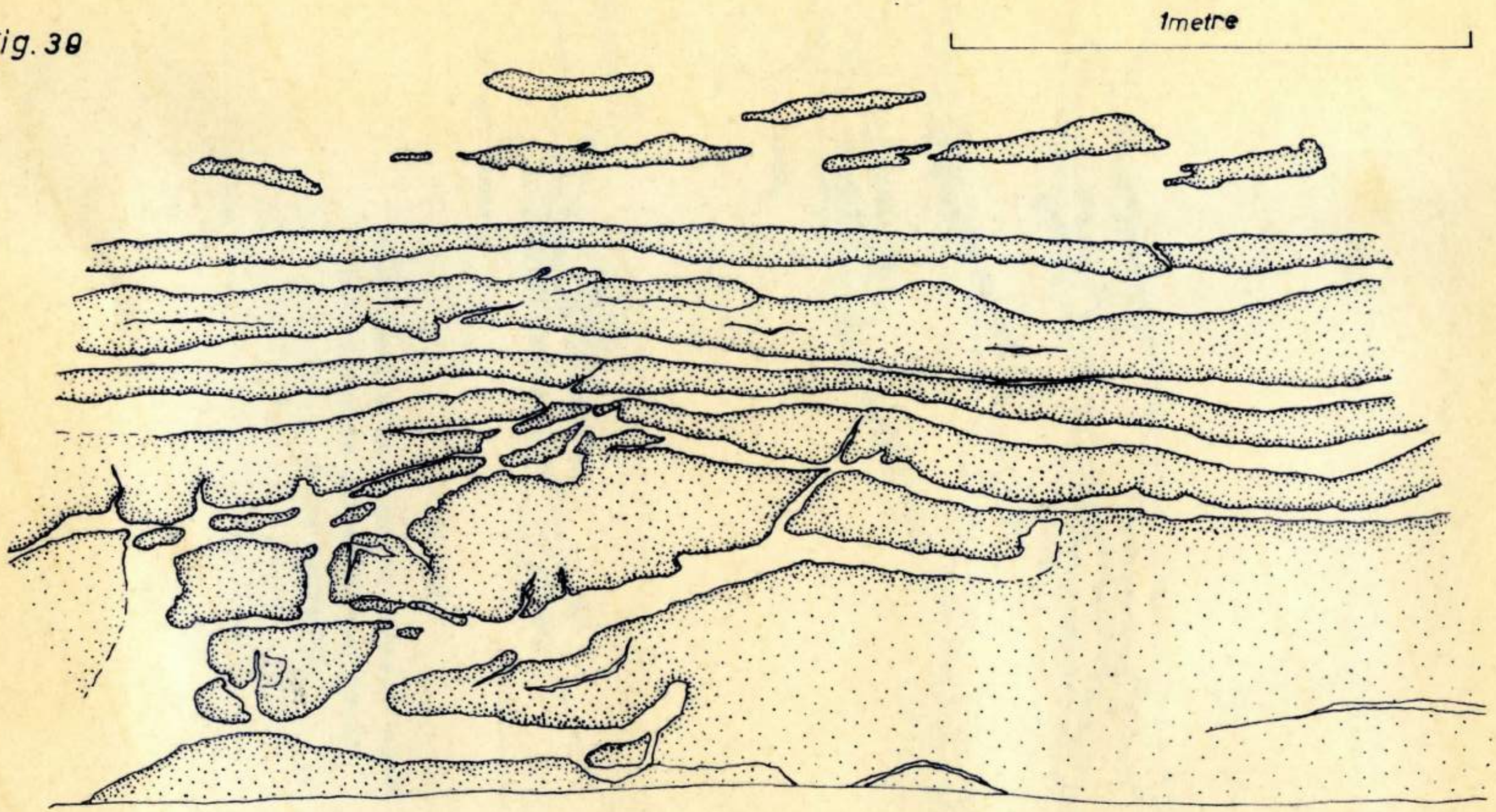


(a) Cluster of small basalt pillows enclosed in granophyre, Olneshofn.



(b) Cluster of porphyritic basalt pillows enclosed in granophyre, exposure on the raised beach below Krossaneslaekur waterfall, Hlidarsandur.

Fig. 38



Cross-section of a group of mainly tabular pillows
in granophyre, Olneshofn.

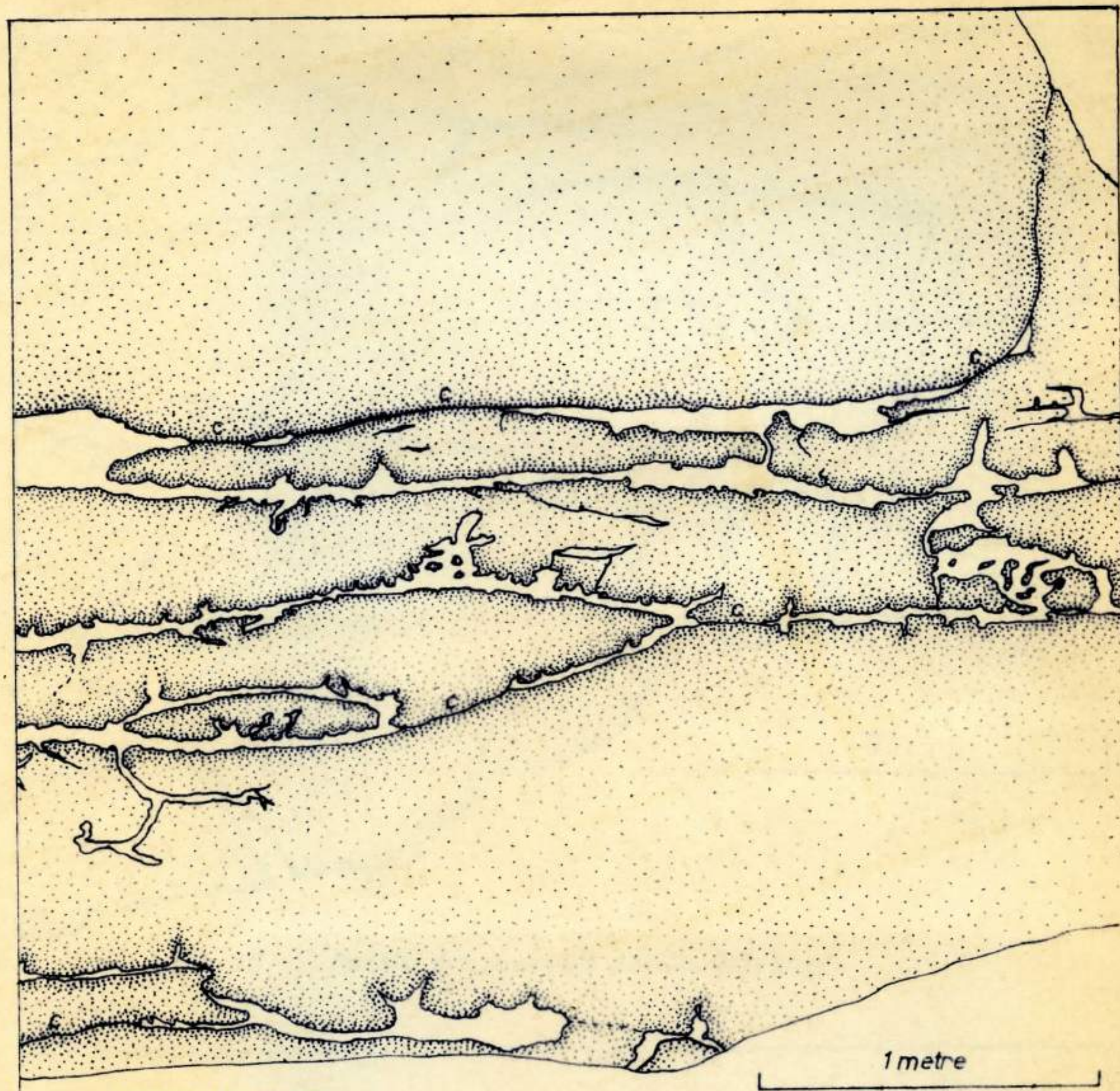


Fig. 39

'Sheet layers' of granophyre between closely-spaced dolerite pillows, Raised beach below Hvasshjalli

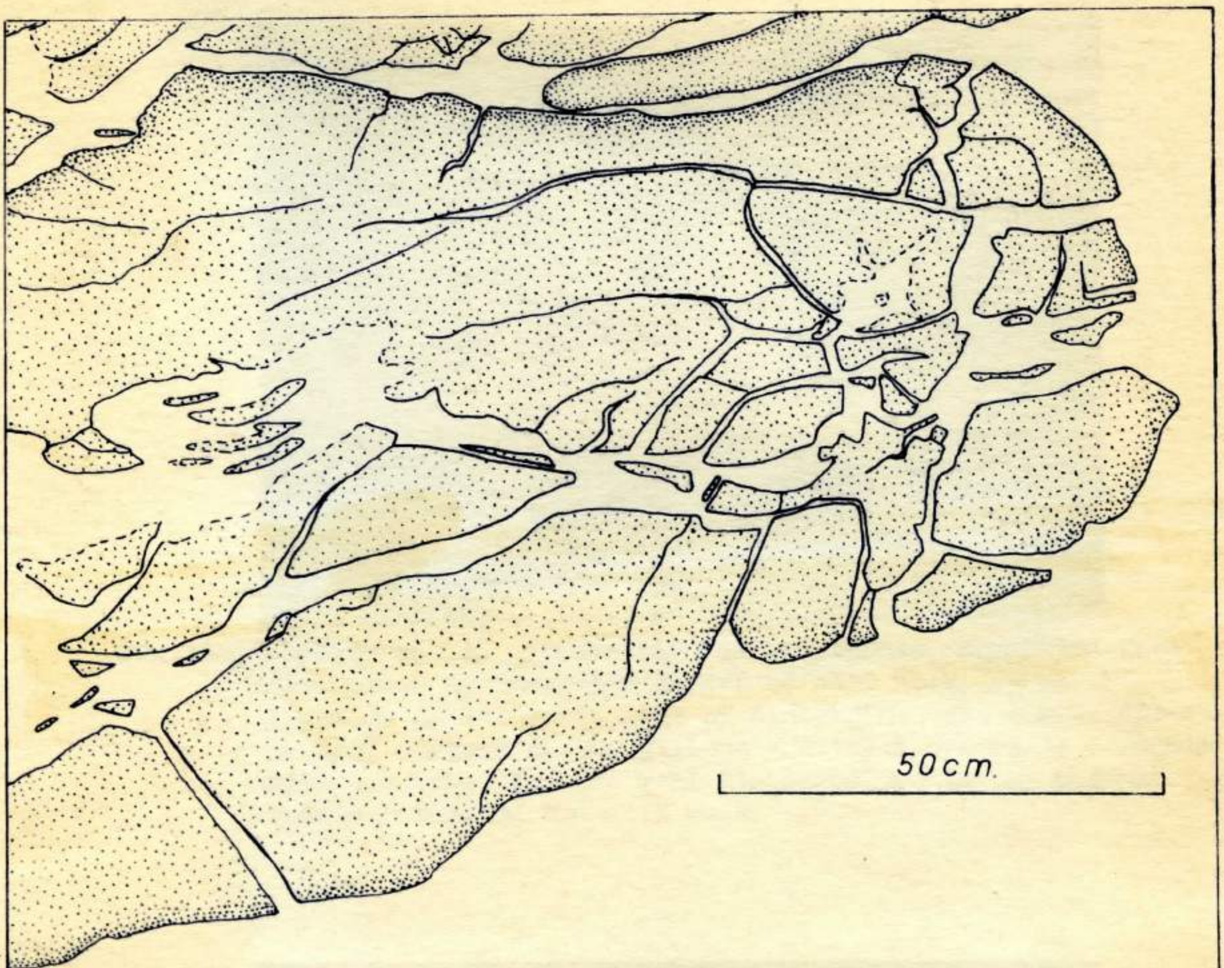


Fig. 40 Partly fragmented pillow, Olneshofn.

Fig.41a. Closely spaced porphyritic basalt pillows, separated from each other by irregular layers of acid rock, at an exposure on the north side of Olneshofn. The darker finer-grained margins of the pillows and their crenulate contacts with the acid rock are well displayed, as is the patchy hybrid nature of the acid rock.

Fig.41b. Two hollow basic pillows, one dismembered, in granophyre at Olneshofn

Fig.42a. The outer part of a large basic pillow, showing a progressive increase in grain-size from a fine-grained porphyritic basalt at the pillow margin to a coarse doleritic rock in the pillow interior, Krossanes.

Fig.42b. Large basic pillow partly fragmented by veining granophyre, 200m. north of Olneshofn. Some of the acid veins pass through feldspathic patches within the pillow. Remnants of the finer-grained pillow margin are seen at the top of the photograph. (The rule in the picture is 24cms. long).

Fig.43a Irregular acid veins cutting basic pillows, Hvalnes.

Fig.43b. Reticulate acid veins cutting dolerite at Krossanes. The dolerite mass shown here is possibly part of a large basic pillow.