CHAPTER III

P E T R O G R A P H Y

In this chapter the author has given the details of the megascopic and microscopic characters of the various amphibolitic and granitic rocks encountered in the area.

The amphibolites and the associated granitic rocks represent two stages of plutonic processes under geosynclinal conditions. The author has come to the conclusion that no clearcut line of demarcation can be drawn between the regional metamorphism and granitisation, and it is obvious that the regional metamorphic processes which were

responsible for the transformation of basic igneous masses into a complex assemblage of hornblendic rocks, gradually changed over to metasomatic processes of granitisation.

AMPHIBOLITIC ROCKS

In the field, the amphibolitic rocks are seen to form a banded assemblage of a number of rock types. All transitions exist between the various types at most places, and this fact clearly illustrates that the different varieties have originated from a common basic rock by metamorphic and metasomatic processes.

A brief description of the textural and mineralogical characters of the various types is given below. For the convenience of description, these hornblendic rocks have been divided into the following groups. These divisions however, are arbitrary as they do not show any clear cut demarcation line in between them:-

(i) Foliated amphibolites,

(ii) Massive amphibolites,

(iii) Streaky amphibolites.

FOLIATED AMPHIBOLITES

Megascopic characters

These are dark coloured fine grained to medium grained foliated rocks. The specific gravity of these rocks varies from 3.117 to 3.291. In hand specimens they show distinct foliation characterised by the parallel orientation of crystals of hornblende. In the field, these rocks occur as small sheets ranging in thickness from a few cms to about 40 - 50 metres. The detailed field characters of these rocks are given elsewhere (Chapter IV).

Microscopic characters

Texture: Under the microscope, the thin sections reveal a typical gneissose structure, such that the hornblendic prisms show a distinct parallel orientation. Even the subordinate minerals like felspar, and at times quartz, form streaks and lenses parallel to the direction of foliation (Plate 2).

Mineral assemblage: Hornblende, plagioclase and a little quartz. In most cases, the hornblende predominates over plagioclase, and quartz occurs only in a very subordinate amount. But varieties containing larger proportions of

PLATE 2

Foliated amphibolites with some quartz. (X 30)
(Sp. YVD. 328, Hiregutti area)

plagioclase (and quartz) are not uncommon.

Hornblende occurs as prismatic, well developed crystals. In fine grained type the grains are euhedral to subhedral (0.03 x 0.4 mm), while the medium grained varieties contain rather subhedral crystals (0.05 x 0.6 mm). Cleavages on (110) are very frequently met and a few basal sections showing the 120° - 60° angle are also seen. The hornblende occurs in various shades of green colour, and is strongly pleochroic. The pleochroism is - Z > Y > X (Z - Bluish green; Y - Brownish yellow, X - Pale yellow). R.I. varies from 1.674 to 1.693 (for Z) and the birefringence is between 0.0210 and 0.0204 ($n_\gamma - n_\alpha$ Berek). It is biaxial negative with optic axial angle (- 68°) varying by 2°. C∧Z varies from 18° - 20°.

In longitudinal sections the extinction angle is between 10° to 28°. The index of elongation of hornblende in the fine grained type is between 17 and 18 and that of medium grained type is between 5 and 6. Inclusions are those of dusty iron-ore and quartz. In a few crystals rounded grains of quartz have developed a sort of sieve structure. The hornblende is quite often seen to be altering to biotite and chlorite.

Plagioclase occurs as irregular grains, mostly occupying the intervening space between hornblende crystals. Both twinned as well as untwinned grains are present; and the twinning is seen to be on Albite law. The crystals generally measure 0.5 mm x 0.02 mm to 0.7 x 0.07 mm in size. The anorthite content varies between An_{26} to An_{36}; and the plagioclase could be considered as andesine. In most cases the felspar is somewhat altered and contains plenty of inclusions of tiny mica flakes, epidote and clinozoisite.

Quartz occurs sporadically as irregular grains of small sizes measuring about 0.10 mm across. It also occurs in plagioclase and hornblende as inclusions. On the whole, the amount of quartz, in medium grained variety is less as compared to that in the fine grained variety. Mostly it occurs associated with the plagioclase. In very many cases it shows the tendency of replacing the hornblende.

Sphene, apatite and iron-ore (ilmenite) occur as accessory constituents. The amounts of these minerals vary in different varieties, but is always subordinate.

MASSIVE AMPHIBOLITES

Megascopic characters

These hornblendic (amphibolitic) rocks occur in close proximity with the other varieties as distinct bands,

patches and irregular masses. These are nonfoliated, massive rocks with dark grey to dark greenish grey colour. The specific gravity is 3.219. In hand specimen, hornblende can be recognised as dark lustrous prisms and plates of various sizes. In between them occur greyish green or whitish green felspars. Occasionally yellowish green colour is seen to develop due to the formation of epidote.

Microscopic characters

Texture: Under the microscope the rock slice appears as a granular mass of hornblende and plagioclase. No orientation of mineral grain is seen, and the texture is somewhat granoblastic (Plate 3).

Mineral assemblage: Hornblende - plagioclase - (quartz). The hornblende predominates over plagioclase. Quartz is present sometimes and in small amount.

Hornblende forms medium size (0.1 x 0.3 mm) crystals, mostly anhedral. Its colour varies from very pale yellowish green to bluish green. Very often one single crystal would show different colours, or a part of the crystal would appear colourless or bleached. Wherever formation of chlorite has taken place, it appears rather greyish. Though it is

PLATE 3

Massive amphibolite showing a granoblastic texture (X 30) (Sp. YVD. 218, Andle area).

pleochroic, due to the patchy colouration, the pleochroic scheme cannot be mentioned definitely.

In most sections, cleavages are commonly seen. The extinction angle is 18° to 20° along (110). The hornblende shows much alteration to chlorite and biotite, and has developed somewhat fibrous nature so much so that in two areas (Kadme and Kudle) they appear full of long shreads, intimately mixed with chlorite. In the specimens from Kadme and Chivatgeri the formation of iron-ore appears to be very striking at the expense of hornblende. Inclusions are very common especially along the tufted ends and in cracks and are those of epidote, iron-ore and quartz.

Chlorite which is derived from hornblende, occurs in pale green to greyish green colour and appears almost dark under crossed nicols. It is feebly pleochroic with Y = Z > X (Y = Z - greenish; X = Pale yellowish green). A few well developed plates show biaxial (negative) figure.

Biotite is also derived from hornblende and forms pale yellowish brown flakes.

Most of the plagioclase is considerably altered and is difficult to study. Twinning is on the whole, rare and is seen only occasionally. In composition, these

plagioclase are near Andesine (An 27 to An 30). Other optical characters are undeterminable due to alteration of the plagioclase. The common alteration products are mica and clinozoisite, forming finegrained confused patches.

Quartz is not always present and is seen only in some cases. When present it is in subordinate amount and forms lenses, irregular grains scattered all over, but generally associated with plagioclase.

Epidote, iron-ore and sphene occur as accessory constituents but only in very small quantities.

STREAKY AMPHIBOLITES

Megascopic characters

This variety, which in fact is the most dominant one, occurs practically in all parts of the area where amphibolitic rocks are exposed, but in general it is more common along the coast line.

In the field, this variety exhibits a characteristic striping, comprising of numerous light coloured bands and streaks of various shades ranging from dark grey to almost white. Obviously the colour of the bands, depends on the

relative proportions of hornblende at one end and the quartz-felspar at the other. The leucocratic portions show quartz and felspars in varying proportions (Perhaps those which show considerable quartz proportion point to the beginning of granitisation process).

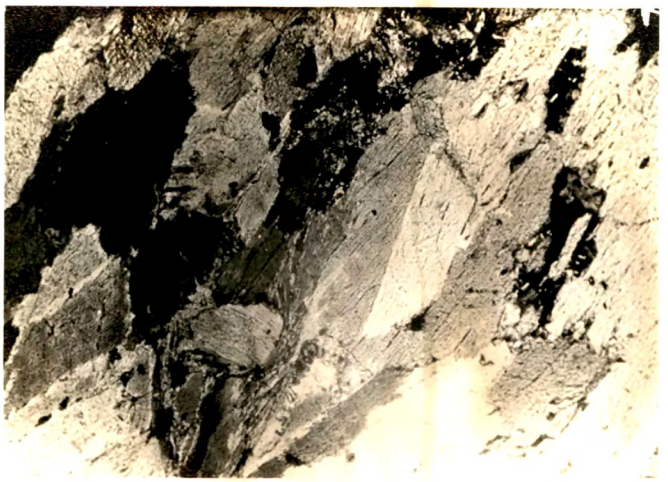
All gradations can be seen from exclusively hornblendic bands to almost hornblende free quartz-felspar rock. On the other hand, with the decrease in the banding these streaky amphibolites merge with the other two previously mentioned varieties.

Taking into account the relative proportions of the mineral constituents, the following three main types comprise this streaky variety:-

1. Consisting almost exclusively of hornblende (Plate 4A).
2. Consisting almost exclusively of felspar and/or quartz (Plate 4B).
3. Consisting of hornblende, felspar and quartz in different proportions.

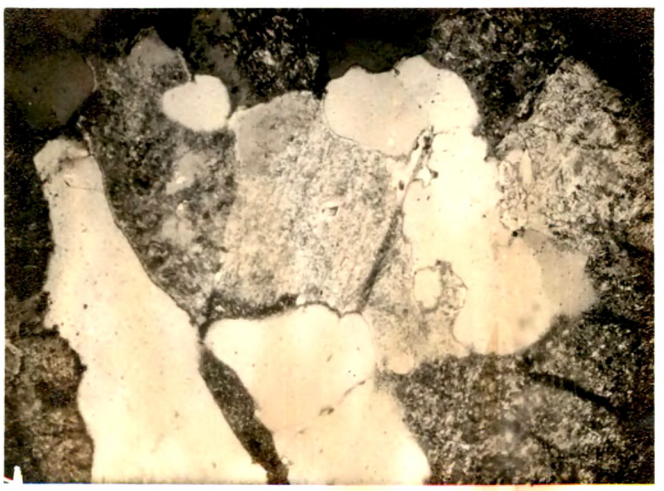
The author would like to point out here that this banded and streakiness is obviously a phenomenon connected with the segregation brought about by early metamorphic

PLATE 4



A

A. Dark coloured (hornblendic) band in streaky amphibolite (X 30) (Sp. YVD 259, Ankola area).



B

B. Light coloured quartzo-felspathic band in streaky amphibolites (X 40) (Sp. YVD. 307, Ankola area).

differentiation and the migmatisation of pre-existing basic rocks. The details of these processes have been subsequently discussed. It is seen that this banded variety shows considerable obscured tight isoclinal folding and this fact clearly points out to the important role played by deformation in bringing about this differentiation.

Microscopic characters

Texture: Thin sections of the various bands of different mineral proportions show more or less granoblastic to granulitic texture.

Mineral assemblage: Hornblende - Plagioclase - Quartz.

Hornblende occurs as rather large crystals (0.2 x 0.5 mm) and it is pale green to pale yellowish green and occasionally green. Pleochroism is Z = Y > X (Z = greenish yellow; X = yellowish). Usual prismatic cleavages are well developed. The birefringence of the hornblende crystals varies between 0.0242 and 0.0272.

The hornblende shows frequent alteration to biotite and chlorite. The formation of biotite is quite common in Hosgadde and Ankola areas, where the granitisation shows addition of potash. The alteration of hornblende

to chlorite (and epidote) is more common in the rocks which have been subjected to shearing in the vicinity of the Gangavali fault.

Plagioclase is generally altered and in many sections it is rather difficult to study its optical characters. Broadly speaking, the felspars of the rock varieties poorer in hornblende are relatively less altered. The alteration is of the nature of saussuritization rendering the individual felspar grains obscure and crowded with tiny mica, epidote and clinozoisite. In many grains, Albite twinning is distinctly seen. The values of Anorthite content vary between An26 to An33. The plagioclase is thus an andesine. Apart from the alteration products, inclusions of quartz are common. Sometimes quartz is seen corroding the felspar.

Samples collected from the exposures in the vicinity of the Gangavali river show considerable strain effects. The bend and microfaulted twin lamellae, and alteration along such planes are frequent.

Quartz is mostly granular, varying in sizes from 0.02 x 0.02 mm to 0.05 x 1.0 mm. The smaller grains

occupy the interstitial positions and very often they form mortar structure in which smaller grains and granules surround the bigger grains of quartz or the crystals of plagioclase felspar. Quartz is also seen intergrowing with felspar.

Biotite forms fine flakes and shreds and often occurs in elongated clusters. Usually it is pale yellow to yellowish brown in colour with distinct cleavages. Pleochroism is - Z > Y > X (Z = Yellowish brown, Y = Pale yellowish brown, X = Pale yellow). Very often the biotite is greenish and chloritised. Inclusions of zircon, rutile and iron-ore are common. The pleochroic haloes are of very small sizes (less than 0.01 mm).

Chlorite when present is derived from hornblende and biotite, more from the former. Pale green to greyish green in colour and it is slightly pleochroic, but quite often almost isotropic.

Epidote is seen to form scattered grains as well as aggregates of pale green to pistachio green colour. Optical characters in some large grains have been determined. The mineral is found to be biaxial negative with birefringence very strong varying between 0.0291 and 0.0313 (Berek).

In Belse and Vadibogri areas the amount of epidote is seen considerably increased in these rocks. This is mainly because of crushing and shearing in these rocks. Well developed grains and crystals measuring 0.02 x 0.07 mm are seen in many slices.

Apart from the minerals of secondary origin, zircon, apatite, sphene and iron-ore occur as accessory minerals in these rocks.

ROCK TYPES DERIVED FROM THE AMPHIBOLITIC ROCKS

The amphibolitic rocks at some places have given rise to some distinct varieties which need special mention. These are:

1. Chlorite schist,
2. Magnetite-schist and Banded-haematite-hornblende-quartzite.

Out of these, the first one is obviously the retrograde rocks due to intense crushing along shear zones, while the second one represents a rather unusual alteration of amphibolitic rock.

Chlorite schist

This occurs in hornblendic rocks as narrow patches of dark green and compact rock, with a fine schistose

structure. In hand specimens, one can see only dark green or greyish green chlorite.

Under the microscope the rock appears as a fine mass of chloritic matter with occasional crystal of partly altered hornblende. Both of them show a very fine phyllonitic texture. Hornblende occurs as partly altered crystals and does not show detailed optical properties. Chlorite occurs as minute scales or fibres, altering from hornblende, showing pale green to greyish green colour.

In addition, felspar (plagioclase), epidote and pyrite also occur as minute grains. Quartz occurs as fine grains but only occasionally.

Magnetite schist and banded haematite-hornblende - quartzite

This rock occurs as discontinuous bands (a few cm. thick) in partly granitised amphibolitic rocks near Ulvari and near Chivatgeri. They are seen grading into hornblendic rocks on one hand and into massive (ferruginous) patches of laterite, on the other.

The rock is reddish brown in colour and is made up of alternating layers of quartz felspar and granular

magnetite and/or haematite. Some altered hornblende and epidote are also present (Plate 5).

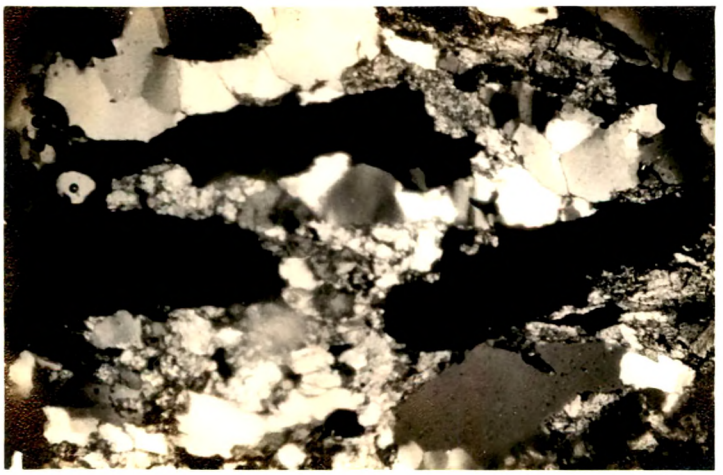
This rock has obviously been derived from streaky hornblendic rock wherein it appears that the subsequent granitising processes have augmented the segregation of iron-oxides in distinct bands, having developed at the expense of hornblende.

GRANITIC ROCKS

"The granitic rocks include a number of species of light-coloured acid plutonic rocks which contain in varying proportions the minerals quartz, plagioclase and potash felspar and a ferromagnesian mineral generally hornblende and biotite" (Read and Watson, 1962, p. 570).

On account of the presence of numerous intermediate rocks representing different stages of granitisation, all intimately mixed and subjected to folding, it is rather a difficult task to give the petrographic details of the granitic rocks in a systematic manner. In the following pages, the author has attempted to describe the numerous varieties of granitic rocks. It should, however, be noted that, complete transitions exist from one type to the other, both texturally as well as mineralogically.

PLATE 5



Banded haematite-hornblende-quartz-rock (X 30) (Sp. YVD. 158, Chivatgeri area).

In a general way, the entire granitic terrain can be said to be made up of grey, medium-grained granitic rocks - both, foliated as well as nonfoliated (massive). The foliation is either characterised by the linear orientation of mafic minerals (biotite and hornblende) or by a fine banding of alternating dark and light coloured constituents. Such a mass, in turn is seen extensively traversed and cut up by light coloured - almost white - granitic material, almost entirely devoid of biotite, hornblende etc. Some of these leucocratic bands are involved in folding while others cut across the folded structure and foliation. But in most cases, they show very clear evidences of metasomatic growth along the foliation and joint planes.

From the subsequent description it will be seen that considerable mineralogical variation exists even within the two above mentioned major types. However, for the convenience of description, the granitic rocks have been divided into the following two main groups:

(I) Granitic rocks containing mafic minerals.

(II) Granitic rocks devoid of mafic minerals.

GRANITIC ROCKS CONTAINING MAFIC MINERALS

Megascopic characters

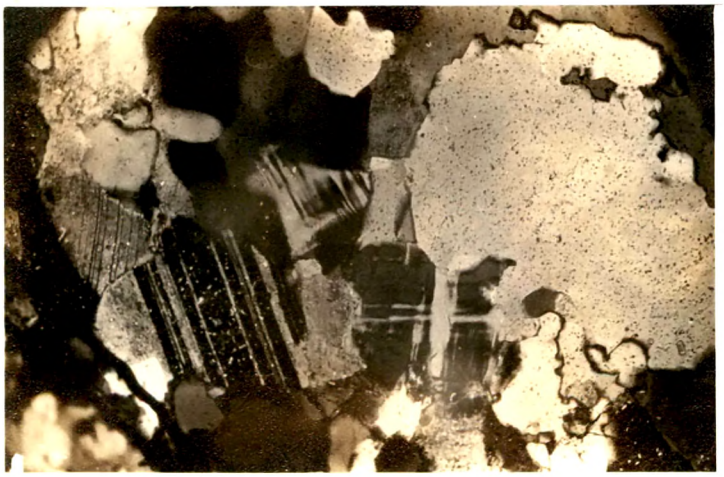
Always medium to fine grained, the rock samples show various shades of grey- depending on the amount of the mafic minerals present. Those having a higher content of biotite and/or hornblende show a dark grey colour. While such varieties which are relatively poorer in these minerals are light grey. Depending on the mafic content, the specific gravity also varies between 2.675 and 2.713.

These grey granitic rocks are either massive and unfoliated or show a characteristic streakiness. The streaky gneissic structure is due to the parallel orientation of mafic minerals.

Microscopic characters

Texture: In thin sections, the unfoliated varieties show a typical granitic to granoblastic texture with frequent intergrowth. The foliated varieties, on the other hand show either a uniformly scattered hornblende and/or biotite showing a parallel orientation or a fine alternation of streaks of leucocratic and melanocratic constituent (Plate 6).

PLATE 6



A

A. Unfoliated granite typically showing replacement structures. (X 30) (Sp. YVD. 290, Bargi area).

B

B. Foliated granite showing parallel orientation of biotite flakes. (X 30) (Sp.YVD 95, 19th M.St., Ankola area).

Mineral assemblages: These granitic rocks are made up of quartz, plagioclase, microcline, biotite and hornblende in varying proportions. Depending on the predominance of one or the other minerals, following mineral assemblages have been recognised:

1. Quartz, plagioclase, hornblende;
2. Quartz, plagioclase, hornblende, biotite;
3. Quartz, plagioclase, biotite, hornblende;
4. Quartz, biotite, plagioclase, hornblende;
5. Quartz, biotite, plagioclase, microcline;
6. Quartz, biotite, microcline, plagioclase.

Quartz forms irregular grains of variable sizes and occurs as scattered grains. It also occurs interstitially. The bigger grains in general, show somewhat lenticular shapes, while smaller grains form interlocking aggregates.

In many cases, it is seen attacking felspar with convex faces towards the felspar grains. Occasionally small crystals of biotite, hornblende and felspar are seen as inclusions. The relative amount of this mineral varies considerably.

Plagioclase occurs as anhedral to subhedral grains of variable size and is an oligoclase (An_{22-24}). Its

amount also varies. Relatively unaltered, it shows polysynthetic twinning on Albite law. In varieties which contain microcline, the plagioclase crystals are seen under gradual replacement by the latter. All stages of replacement of plagioclase by microcline are recorded. In some cases, microcline containing only a few relics of plagioclase are seen. Sometimes, the plagioclase shows alteration to a fine mica.

Microcline is seen at most places, though its amount is very variable. Some varieties are almost free from microcline, while others contain this mineral in varying proportions. When present in smaller amount it occurs as irregular interstitial grains. With its increasing content it tends to form larger crystals and plates and replace the plagioclase (Plate 7).

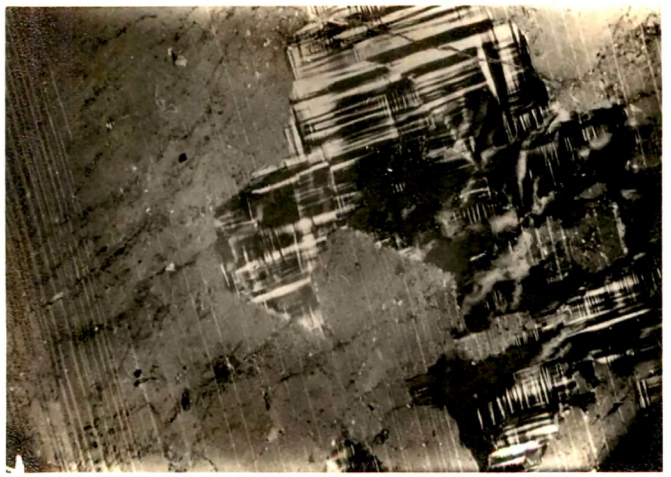
Rather large and porphyroblastic grains are not uncommon. The usual cross-hatching is always present.

Inclusions are those of quartz and occasionally of biotite flakes. The replacement of plagioclase by microcline has given rise to very interesting textural relationship. In most cases, the microcline is seen attacking the plagioclase with convex borders. In some cases good myrmekitic structure has developed.

PLATE 7

A

A. Microcline replacing the plagioclase by "Corroding" from all sides. (X 30) (Sp. YVD. 326, Bargi area).



B

B. Microcline developing at the expense of plagioclase (X 30) (Sp. YVD 326, Bargi area).

Hornblende occurs in many granites in subordinate but variable proportions, and in most cases it is seen to be changing to biotite. It forms rather ill-defined flakes of pale-green colour with pleochroism, Z > Y > X (Z = Green or olive green, Y = Pale green, X = Yellowish green). Extinction angle varies between 18° to 22° on (110); Biaxial -ve. R.I. - 1.679 (n), and Birefringence is 0.0213 (Berek).

Occasionally, this mineral is seen forming clusters and distinct veins of euhedral crystals in the main mass. In more quartzose varieties the mineral is seen 'attacked' by quartz grains along its border.

Biotite has obviously developed at the expense of hornblende. It forms flakes and big plates of varying size. Generally yellowish to yellowish green, it is highly pleochroic (Z = greenish brown or yellowish brown or olive green, Y = yellowish green, X = light yellow).

Accessory minerals are apatite, rutile, sphene, iron-ore (ilmenite), epidote and zircon.

GRANITIC ROCKS DEVOID OF MAFIC MINERALS

Megascopic characters

To this group belong the leucocratic quartzo-felspathic rocks of pegmatitic and aplitic nature which occur in the grey granite described above. These rocks show mainly the following modes of occurrence:-

1. As distinct patches in grey granites, gradually merging into the surrounding rock.

2. As stringers, veins and bands, running mostly parallel to the gneissic foliation. The junctions of these concordant bodies may be either diffused and gradual, or sharp.

3. As veins and bands cutting the main mass in all directions in a criss-cross manner. The contacts are rather sharp and well defined. Some of the veins of this category are folded while other cut across the folds (Plate 8).

The most noteworthy feature of the veins and bands of the rock occurring in the grey granites is their metasomatic origin. These veins afford an excellent example of "in situ" growth of quartz-felspar material along

PLATE 8

A

A. Dykes and veins of quartzo-felspathic matter cutting the granitic rocks.
Loc: Near 19th Milestone N of Ankola.

B

B. Folded quartzo-felspathic vein in granite.
Loc: Near 19th milestone N of Ankola.

foliation and other partings. Following evidences suggesting metasomatic growth of these quartzo-felspathic veins are encountered at most places:-

1. Almost invariably the median portions of these veins and bands are fine grained which towards the marginal portions become progressively coarser (Plate 9A).

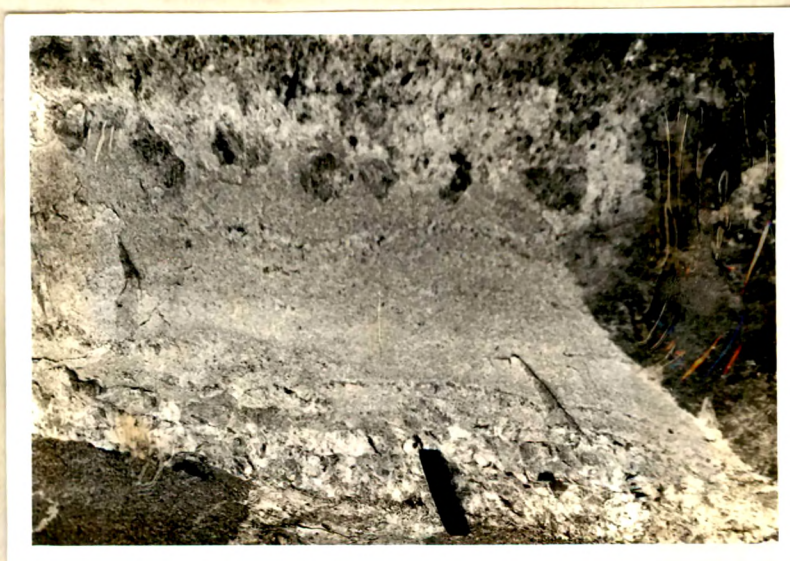
2. In most of these veins which are richer in microcline, this mineral forms large number of big (1 to 3 cm dia) round or oval shaped ("ovoids") greasy crystals, crowded along the marginal portion (Plate 9B).

3. A large number of such bands are seen showing sharp cross cutting relationship with the foliation of the main rock, giving them an intrusive appearance, as if these have been forcefully injected. But on careful scrutiny, it becomes so clear that the foliation of the enclosing rock passes through these veins and bands almost undisturbed. This is a very clear indication of a slow and gradual replacement along some fracture and joint planes, oblique to the foliation (Plate 10).

PLATE 9

A

A. Pegmatite vein in granitic rocks showing progressive increase in grain size towards margins. Loc: Near 19th milestone N of Ankola.

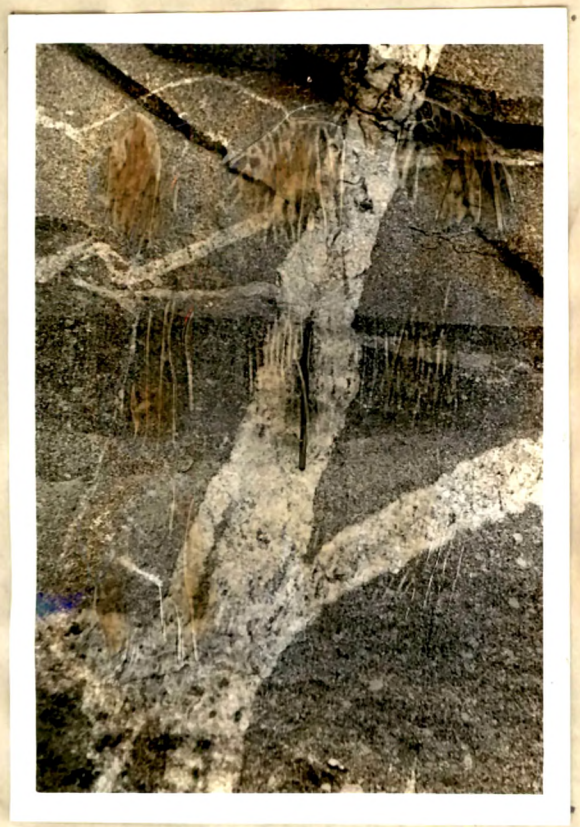


B

B. Pegmatite in granitic rocks showing coarser grain near the margins and the development of 'ovoids' Loc: Near 19th milestone N of Ankola.

PLATE 10

A



A. Pegmatite vein having grown by gradual replacement, still preserving the original gneissic foliation. Loc: Near 19th milestone N of Ankola.

B

B. Close up view of a portion of pegmatite clearly showing gradual metasomatic growth, preserving the original foliation. Loc: Bargi area.

4. Very often, especially those veins of quartz-felspar which have been involved into isoclinal folding, contain distinct selvages of mafic minerals (biotite-hornblende) along the margins. This is indicative of 'filtering off' or metasomatic differentiation of a hornblende- or biotite bearing granitic material into dark and white portions during granitisation and folding (Plate 11).

These quartzo-felspathic varieties are seen to occur in abundance in practically all the granitic areas. Veins, pods and lenses of these rocks are also present in the amphibolitic rocks, particularly along the Gokarn-Kudle coast.

In hand specimen, these rocks are leucocratic almost white in colour, massive and non-foliated, showing a great variation in the grain size. All gradations, from finegrained to medium grained and occasionally coarse grained, exist.

Microscopic characters

Texture: These rocks show a variety of textures, mainly granitic. But granoblastic and pegmatitic textures are also quite common. Some varieties show a faint foliation

PLATE 11

A

A. Lensoid patch of hornblendic matter with a quartzo-felspathic core, indicative of 'filtering off' action. Loc: Kadme.

B

B. Elliptical hornblendic patches in granites with distinct leucocratic rims. Loc: Kadme.

marked by lenticular growth of quartz and felspar, individually as well as in aggregates. Occasional flakes of biotite or hornblende also indicate the relict foliation. In varieties containing microcline, a clear tendency of the plagioclase being replaced by the microcline is noticed.

Mineral assemblage: The minerals that make up the rocks of this group are quartz, plagioclase, and microcline. Only rarely a few flakes or plates of biotite and crystals of hornblende are noticed.

The amount of quartz is quite variable. Some of these leucocratic granites are dominant in plagioclase while the others are richer in microcline, though on the whole the former variety is more common. Based on the relative abundance of the felspar, the following varieties could be established.

1. Quartz - Plagioclase,
2. Quartz - Plagioclase - Microcline,
3. Quartz - Microcline - Plagioclase,
4. Quartz - Microcline.

Quartz forms irregular grains of variable sizes, quite often as interlocking aggregates of small grains.

It also occurs interstitially and as inclusions in felspar. There are ample examples of quartz corroding the plagioclase. With microcline, it shows frequent intergrowth.

Plagioclase occurs in varying sizes and generally forms subhedral laths and plates (0.3 x 0.5 mm to 1.0 x 3.0 mm). It shows, in most cases lamellar twinning on Albite law, and is found to be approximately oligoclase (An_{22} - An_{24}). Microcline is seen replacing it and all stages of replacement are recorded. Generally the plagioclase is fresh and unaltered, but the samples which have been subjected to shearing, show bent twin lamellae, microfaulting and alteration to fine mica.

Microcline forms irregular grains varying from (0.01 x 0.02 to 0.02 x 0.04 mm). In varieties dominant in plagioclase, the microcline occurs as irregular patchy grains interstitially. With increasing microcline content, the mineral is seen replacing the plagioclase. The replacement of plagioclase by microcline indicates that the leucocratic veins made up of plagioclase and quartz were later on affected by potash metasomatism, ultimately giving rise to microcline rich bodies. The microcline is almost always fresh and unaltered, showing distinct grating

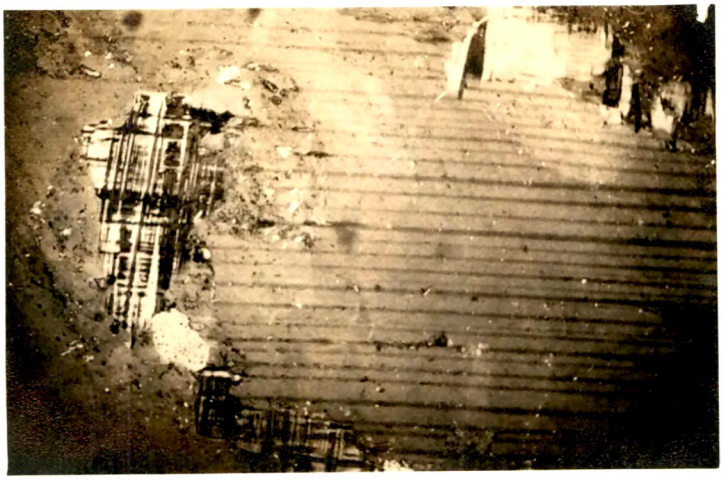
structure. Antiperthitic and perthitic structures between plagioclase and microcline indicate replacement origin (Plate 12).

Biotite occurs only occasionally and when present it is in small flakes.

Hornblende is very scarce and when present forms small prisms and flakes and shows all stages of alterations to biotite.

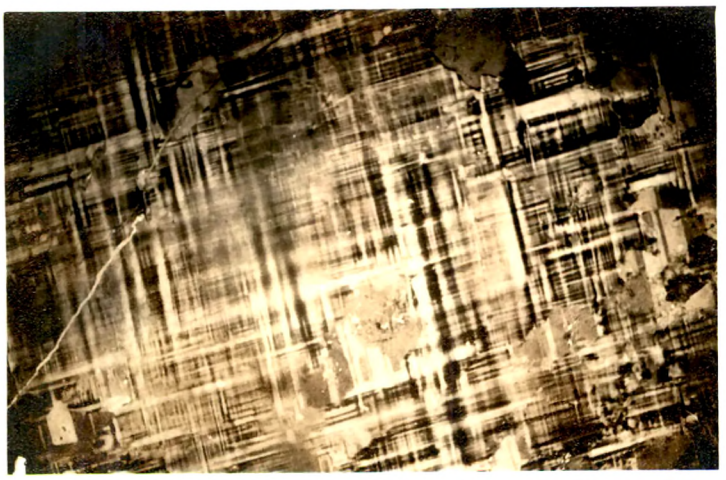
The common accessory minerals are apatite and zircon.

PLATE 12



A

A. Somewhat antiperthitic structure due to an early stage of replacement of plagioclase by microcline (X 40) (Sp. YVD. 226; 19th M.St., Ankola area).



B

B. Microperthitic structure due to replacement of plagioclase by microcline. (X 40) (Sp. YVD. 322B, Hosgadde area).