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A NEW OCCURRENCE OF A CALCO-ALKALINE GRANITE INTRUSION FROM THE FREDERIKSHAAB DISTRICT, SOUTH GREENLAND

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WITH 8 FIGURES IN THE TEXT

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Abstract.

A newly discovered, fluorite-bearing, calco-alkaline granite intrusive from the Frederikshaab District, Southwest Greenland, is described.

The granite is closely related to some rapakivi granites, pyterlite and wiborgite, from the Viipuri area, Finland, as described by Wahl (1925).

The relation between this intrusive and other "younger intrusives" is discussed, with respect to the fluorine content of the group of younger intrusives (Wegmann, 1938).

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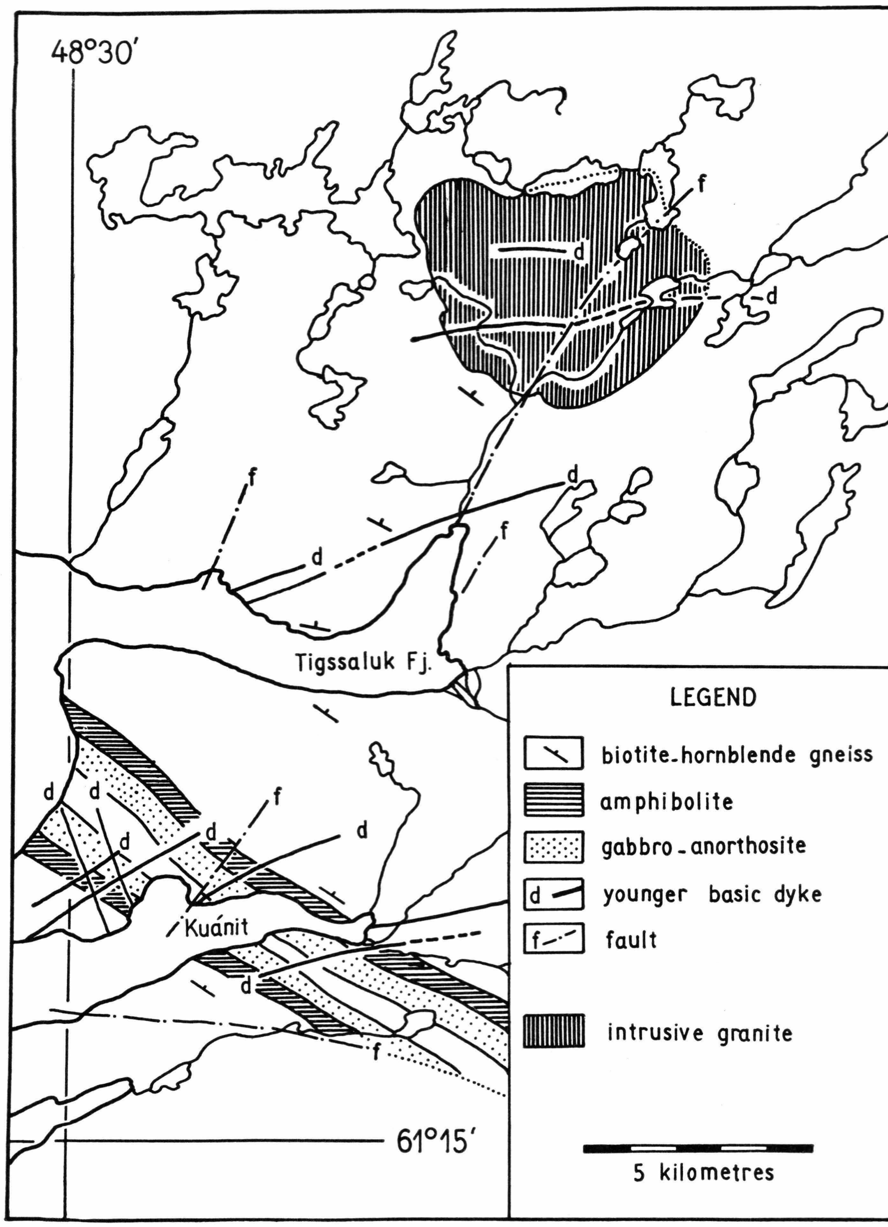


Fig. 1. Generalized geological sketchmap of the area around Tigssaluk fiord. The amphibolite- and gabbro-anorthosite beds are structural guiding horizons.

Introduction.

During a survey of aerial photographs of the area between Frederikshaab and Ivigtut in the Frederikshaab District, as a preliminary to a systematic revision of previous mapping in that area, a conspicuous, disharmonious structure was discovered on one of the views (Fig. 2).

This structure was interpreted as a "younger intrusive", belonging to the Upper Gardar formation, in the sense of Wegmann (1938, p. 93).

The group of the "younger intrusives" has first been recognized by Ussing, who called this group of rocks "newer abyssal rocks" (Ussing, 1911, p. 22). On his sketch map of South Greenland, Ussing distinguished between the group of nepheline syenites and that of granites and syenites. Stratigraphically, Ussing placed the intrusives in the Upper Devonian. There is, however, no convincing evidence for doing so.

As a support for the assumption that this new granite complex would belong to the group of the "younger intrusives", the form of the structure had to be taken into account. The resemblance in occurrence with the known Kûngnât massif near Arsuk, is striking. Moreover, Professor Arne Noe-Nygaard, assisted by A. Berthelsen, observed granite boulders at the head of Tigssaluk fiord, on a brief reconnaissance trip in 1949.

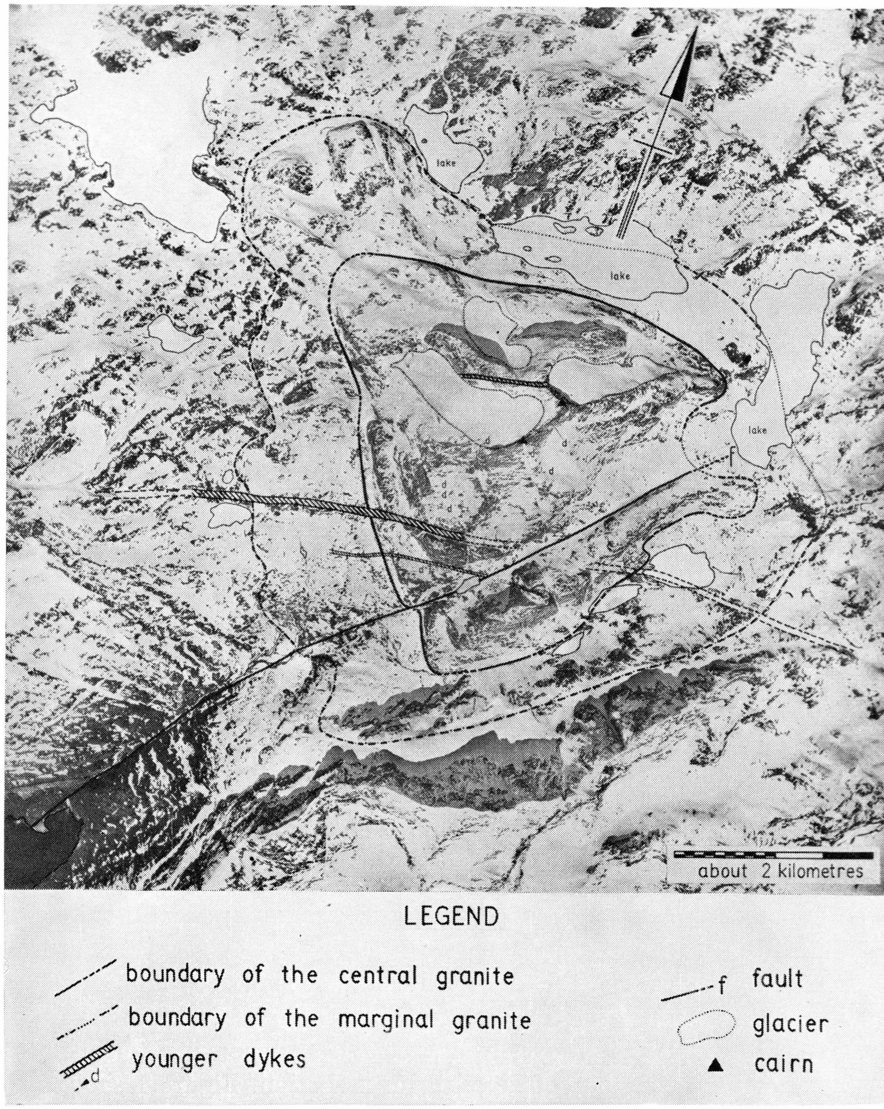
As the knowledge of the distribution and type of occurrence of these younger intrusives is of special interest, it was decided to visit the new occurrence, even if mapping in that, geologically speaking, terra incognita, is not yet in a stage of detailed investigation. Figure 1 shows the geological surroundings of the granite intrusion.

So far, the following "younger intrusives" are known:

i/ in the peralkaline to alkaline group; the Ilímaussak and the Igaliko batholites in the Julianehaab District (Ussing, 1911). The Grønnedal-Íka massif, near Ivigtut (Callisen, 1943), and the Kûngnât massif (Wegmann, 1938), in the Frederikshaab District.

ii/ in the granitic group; the Nunarssuit and the Sydprøven massives in the Julianehaab District (Wegmann, 1938).

In the summer of 1955, the author made a three-day reconnaissance of the area, and the nature of the granites could be studied in the field.



(GEODÆTISK INSTITUT, Eneret).

Fig. 2. Geological interpretation of the aerial view, supplied by field observations.

On a later air reconnaissance, it could be ascertained that the contacts of the granite complex were approximately as originally outlined on the map.

Another granite complex was on the same occasion seen from the air at the head of Neria fiord, at 61° 45′ latitude, 48° 30′ longitude. (Fig. 3). This complex has a far greater extent than the granite plug, described

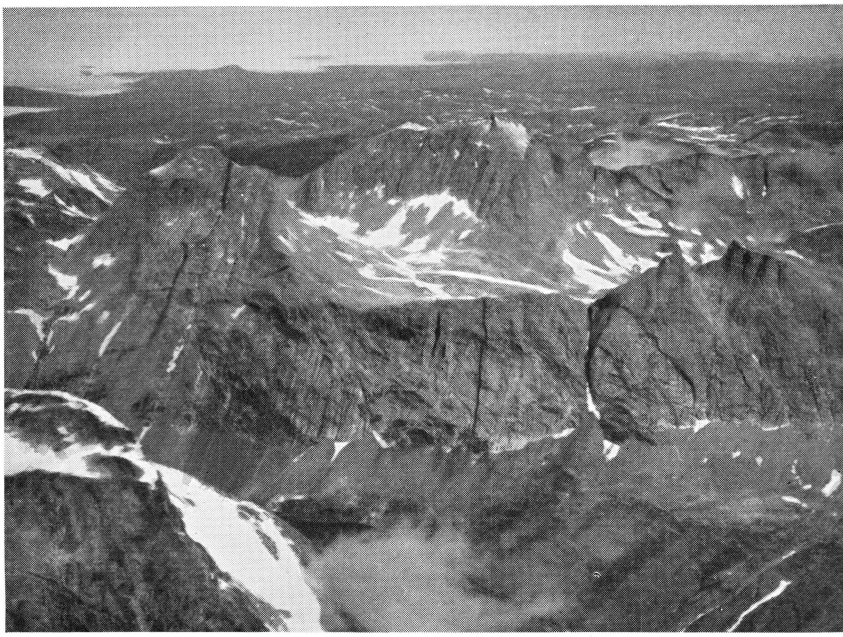


Fig. 3. The granite complex at the head of Neria fiord, as seen from the air. Note the dark inclusions in the steep wall in the foreground.

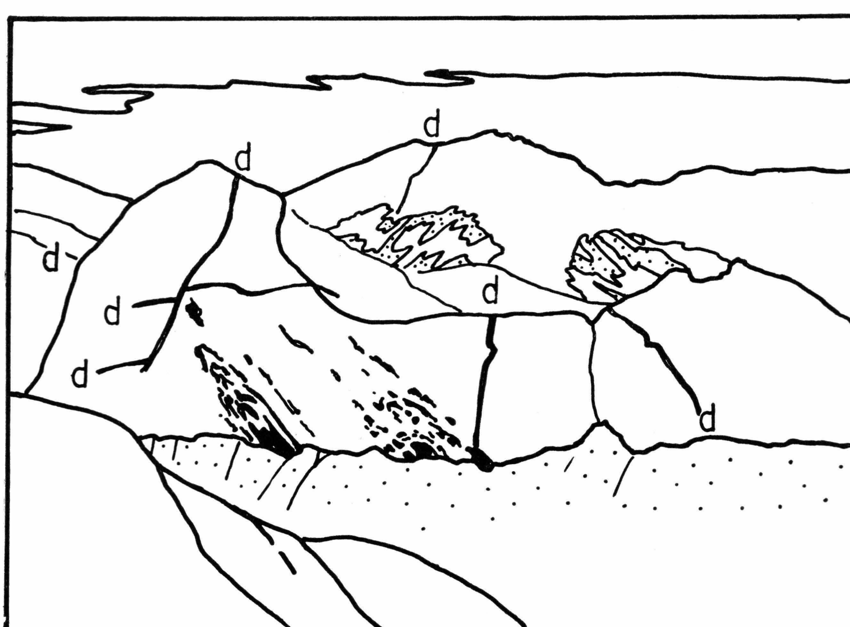


Fig. 4. A sketch of Figure 3, to show the position of the dark inclusions and the younger basic dykes, marked with d.

here. It resembles, as far as could be seen from the air, the Nunarssuit massif (Wegmann, 1938, p. 98).

Large lenses of dark inclusions were noticed in the southern wall of the complex (Fig. 3, compare Fig. 51, Wegmann, 1938, p. 99).

This study is of a preliminary character.

Grønlands Geologiske Undersøgelser,
Copenhagen, November 1955.

Situation.

The granite plug is situated at 61°25′ latitude, 48°15′ longitude.

The distance from the head of the Tigssaluk fiord to the centre of the massif is about 6 kilometres.

The complex has a width of about 5 kilometres in both north-south and east-west directions, the contact having a rounded triangular form.

It is surrounded by a series of banded biotite gneisses with a general lineation strike of N 60/70 W, with a steep northerly dip, and a northwesterly fold axis. The banded gneiss-series and the tectonics of the surrounding area have not yet been the subject of more detailed study.

The massif rises to a height of about 1270 metres above sea-level.

A deep-cut valley from the head of Tigssaluk fiord continues in a northeastern direction through the granite complex. It is considered a fault zone. Several mylonitic rocks have been found in the gully. The fault zone is characterized by red-coloured alkali feldspars as it cuts through the granites.

A meltwater stream, coming from the Inlandice, runs around the eastern side of the complex and proceeds through the above-mentioned valley.

The weathered granite surface, near the western contact, consists of low, rounded, barren hills, "roches moutonnées", which show a sheeting, due to horizontal jointing. This is a feature seldom met with in the inland of South Greenland. Mostly a covering of gravel and vegetation is to be found. The slightly granitized gneisses along the contact show the same peculiar surface.

To the north, the granite complex is bordered by a string of lakes, which persistently lie at an altitude of 450 to 550 metres. To the east, the contact is marked by the meltwater stream and by very steep gneiss walls. A permanent ice-covering is found on the steep northern slopes.

The aerial view (Fig. 2) was taken in the early spring.

The gneiss-series.

The banded gneiss-series is of a regional character and is ordinary hornblende-carrying biotite gneiss, with horizons of amphibolite and with hornblenditic zones. No detailed study of these rock series has yet been made.

Along the contact of the granite plug the gneisses seem to be more homogenized.

The contact zone.

The contact of the granites towards the gneisses is rather sharp. It is an "intrusive" contact, and the granite complex might thus be classified as belonging to the group of the "granites circonscrites" (Rauguin, 1946).

A contact aureole of maximally 2 metres wide is found, in which a granitized gneiss occurs, with phantom remnants of the original lineation. Outwards the gneissic character of the surrounding rocks becomes gradually more pronounced, but over a width of approximately 200 metres from the contact, this gneissic zone is penetrated by a very large number of barren quartz pegmatites. The number of these pegmatites also gradually decreases from the contact zone outwards.

The quartz pegmatites are mainly distributed in two systems: one system along the strike of the gneisses, in N 60/70 W, the other in the direction N 40 E (Fig. 5). They must belong to the granite intrusion. The character of these pegmatites is definitely diverging from that of the pegmatitic material of the gneissic series, which carries a large amount of feldspathic material. The quartz pegmatites of the granitic parentage are practically void of any other mineral, except minor amounts of potassium feldspar.

In the granite complex itself no pegmatites were found; only loose quartz-pegmatitic cobbles have been noticed occasionally.

A sample of the homogenized gneiss (GGU 15269), from the southern contact zone, clearly showed under the microscope its dualistic origin.

The rock is a granitized biotite granodiorite.

The original feldspar is a plagioclase, with about 28 An, most frequently twinned according to the albite law. Occasionally pericline twins may be observed.

Most of the potassium feldspar is introduced in this rock, which consists of 24 per cent quartz, 61 per cent feldspars, 12 per cent biotite, 1 per cent hornblende, 1 per cent accessories and about 1 per cent secondary minerals.

The potassium feldspars occur partly as microcline patches in microcline microperthite, partly as a fairly homogeneous feldspar of the orthoclase type. Frequently the orthoclase is in a stage of microcliniza-tion. The homogeneous potassium feldspars are not seldom "craquelées".

Fig. 5. Pegmatites of granitic parentage in the surrounding gneisses, striking two different systems.

In the microperthite textures the twinning of the plagioclase component may often still be preserved. The amount of potassium feldspar is around 50 per cent of the total amount of feldspar, which seems considerable.

The biotite is nearly uniaxial, with $n\alpha$: olive green, and $n\beta n\gamma$: greenish brown.

There is no doubt that the surrounding gneiss-series is of a grano-dioritic composition, as also seen in the field.

They are typical rocks of the amphibolite facies in this part of Greenland. However, as the more exact mineral composition is not yet known, an estimation of the amount of introduced material must be omitted from this discussion. The nature of the mobilized material is certainly alkalic.

The granites.

The granites of the complex can roughly be divided into two distinct groups. A light-coloured central granite (on Figure 2 outlined by a solid line), and a darker coloured marginal granite, which encloses the central granite.

The granites show a great affinity to certain rapakivi rocks from South Finland, as described by WAHL (1925).

The central granite.

The main central granite of the massif consists of a very homogeneous, fluorite carrying, calco-alkaline biotite granite. The granite is rather coarse-grained.

The colour is usually very light pink.

In particular zones, the potassium feldspars may be more reddish to deep red, which gives the granite a porphyritic appearance. This might also be the case where the granite is in contact with huge basic dykes.

The reddish zones in the granite complex apparently indicate zones of movement, with mylonitic (recrystallization) phenomena, which at the present cannot be satisfactorily explained. The zones, in which the red colour is due to a ferruginous staining of the potassium feldspars, are steep dipping, rather wide areas. A zone of about 200 metres wide has been observed in continuation of the meltwater stream gully (Fig. 6). The strike of these zones is usually northeasterly. Occasionally veins of epidote, some 10 to 20 centimetres wide, are found. The epidote veins often carry dark purple coloured fluorite crystals. A sample of the granite from the "fault" zone apparently does not give any definite evidence for faulting or mylonitization. The only difference which can be noted, compared with a sample of the central granite, is that the potassium feldspars are more weathered, more sericitized and stained. If faulting occurred, which seems probable from the field evidence, the effect of faulting on the granites has been relatively small.

The central granite contains macroscopically visible crystals of a purple coloured fluorite.

A geometric analysis on a thin section of the central granite (GGU 15258), according to the point-counter method, yielded the following results: 39 per cent quartz, 57 per cent feldspars, 4 per cent dark minerals and accessories.

Fig. 6. The southern, central part of the granite intrusion, as seen from the west. In the foreground, the marginal granite. The summit is hidden by clouds. The central granite is divided into two parts by a faultzone. To the right the steep south-eastern gneiss-walls can be seen.

The quartz partly consists of what might be considered the first generation of idiomorphic grains, with undulating or irregular extinction, partly of interstitially developed fine-grained quartz with normal extinction. Inclusions are practically only to be seen in the larger "first generation" grains. Myrmekitic intergrowths with feldspar are rare.

The feldspars consist mostly of potassium feldspar and mixed alkali feldspars, occurring both as microcline, microcline-perthite, intermediate potassium feldspars (GOLDSMITH and LAVES, 1955), and micro string-perthite. The total amount of alkali feldspars is about 40 per cent. The rest of the feldspars consist of albite-oligoclase, with about 15 An, usually twinned according to the albite law. The plagioclase is apparently more effected by weathering than the alkali feldspars. The twinning is sometimes faded out, to give place to perthitic textures.

The dark minerals consist practically exclusively of a dark coloured biotite, with $n\alpha$: light yellow green, $n\beta n\gamma$: dark olive green to reddish brown. The biotite is uniaxial. It carries many tiny apatite inclusions.

Some minor grains of actinolitic hornblende with $c : \gamma$ about 15° have been observed in the thin section.

As to the accessories, the bulk consists of fluorite and apatite, in about equal amounts of 0.5 to 0.7 per cent. A few grains of ore are to be seen.

Secondary epidote (clinozoisite), mostly occurring as a rim between the biotite-feldspar contacts, amounts to about 0.5 per cent of the total.

The marginal granite.

The marginal granite, close to the southern contact, is apparently more porphyritic than the central granite. It is also darker and resembles more the granitized gneiss of the contact aureole. The marginal granite is, however, as coarse-grained as the central granite, while the granitized gneiss is rather fine-grained.

The eastern contact zone of the granite plug has a pegmatitic appearance (GGU 15255). The main rock here is a very coarse-grained granitic rock, with comparatively large, polysynthetic twinned areas of plagioclase, up to 4 centimetres large.

A sample of the marginal granite from the southern contact zone (GGU 15269) consists of 32 per cent quartz, 51 per cent feldspars, 12 per cent dark minerals and 5 per cent accessories and secondary minerals.

The quartz shows the same general character as that of the central granite.

The amount of mixed alkali feldspar phases is slightly higher, while the plagioclase content is about half of that of the central granite. In other respects the feldspars resemble those of the central granite.

Notably high is the content of dark minerals, of which far the greater part, 10 per cent, consists of biotite. The biotite is of the same appearance as that of the central granite, with inclusions of apatite and some fluorite, and with pleochroic halos.[1])

The actinolitic hornblende of the granite has an extinction angle of $c : \gamma$ varying around 16° from 14° to 20°. It is faintly pleochroic in red-brown shades. Apatite inclusions are also found in the hornblendes.

The amount of accessories and secondary minerals is higher, compared with the central granite, because of the greater amount of epidote (3 per cent). Of the other 2 per cent, the bulk is made up of apatite and ore, together amounting to more than 1.5 per cent.

The fluorite content is notably less than in the central parts of the granite massif. It can only seldom be seen in hand specimens. The amount of fluorite in the thin section is less than 0.2 per cent.

Zircon occurs as tiny inclusions in all matter, most frequently in the feldspars. Some crystals of a metamict, prismatic mineral, probably also zircon, about 1 to 1.5 millimetres long, occur in the thin section.

The basic inclusions.

In the central part of the granite massif, several comparatively small basic inclusions have been observed.

These inclusions, which are rounded, and which seldom exceed 0.5 metres in diameter, occur scattered in the granite. Sometimes a group of inclusions is met with, sometimes only single inclusions are found

[1]) Pleochroic halos are frequently noticed in the biotites of the rapakivi rock-suits and have recently been discussed by Kaitaro (1955).

Fig. 7. Basic inclusions in the central granite.

(Fig. 7). So far, no relationship between the basic inclusions and pre-granitic basic rocks in the surrounding gneisses has been found.

The inclusions consist of a dense, dark green matrix, built up mainly of biotite, hornblende and feldspar, with small nodules 1 to 5 millimetres in diameter, made up of quartz and feldspar. Sometimes these nodules are filled with fluorite.

The rock has a porphyritic appearance and is of kersantitic parentage, more correctly a hornblende kersantite, with an approximate composition of 10 per cent quartz, 30 per cent feldspars, 45 per cent dark minerals, 4 per cent apatite, 3 per cent fluorite and 8 per cent accessories and secondary minerals.

The quartz occurs idiomorphically in the nodules, only seldom interstitially. It contains mostly numerous inclusions of apatite, as well as zircon and rutile.

The bulk of the feldspars consists of plagioclase, an andesine-labradorite, with about 50 per cent An, usually twinned, although the twin-plane is faded out in many instances. It occurs mainly in the groundmass, together with biotite and hornblende. The plagioclase carries many small inclusions of apatite and rutile. Only 4 per cent of the total feldspar-amount consists of potassium feldspar, which is exclusively found in the nodules. It is a homogeneous feldspar, occasionally carrying "rounded" insula of biotite.

About half of the dark minerals consist of a brownish-green biotite, which is partly chloritized, especially in the groundmass. The biotite of the groundmass forms a network of tiny flakes. Larger uncorroded flakes of biotite always occur in the nodules.

The other half of the dark mineral group, about 24 per cent of the total, consists of a dark greenish-brown hornblende or occasionally uralitic pyroxene.

Apatite only occurs as inclusions, which, however, can be very densely seeded, mainly in quartz and plagioclase. Apatite inclusions have also been observed in biotite.

The occurrence of fluorite, mainly interstitially, is very conspicuous. The fluorite is, moreover, macroscopically visible in the nodules, which it occasionally fills completely. The fluorite has a deep purple colour and is easily detected under the microscope. It has been observed as interstitial, irregular masses, mostly bordering biotite, but it may also occur as inclusions in the hornblendes. Sometimes it is found as tiny drops or blebs in the plagioclases. The fluorite crystals of the nodules do not exceed 1 millimeter in diameter. The fluorite fills the nodules in the same manner, as calcite does in some other kersantites.

Considering the genesis of the basic inclusions, it suffices to quote Wegmann (Proc. Int. Geol. Congr. London, 1948), as is also done by Barth (1952, p. 188): "De nombreuse roches décrites sous le nom de lamprophyre, ne sont autre chose, que des filons basiques transformés".

The younger dykes.

It is of special interest to note the occurrences of younger basic dykes. The knowledge of an active phase, younger than some of the youngest of the crystalline rocks, will make it possible, in the long run, to distinguish between the different dyke systems in the whole area, and to establish a chronology on their occurrences.

Ussing (1911) has already pointed out the importance of the younger dykes in the Ilímaussaq batholite. He described a number of these from subvolcanos and intrusives from the Julianehaab District.

Wegmann (1938) again mentioned the group of younger dykes as a topic for further detailed studies, as it possibly allows for the chronological sequence of events in the Post-Gardar formation.[1]) Wegmann distinguishes between the group of black dykes and the group of brown dykes. The black dykes are the eldest and range from "highly olivine-bearing diabases to quartzitic feldspar porphyries", referred to by Wegmann, as belonging to the porphyry formation of the Gardar formation. The younger group of brown dykes is a more homogeneous group of broad diabases, characterized by its pyrite content and its content of titan-augitic pyroxenes, according to Wegmann.

It is rather doubtful whether Wegmann's classification suffices. It will be more safe to await a classification on the basis of the petrology of the dyke rocks, rather than use a morphologic classification of the dyke systems.

Field investigations in the area north of Arsuk tend to show that there are two structural dyke systems, one striking northeast, and one striking northwest. In both systems, however, older and younger dykes occur. Intersection of dykes in one system and intersection between the dyke systems is rather common, but it gives no definite answer as yet with respect to the stratigraphic positions of the respective dyke rocks.

The younger dykes intersecting the granites.

(Fig. 8).

The granites are intersected by several younger dykes, of which one can be followed over a considerable distance, both through the granites as well as through the surrounding gneisses. This broad diabase dyke, which is about 50 metres wide, cuts right through the central part of the granite and is easily detected on the aerial view (Fig. 2). This dyke strikes about east-west.

Several minor dykes, possibly apophyses, striking in the same manner as the above-mentioned diabase, have the same general appearance and approximately the same composition.

An exception has to be made for a thin dyke, striking N 30 W, which has been observed at an altitude of about 1250 metres, near the summit. This dyke carries rows of cavities, filled with natrolitic material.

The main, broad, continuous diabase (GGU 15264) appears to be an olivine diabase, with about 60 per cent plagioclase, 11 per cent olivine, 13 per cent subcalcic augitic pyroxene (pigeonite), 12 per cent chlorites and 4 per cent ore. Only a few grains of apatite have been observed in the thin section. The diabase shows a very typical ophitic texture.

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[1]) For a discussion of the rocks of the Gardar formation, see Wegmann, op. cit., pp. 60—124.

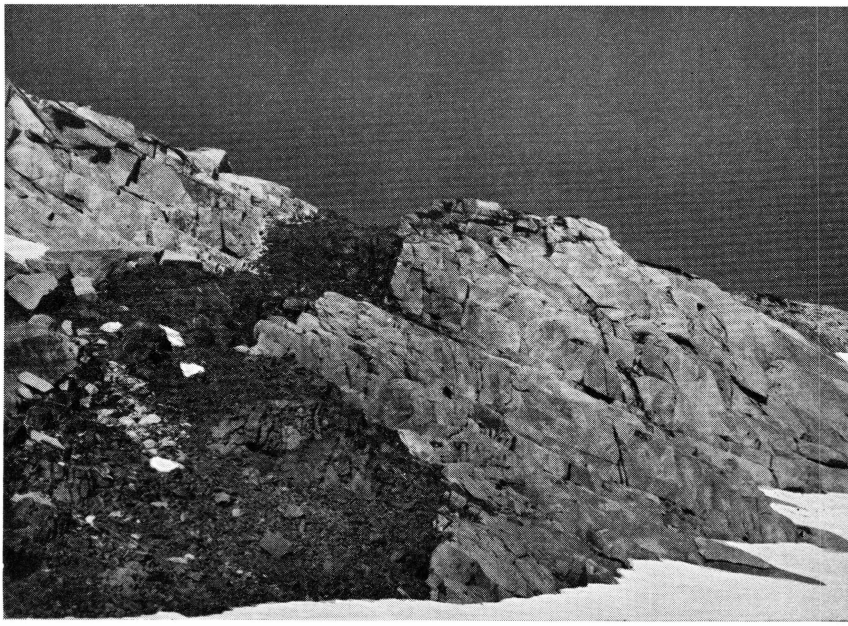

Fig. 8. A younger basic dyke, intruding the central granite. Altitude 1100 metres

The olivine has not been determined by other than optical means. The optic axial angle is about 90°, the birefringence about 0.04. Consequently the olivine would be a Mg-rich forsteritic olivine, with about 20 Fa.

Most of the pyroxenes have a small axial angle, which points to a pigeonitic composition, but occasionally a pyroxene with a larger optic angle has been found. This pyroxene is nearly augitic in composition. The extinction angle of the pyroxenes varies slightly around 45°. The pyroxenes are often altered to chlorites.

The plagioclases are usually twinned according to the albite-carlsbad law. The composition is approximately 70 An. Zonar plagioclase phenocrysts show a decrease of anorthite content of about 30 per cent, from about 75 An in the centre to about 45 An perpherical. The plagioclases are usually clouded by small brown inclusions. This phenomenon tends to show that they have been recrystallized from high-temperature forms to low-temperature forms.

The following diagram illustrates the measurements on two albite-carlsbad twins, according to the diagrams of VAN DER KAADEN (1951) and KÖHLER (1941):[1])

[1]) The measurements were carried out by Mr. S. BAK JENSEN.

Twin	Reinhard – van der Kaaden		Twin	Köhler				
	high	low		$\alpha\alpha$	$\beta\beta$	$\gamma\gamma$		mean
A–C^i	56	63	A–C^i/ A–C^{ii}	56	58	54	high	56
A–C^{ii}	56	60		61	61	66	low	62
C^i	58	65	C^i / C^{ii}	58	59	60	high	58
C^{ii}	59	66		63	65	67	low	65
Mean	57	63						

high temperature: 57 An. low temperature: 63 An.

There is no distinct difference between high- and low-temperature forms in the given composition interval. The optics of both forms fit equally well in the diagrams of both van der Kaaden and of Köhler. Other observations on the optics of the plagioclases leave the same doubt. Presumably the optics are of a low-temperature character as the combined observations on 16 measured twins tend to show. Moreover, the plagioclases are usually clouded, which points to a recrystallization from high-temperature forms.

The most probable value of the anorthite content, in case of low-temperature optics, will be about 70 per cent. The maximum variation in composition, measured on the albite and carlsbad twins, is 10 per cent, from 63 An to 73 An. There exsists a marked tendency of a maximum composition frequency, near 70 An.

A measurement of a zonar plagioclase-indicatrix measured with respect to (010) —, gave the following results, according to van der Kaaden:

Zone	Composition	
	high	low
central................	69	75
intermediate...........	69	76
peripherical	48	45

A measurement in the intermediate zone, with respect to (001), has given 58 An high, 68 An low.

Again there is excellent agreement between the optical measurements and the graphical determination tables in both high- and low-temperature optics.

The larger disagreement between the high-temperature optics in the intermediate zone, with regard to respectively (010) and (001) orientation, tends to show that the plagioclase is a low-temperature form. The most reasonable value for the composition of the central part of the phenocryst is thus 75 An; for the peripherical zone, 45 An.

Conclusively it may be said that the plagioclases of the diabase are of a labradorite — bytownitic composition.

Discussion.

In his paper of the geology of Southern Greenland, WEGMANN (1938) discusses "The group of younger granites and syenites". Since the area north of Arsuk Fjord in many respects forms a continuation to the north of the area, described by WEGMANN, it will be quite natural to connect this new occurrence of calco-alkaline granite with the known and described younger granites from the southern area. The association with the other group of younger intrusives, the nepheline syenites, seems obvious; and this has also been discussed by WEGMANN (p. 100). On this assumption it is concluded that the "younger intrusive period" is characterized by alkaline rocks, ranging from calco-alkaline granites of the rapakivi type, over quartz syenites to peralkaline nepheline syenites.

The resemblance to the rapakivi rocks is often striking, though the typical feldspar ovoids—a potassium feldspar, surrounded by a rim of plagioclase—, are missing in the granites of South Greenland.

The comparatively large content of fluorine, however, is a conspicuous feature for the whole group of younger intrusives. The fluorine might be hidden in minerals other than fluorite.

Fluorite has been found in veins on Panernaq, near Narssaq, and in breccia, as near Agpat, on the eastern shore of Tunugdliarfik: both localities near the Ilímaussaq batholite described by USSING (1911). Fluorite has also been noticed in abundance in the northern part of the Igaliko batholite, near Narssarssuaq, and has been mentioned by the author from a meta-trachytic dyke rock (BONDAM, 1954, p. 13). Fluorite occurs as an accessory in the main foyaite of the Grønnedal-Íka massif (CALLISEN, 1943, p. 34). WEGMANN mentions the occurrence of fluorite from the Kûngnât intrusive (WEGMANN, 1938, p. 97). The extreme fluorine-rich cryolite occurrence at Ivigtut presumably belongs to the same cycle.

The granites, here described, are no exception to the "rule" that younger intrusives are accompanied by fairly large amounts of fluorine. Normally the fluorine content in rocks of granitic and syenitic parentage is so low that it is easily absorbed by common minerals, such as biotite, amphiboles, and apatite, which are able to contain fluorine in their lattice. The excess of fluorine must crystallize in other forms, as for instance, alkali aluminofluorides in an extremely fluorine-rich environment or as fluorite in calco-alkaline surroundings.

The basic inclusions in the central granite might be considered as partly assimilated basic rocks, for instance, dykes. The effect of "contamination" on these basites would be the occurrence of potassium feldspar, quartz, and fluorite in the nodules, and possibly the formation of biotite in the groundmass. If so, it would be established that the granite intrusion is characterized by a fairly large content of fluorine.

The central granite resembles, to a great extent, some rapakivi rocks from Viborg, Southern Finland, which have been described by Wahl (1925) under the names of pyterlite and wiborgite. The mineral composition is practically the same as that of the central granite. The quartz, however, is not coloured, as is the case in pyterlite. The potassium feldspars do not have plagioclase rims either. The biotite, which forms the bulk of the dark minerals in the pyterlites, is of nearly the same appearance as that of the central granite. Fluorite is a common, and important, accessory of the Viborg rapakivis.

The resemblance between the group of younger granites in Southern Greenland and the rapakivis of Southern Finland, has been discussed, at length, by Wegmann (1938, pp. 115—121). It suffices to mention here the evidence given in the study of the granites, here described, in supporting Wegmann's assumption of an analoguous development of both rock series: the younger granites of South Greenland and the rapakivis. However, detailed investigations in the group of the younger intrusives are too scarce as yet, to enter into a discussion about the development of the rapakivi rocks of South Greenland.

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