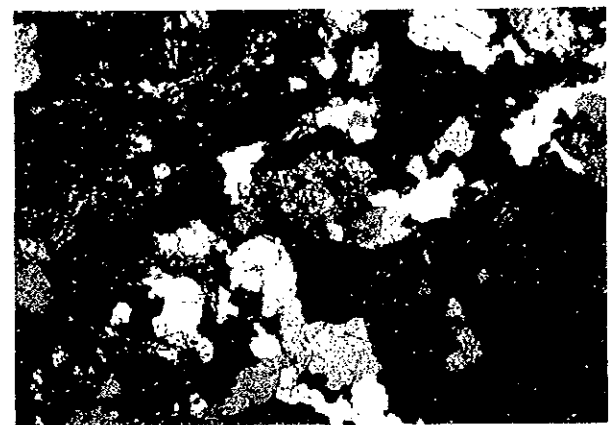
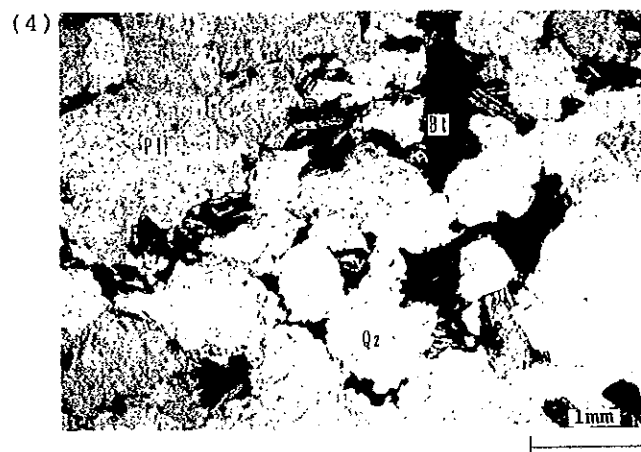
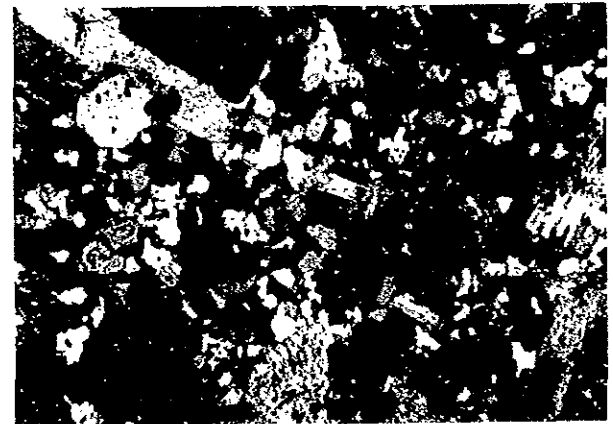
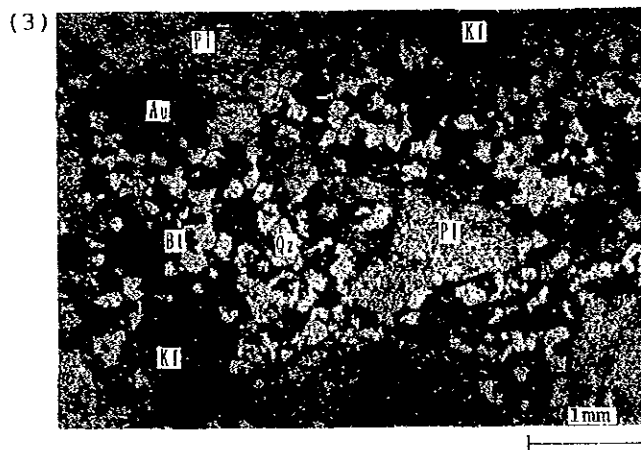
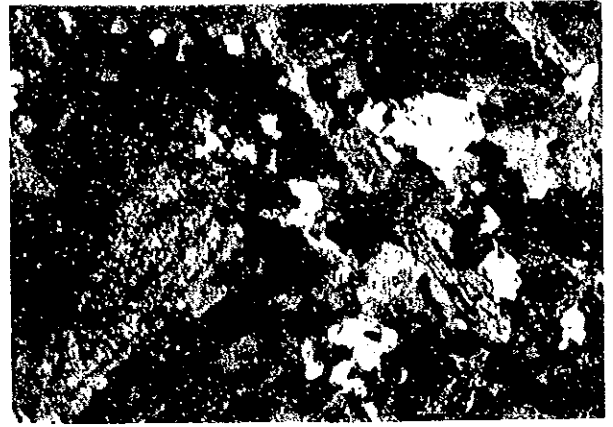


Plane polarized light

Crossed polarized light



(5)

Sample No. : 3DN20

Locality : Tsav

Rock name : Alkali basalt

Observation note :

This specimen is dark gray alkali basalt with phenocrysts of plagioclase (andesine), olivine, augite and biotite, mostly 0.5-1mm in length. Plagioclase phenocryst is highly corroded by groundmass and has abundant glass inclusions. Olivine phenocryst shows a pale yellow tint and is rimmed with minute phlogopite. Augite phenocryst is relatively fresh. Biotite phenocryst is mostly opacitized. Groundmass shows an intersertal texture and consists principally of lath-shaped plagioclase, olivine, pyroxene, opaque oxide and glass.

(6)

Sample No. : 3DN21

Locality : Tsav

Rock name : Nepheline basalt

Observation note :

This specimen is dark gray nepheline basalt with phenocrysts of plagioclase (andesine), nepheline, augite and hornblende (or kaersutite). Nepheline phenocryst is up to 2mm in length, usually made of several parts with slightly different orientation and contains abundant minute opaque inclusions. Hornblende(?) phenocryst is mostly opacitized. Groundmass consists principally of nepheline, clinopyroxene, apatite, plagioclase and opaque oxide.

(7)

Sample No. : 3DN22

Locality : Bayan-Uul

Rock name : Schistose granite

Observation note :

This specimen is gray medium-grained schistose granite, consisting principally of plagioclase (oligoclase), quartz, K-feldspar and biotite. It has undergone a marked cataclastic deformation. Plagioclase is 1-3mm in length, tabular to long prismatic but is often bended and broken into subgrains. Quartz is anhedral and changed into subgrains which show sutured or mortar structure. Biotite is changed into lepidoblastic aggregate of secondary biotite.

(8)

Sample No. : 3DN29

Locality : Mardai

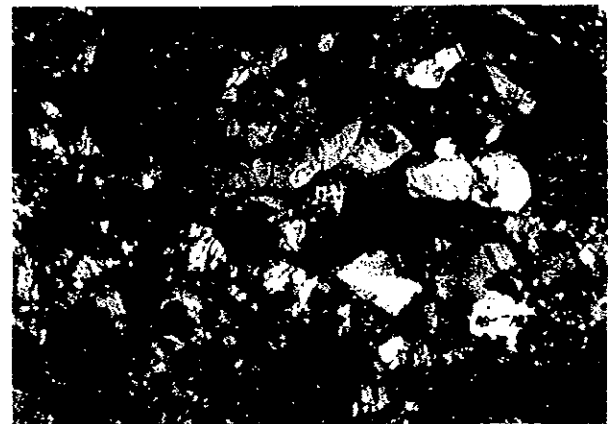
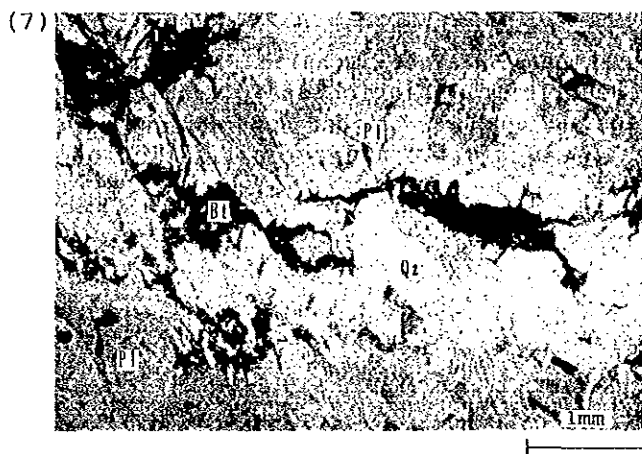
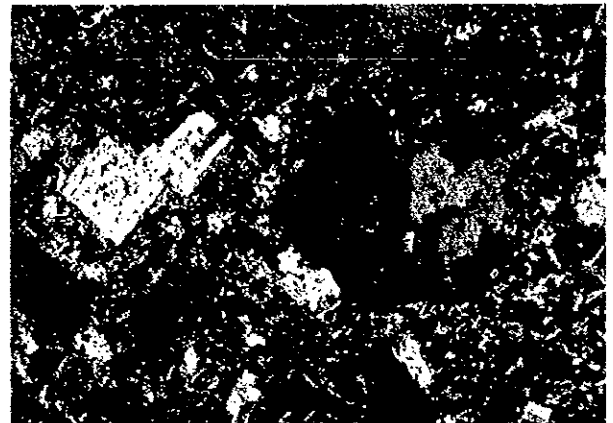
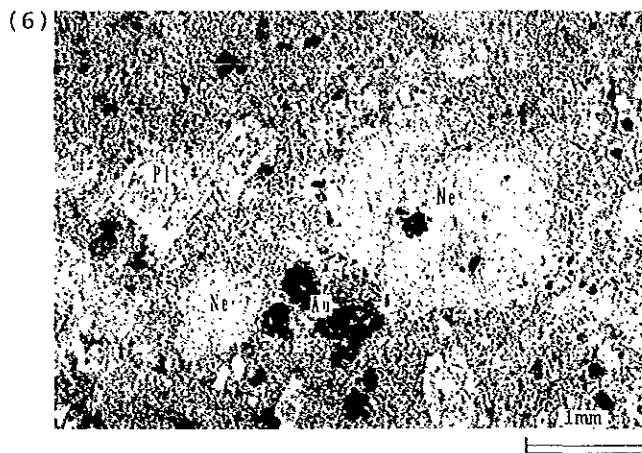
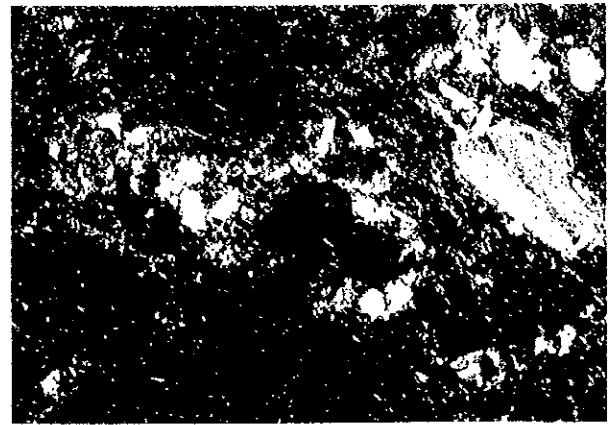
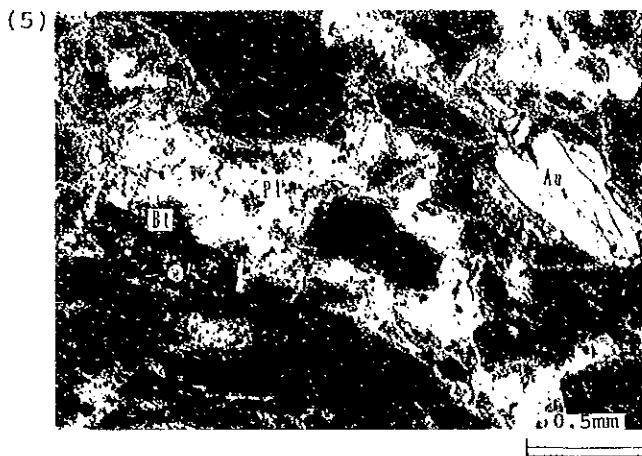
Rock name : Welded tuff(?) with granite fragment

Observation note :

This specimen is black, altered welded tuff(?), containing granite and granite-derived crystal fragments. It is made principally of flattened glass shard which is perfectly altered to sericite and limonite. Granite fragment is of leucocratic granite with myrmekitic structure. Crystal fragments are quartz, plagioclase and K-feldspar. Veinlets consisting of opaque mineral are observed.

Plane polarized light

Crossed polarized light



(9)

Sample No. : 3DN31

Locality : Mardai

Rock name : Rhyolite welded tuff ("ignimbrite")

Observation note :

This specimen is purple, aphyric rhyolite welded tuff with a small amount of corroded quartz phenocryst. Matrix shows a micro-eutaxitic foliation, and is made up of flattened glass shards which are perfectly devitrified into minute crystals of quartz, K-feldspar, plagioclase and hematite. Sanidine occurs as small euhedral crystal in drusy part, probably of vapor phase origin.

(10)

Sample No. : 3DN32

Locality : Ulaan area

Rock name : Rhyolite

Observation note :

This specimen is pale purple, aphyric rhyolite with a distinct flow structure. It consists of fine-grained quartz, K-feldspar(sanidine), plagioclase(oligoclase), biotite and glass, and shows a spherulitic texture made of quartzo-feldspathic spherules with 1-2mm diameter. Small garnet crystals are observed.

(11)

Sample No. : 3DN37

Locality : Tsagaan-Chuluut Hud.

Rock name : Granite

Observation note :

This specimen is pale greenish gray, coarse-grained granite. It consists of quartz, K-feldspar(orthoclase-microperthite), plagioclase(oligoclase), biotite and a minor amount of opaque oxide and apatite. It has considerably undergone an alteration, namely chloritization of biotite and sericitization of plagioclase.

(12)

Sample No. : 3DN38

Locality : Ulaan area

Rock name : Granite

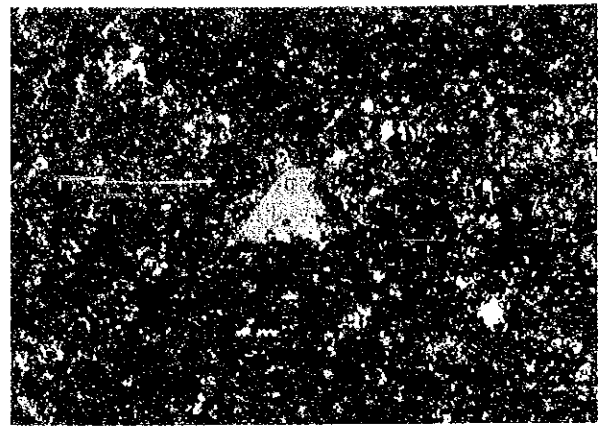
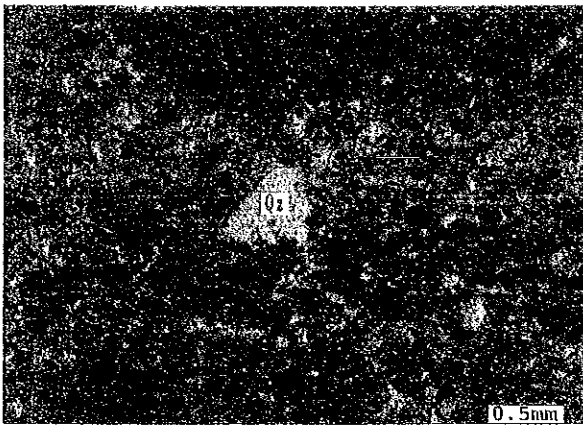
Observation note :

This specimen is pale yellowish gray, coarse-grained granite. It consists of plagioclase(oligoclase), quartz, K-feldspar(microcline-microperthite) and a lesser amount of biotite and muscovite. K-feldspar shows a distinct microcline structure. Biotite is mostly chloritized.

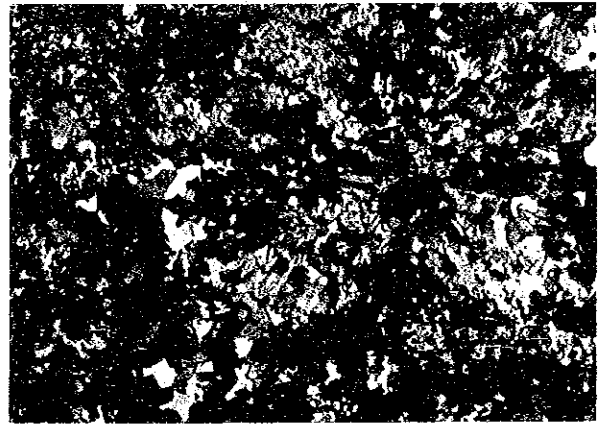
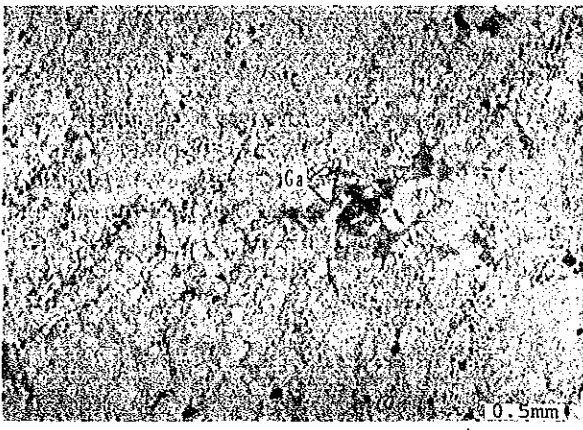
plane polarized light

Crossed polarized light

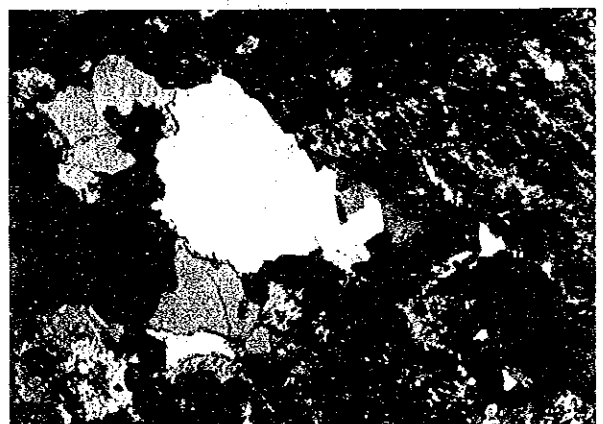
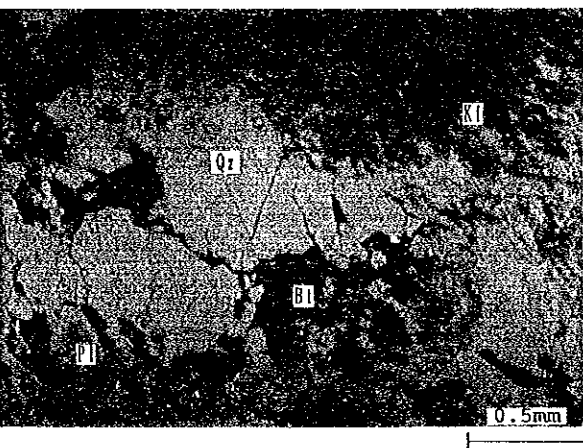
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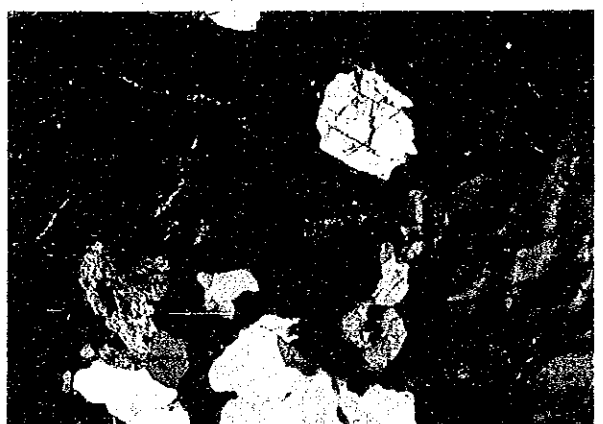
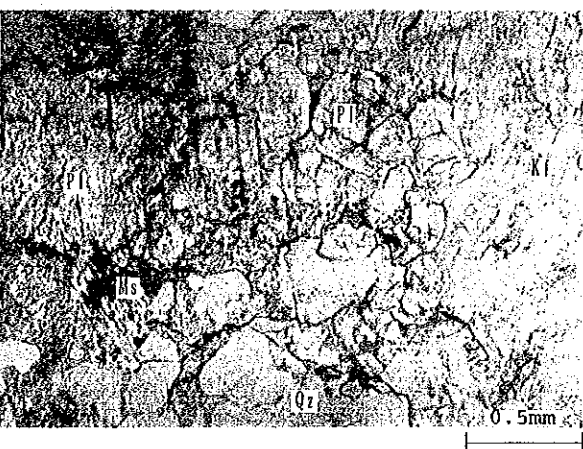
(10)



(11)



(12)



(13)

Sample No. : 3DN39

Locality : Ulaan

Rock name : Rhyolite

Observation note :

This specimen is pale gray, aphyric rhyolite with a small amount of phenocryst. Phenocryst minerals, mostly smaller than 0.5mm, are mainly of K-feldspar(orthoclase) and plagioclase(oligoclase), both considerably replaced by sericite, clay mineral and carbonate mineral. Groundmass consists of fine-grained quartz, K-feldspar and plagioclase. This rock is highly brecciated. The interspace of the breccia are filled with fluorite, quartz and various sulfide minerals.

(14)

Sample No. : 3DN41

Locality : Ulaan

Rock name : Skarn

Observation note :

This specimen is dark green, massive skarn. It consists of epidote, hornblende and garnet(andradite). Garnet occurs as polygonal porphyroblasts, about 1mm across and contains epidote inclusions. Garnet is evidently anisotropic (optic angle $2V= (+)50-60^{\circ}$) and exhibits a distinct twinning and zoning. Epidote is granular crystal, 0.1-0.2mm in length and pleochroic from colorless to pale yellow. Hornblende(or actinolite) occurs as pale-green acicular fibrous crystals.

(15)

Sample No. : 3DN42

Locality : Ulaan

Rock name : Rhyolite

Observation note :

This specimen is pale gray, aphyric rhyolite injected by many quartz veinlets. Rhyolite consists of fine-grained(smaller than 0.1mm) quartz, K-feldspar, plagioclase, carbonate minerals and a minor amount of ore minerals and fluorite. Quartz veinlets contain fluorite, sulfide minerals and carbonate minerals.

(16)

Sample No. : 3DS10

Locality : Tsav

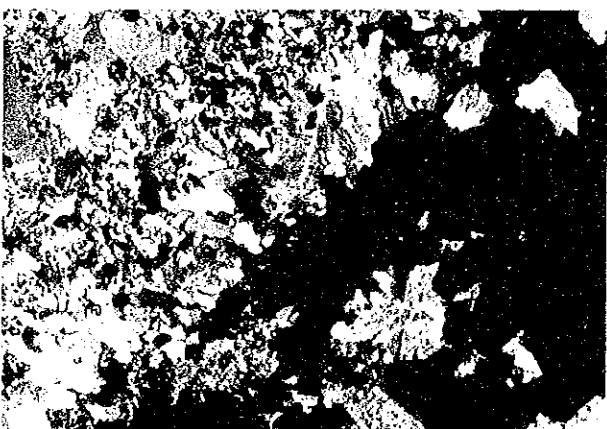
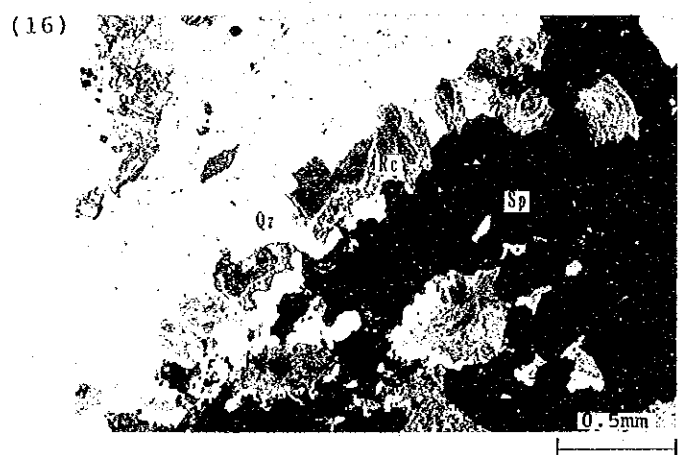
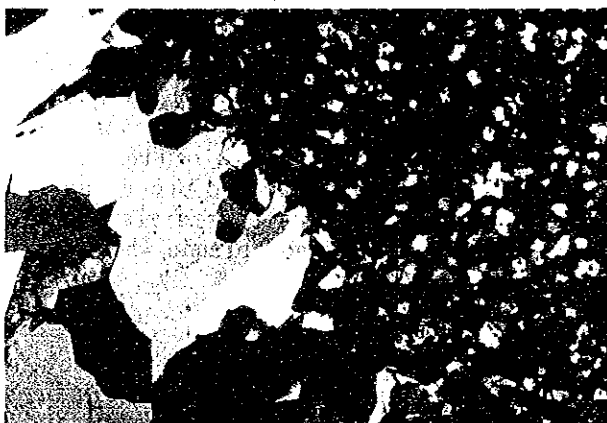
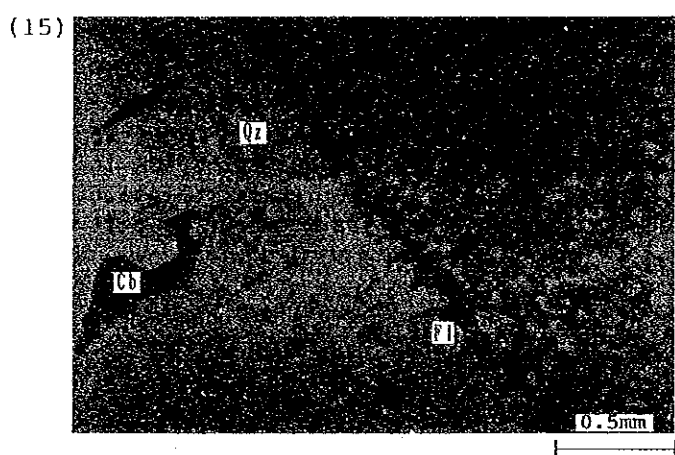
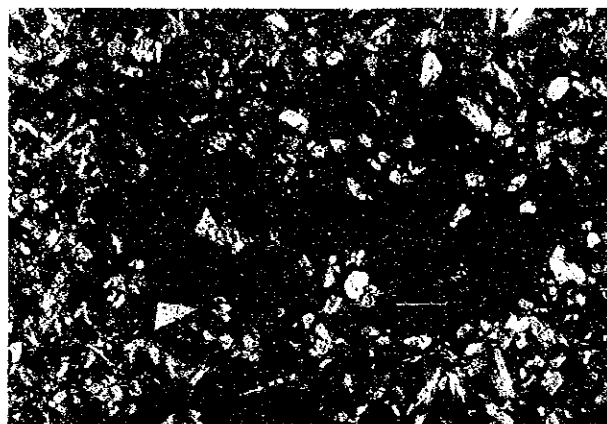
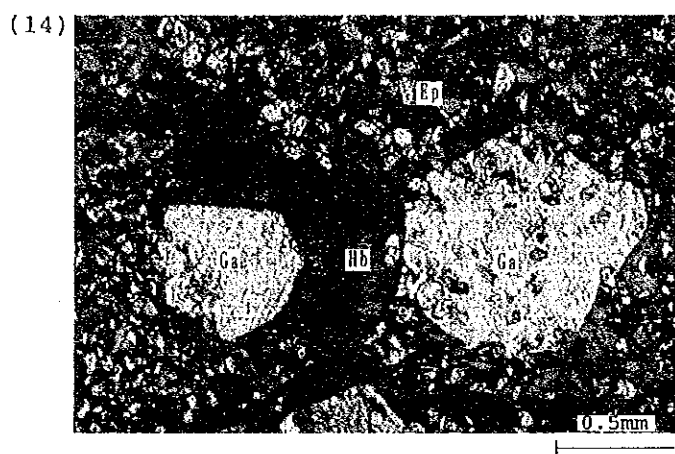
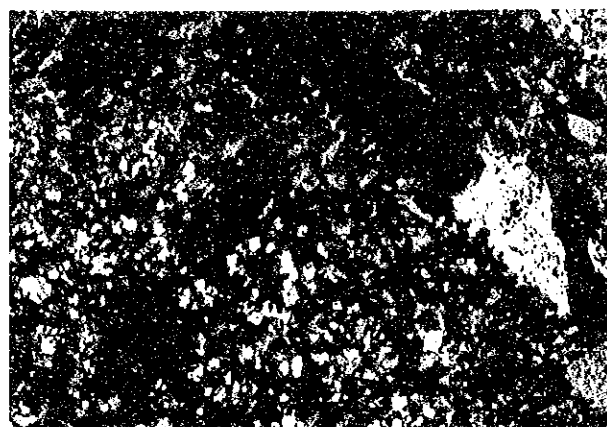
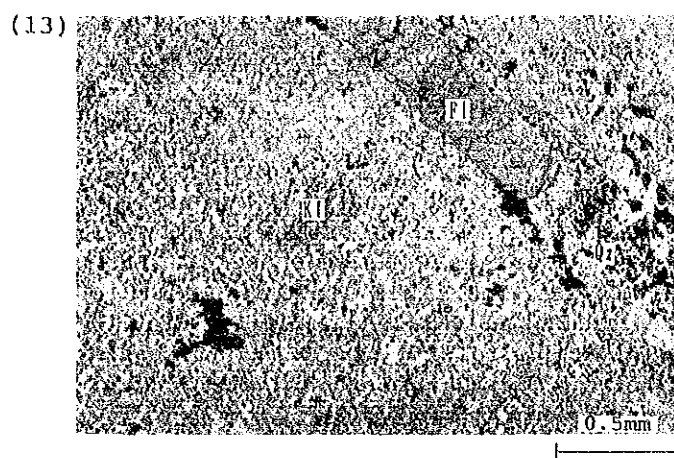
Rock name : Quartz vein

Observation note :

This specimen is pink-gray-black, ore-bearing quartz vein with rhythmically banded structure of about 1mm width. It consists of quartz, sericite, calcite, chlorite, sphalerite, galena, rhodochrosite and other sulfide minerals. Relative abundance of these minerals varies conspicuously from band to band.

Plane polarized light

Crossed polarized light



(17)

Sample No. : 3DS12

Locality : Salhiit

Rock name : Meta-tonalite

Observation note :

This specimen is pale greenish-gray, medium-grained tonalite which has undergone an intense deformation and alteration. It consists primarily of plagioclase, quartz and biotite with accessory opaque oxide and apatite. Plagioclase is primarily of subhedral oligoclase with 2-5mm length, but it is considerably distorted, fractured and replaced by epidote and sericite. Biotite is highly distorted and wholly changed into chlorite, actinolite and carbonate mineral. Quartz occurs interstitially between plagioclase and biotite, and it is recrystallized into an aggregate of smaller quartz subgrain.

(18)

Sample No. : 3DS16

Locality : Ulaan

Rock name : Rhyolite

Observation note :

This specimen is purplish gray, aphyric rhyolite. It consists principally of fine-grained (0.05-0.1mm in average diameter) quartz, K-feldspar and plagioclase and subordinately of ilmenite, carbonate mineral and other opaque mineral. K-feldspar phenocryst is rarely observed. Ilmenite is mostly changed into leucoxene.

(19)

Sample No. : 3DS17

Locality : Ulaan

Rock name : Skarn

Observation note :

This specimen is dark yellowish green, fine-grained skarn shown in the photomicrograph, and is accompanied with a subordinate coarse-grained ore-bearing part. The main part of the skarn consists of epidote, hornblende(or actinolite) and biotite. Epidote occurs as granular crystals, about 0.1mm in length. Hornblende occurs as fibrous crystals, about 0.5mm in length. Biotite occurs as minute crystals, forming a decussate structure. The ore-bearing part consists of hornblende, biotite, garnet, pyrite and carbonate mineral.

(20)

Sample No. : 3DY1

Locality : Tsav

Rock name : Pb-Zn ore

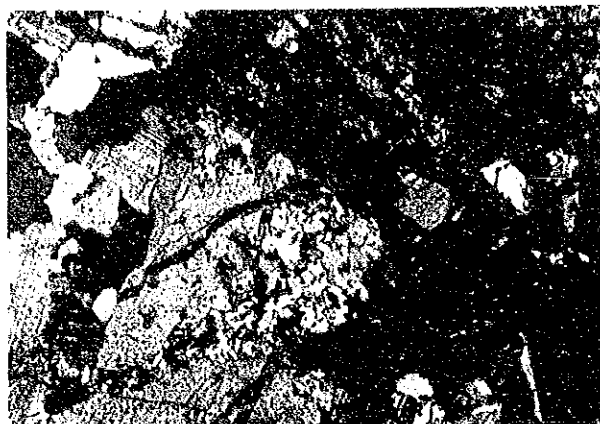
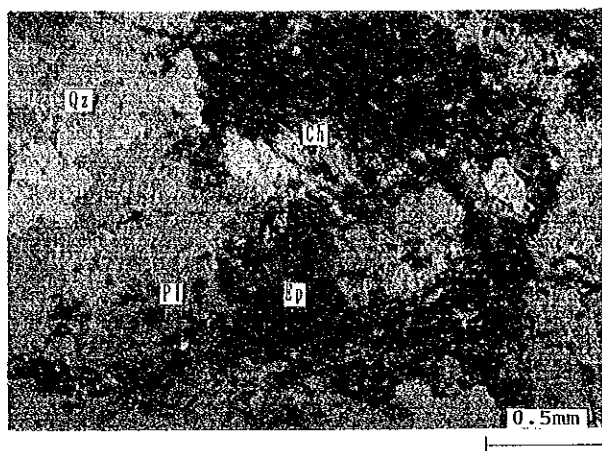
Obseervation note :

This specimen is a part of Pb-Zn ore. It is gray-yellow-white, ore-bearing drusy quartz vein with banded strucre. It consists of quartz, galena, cerussite and other carbonate minerals and sericite. The alteration of galena to cerussite is observed.

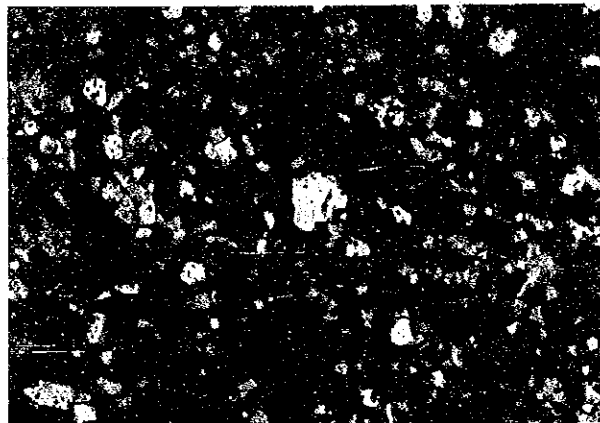
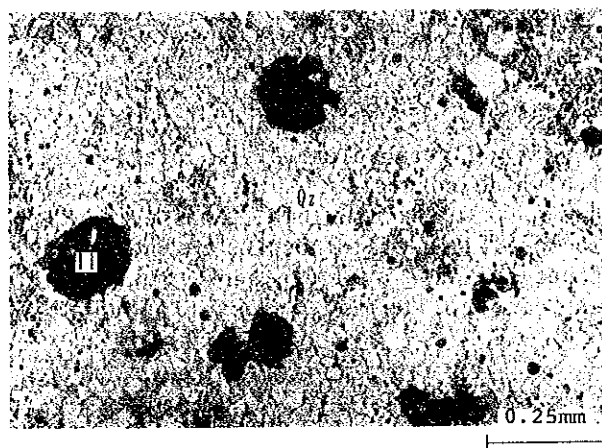
Plane polarized light

Crossed polarized light

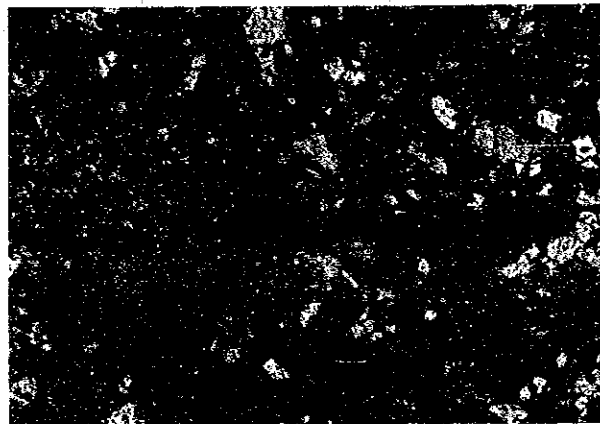
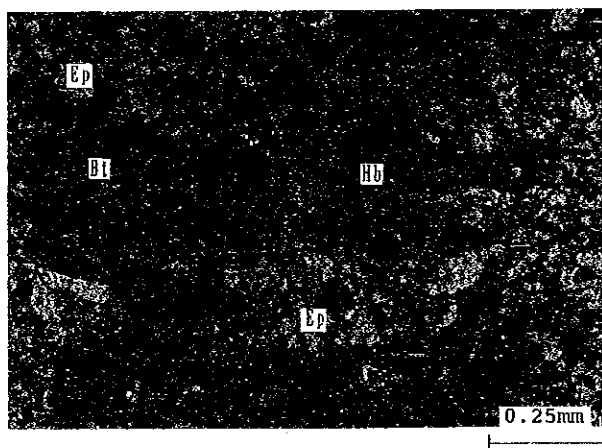
(17)



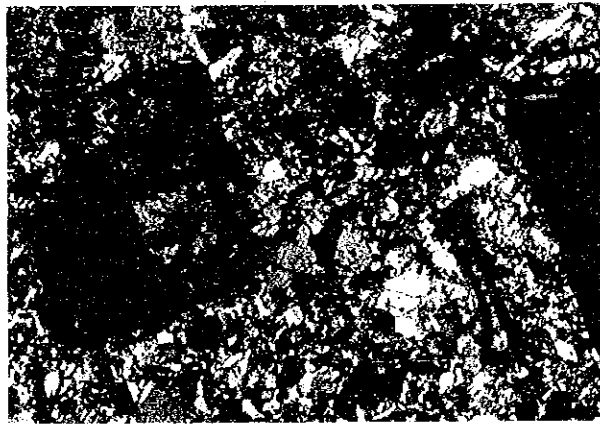
(18)



(19)



(20)



(21)

Sample No. : 3DY4

Locality : Tsav

Rock name : Schistose granite

Observation note :

This specimen is bluish gray, fine-grained, schistose granite. It shows nearly an equigranular texture with an average grain size:0.5mm. It consists of quartz, plagioclase, K-feldspar(orthoclase), biotite, garnet and accessory apatite. Plagioclase occurs as subhedral to anhedral crystals but it is mostly replaced by calcite and sericite. Quartz is anhedral and changed into an aggregate of smaller quartz subgrains. Biotite is aligned with a nearly parallel orientation and often forms a lepidoblastic aggregate. Garnet occurs sporadically and is partly replaced by quartz.

(22)

Sample No. : 3DY13

Locality : Bayan-Uul

Rock name : Meta-dolerite

Observation note :

This specimen is dark gray, fine-grained meta-dolerite with plagioclase phenocryst. It was primarily of dolerite which consists of plagioclase, brown hornblende and opaque oxide and shows an ophitic texture, but it has evidently undergone a thermal metamorphism. Plagioclase(labradorite) occurs as phenocryst up to 3mm in length and also as lath-shaped crystals smaller than 0.5mm. Most of hornblende is changed into fibrous actinolite and a lesser amount of biotite.

(23)

Sample No. : 3DY15

Locality : Tsagaan-Chuluut Hud.

Rock name : Monzodiorite

Observation note :

This specimen is dark gray, fine to medium-grained monzodiorite. It consists principally of plagioclase(andesine), augite, hypersthene, biotite, K-feldspar(orthoclase?) and subordinately of quartz, hornblende(brown to green), opaque oxide and apatite. Plagioclase is nearly euhedral, ranging from 0.2mm to 2mm in length. Augite and hypersthene, 0.1-2mm in length, often show an intergrowth relation to each other and the both are mantled by hornblende and biotite. K-feldspar and quartz occur interstitially between plagioclase and mafic minerals.

(24)

Sample No. : 3DY16

Locality : Tsagaan-Chuluut Hud.

Rock name : Granite porphyry

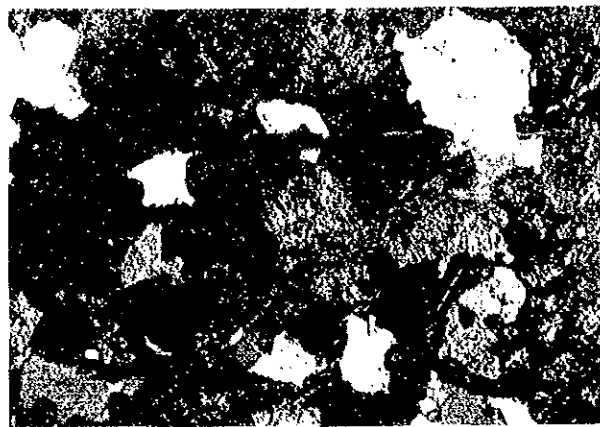
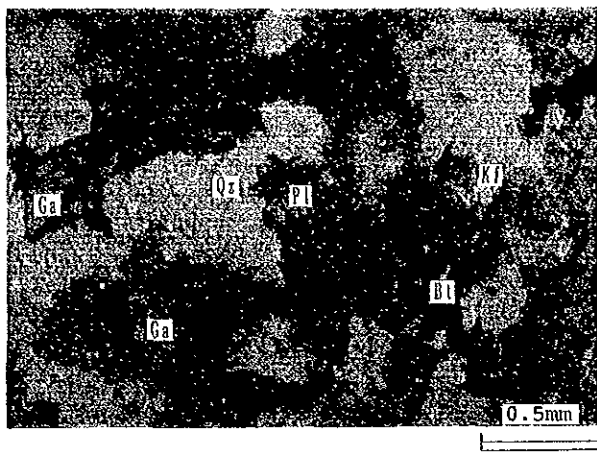
Observation note :

This specimen is pale pinkish gray granite porphyry with abundant phenocrysts, 2-5mm in grain size. Phenocryst minerals are quartz, plagioclase (oligoclase), K-feldspar(orthoclase-micropertthite) and biotite(choloritized). Groundmass consists principally of fine-grained (smaller than 0.2mm) quartz and K-feldspar.

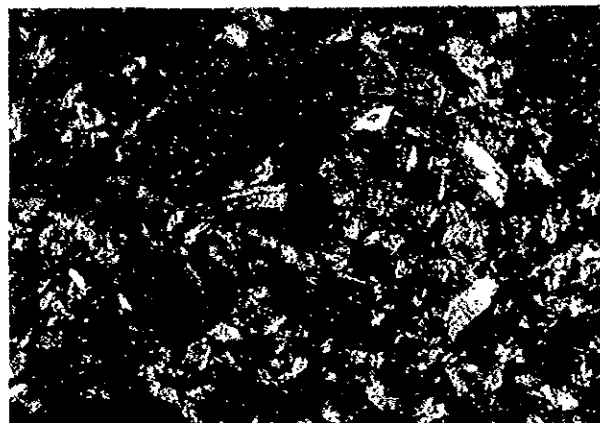
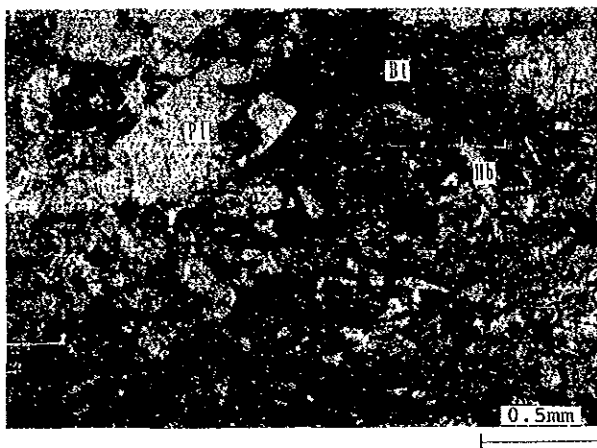
Plane polarized light

Crossed polarized light

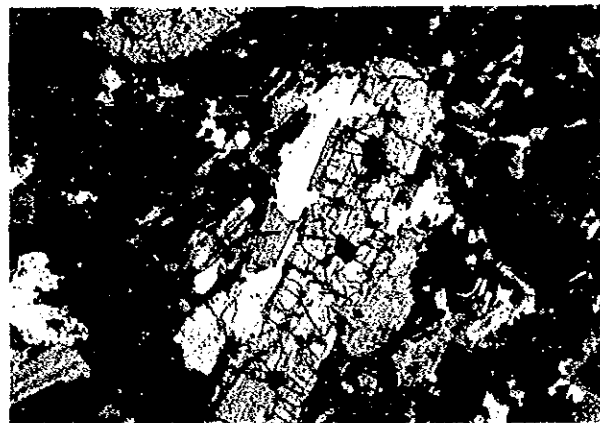
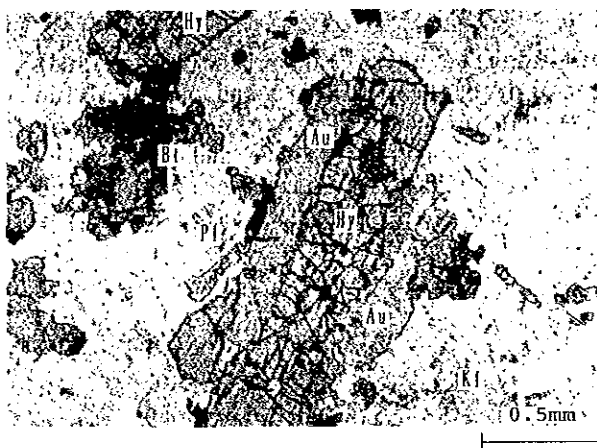
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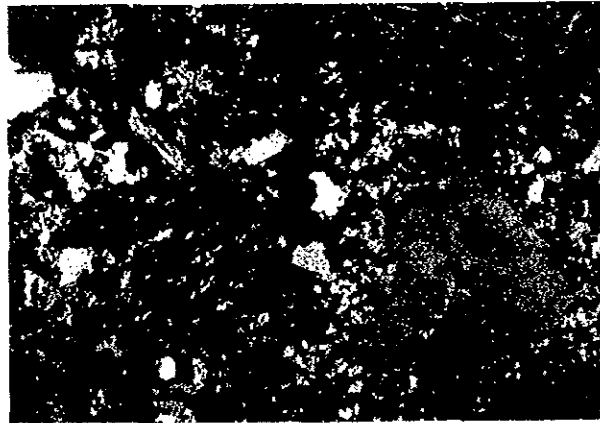
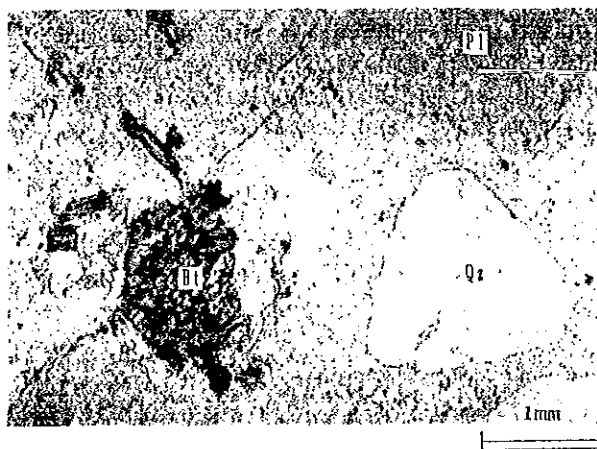
(22)



(23)



(24)



(25)

Sample No. : 3DY17

Locality : Tsagaan-Chuluut Hud.

Rock name : Monzodiorite

Observation note :

This specimen is dark gray, fine to medium-grained hornblende monzodiorite. It consists principally of plagioclase(andesine-oligoclase), hornblende, K-feldspar(orthoclase) and quartz, and subordinately of sphene, opaque oxide and apatite. Hornblende, about 1mm in length, is mostly of brown to green species but accompanied by colorless amphibole. Plagioclase, 0.5-2mm in length, is compositionally zoned and intensively sericitized. K-feldspar and quartz occur interstitially between plagioclase and hornblende.

(26)

Sample No. : 3DY18

Locality : Tsagaan-Chuluut Hud.

Rock name : Meta-granite porphyry

Observation note :

This specimen is pale pink granite porphyry which has evidently undergone a thermal metamorphism. Phenocryst minerals, mostly 1-5mm in grain size, consist of quartz, plagioclase(oligoclase), K-feldspar(orthoclase-microperthite), biotite and accessory opaque oxide. Quartz phenocryst is recrystallized into smaller quartz subgrains. Biotite phenocryst is recrystallized into an aggregate of scaly biotite. Groundmass consists of recrystallized quartz, plagioclase, K-feldspar and biotite, showing a granoblastic texture.

(27)

Sample No. : 3HN16

Locality : Bor-Undur No.11

Rock name : Meta-dacite

Observation note :

This specimen is purplish gray meta-dacite with plagioclase(oligoclase) phenocryst, 1-2mm in length. A small amount of quartz, biotite and opaque oxide occur also as phenocrysts. Plagioclase phenocryst is largely replaced by sericite. Biotite phenocryst is replaced by secondary biotite and muscovite. Groundmass consists of very fine-grained(smaller than 0.05mm), recrystallized quartz, plagioclase, K-feldspar, biotite and opaque oxide, but retains faintly a flow structure of the original rock.

(28)

Sample No. : 3HN21

Locality : Adag No.1

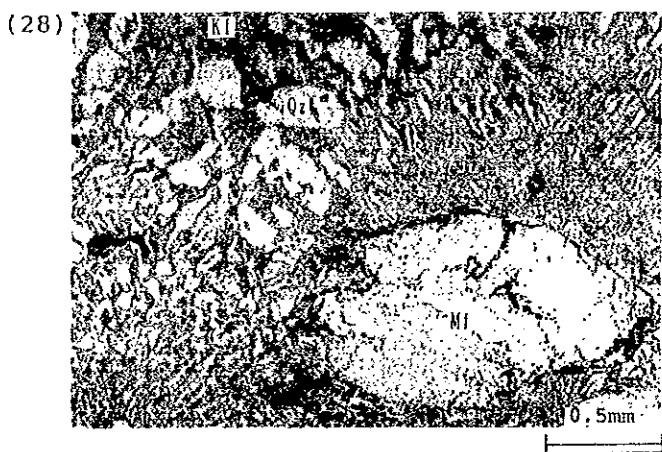
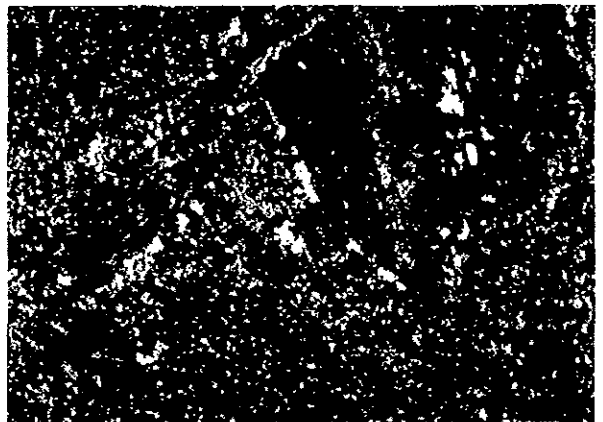
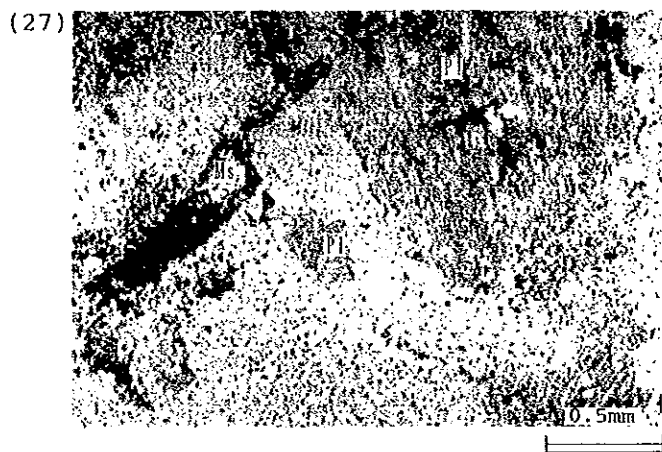
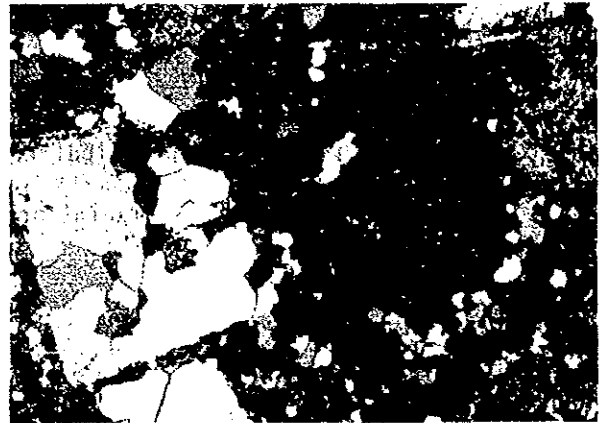
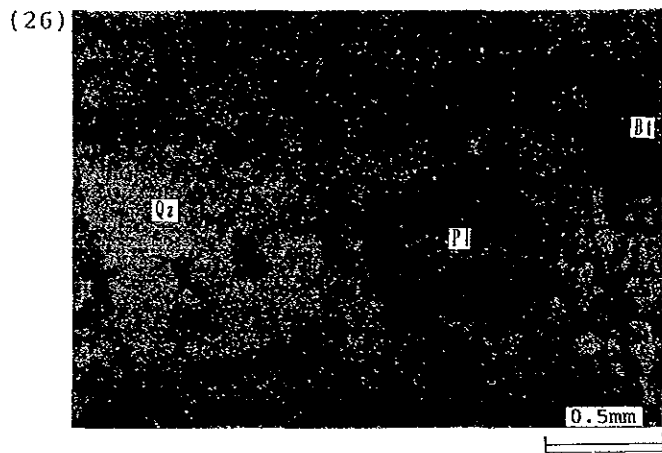
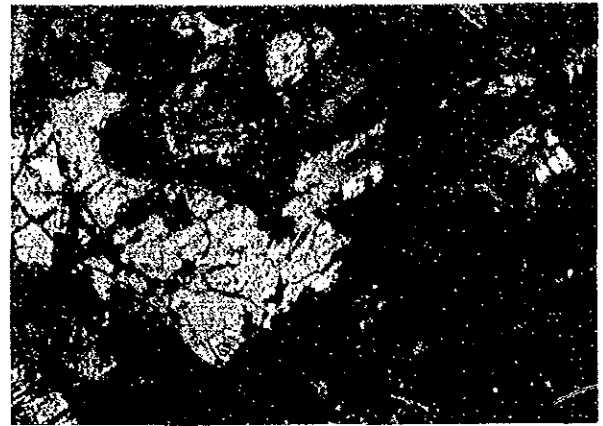
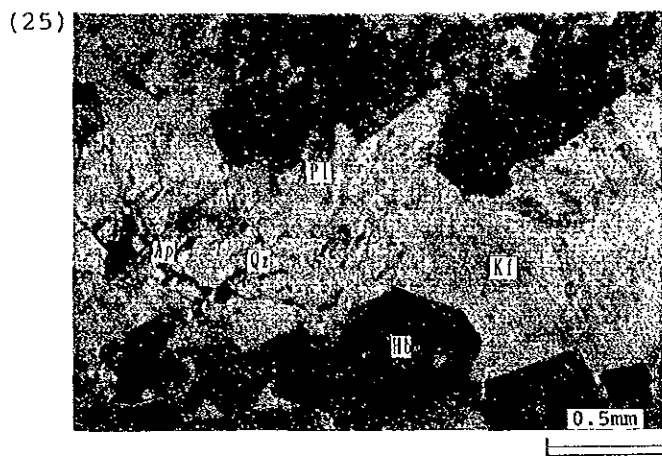
Rock name : Granophyre

Observation note :

This specimen is pale purple granophyre. It consists almost exclusively of quartz and K-feldspar(orthoclase-microperthite), and both minerals show conspicuously a graphic intergrowth. Biotite, opaque oxide and fluorite occur in a small amount. An unknown mafic mineral given in the photomicrograph is now perfectly replaced by very fine-grained serpentine(?) and hematite.

Plane polarized light

Crossed polarized light



(29)

Sample No. : 3HN22

Locality : Bor-Undur No.5

Rock name : Quartz-fluorite vein

Observation note :

This specimen is white to pale purple quartz-fluorite vein. It is made up mostly of fluorite. A small amount of microcrystalline quartz occur interstitially between large fluorite crystals together with small cubic crystals of fluorite.

(30)

Sample No. : 3NS1

Locality : Yuguzer

Rock name : Greisen

Observation note :

This specimen is gray molybdenite-muscovite-quartz greisen with pearly luster. It consists principally of quartz and muscovite, up to 3mm in length. Platy molybdenite is closely associated with muscovite. A small amount of fluorite and carbonate mineral are observed.

(31)

Sample No. : 3NS3

Locality : Yuguzer

Rock name : Greisen

Observation note :

This specimen is gray molybdenite-muscovite-quartz greisen with pearly luster. It consists principally of quartz and muscovite, up to 4mm in length. Large quartz crystal has often an elongated bipyramidal form. Muscovite gives a pale brownish tint in some parts. Platy molybdenite is closely associated with muscovite. A small amount of carbonate mineral are observed.

(32)

Sample No. : 3NS4

Locality : Yuguzer

Rock name : Greisen

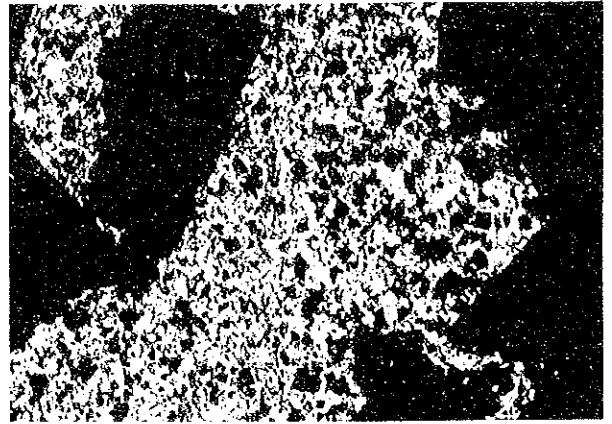
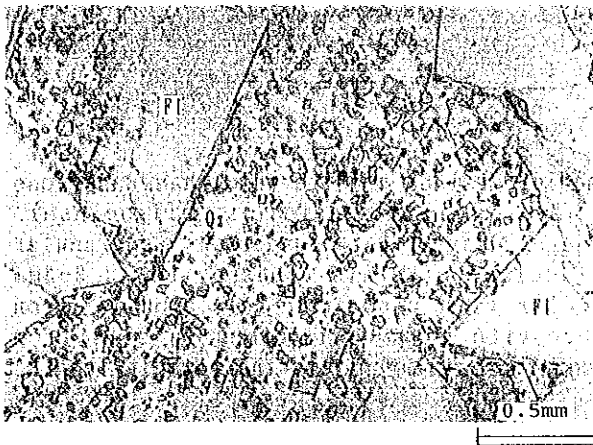
Observation note :

This specimen is gray molybdenite-muscovite-quartz greisen with pearly luster. It consists principally of quartz and muscovite, up to 4mm in length. Large quartz crystal has often an elongated bipyramidal form emphasized by zonal arrangement of fluid inclusion as shown in the photomicrograph. Molybdenite is closely associated with muscovite. Mirolitic quartz is also observed.

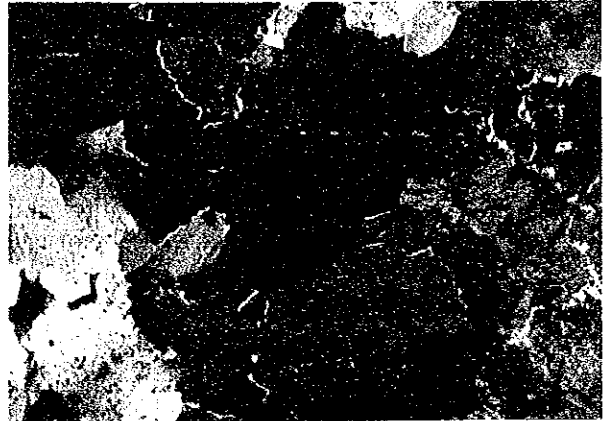
Plane polarized light

Crossed polarized light

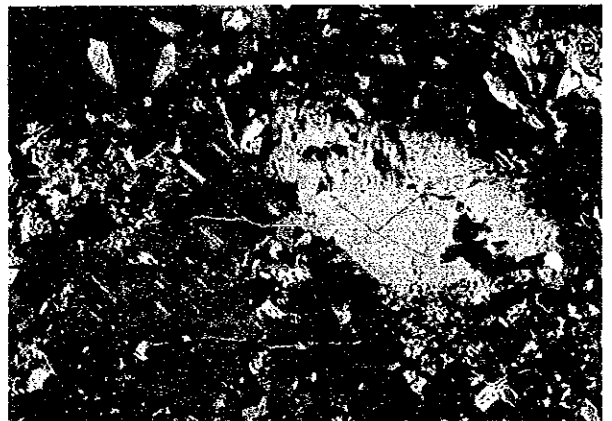
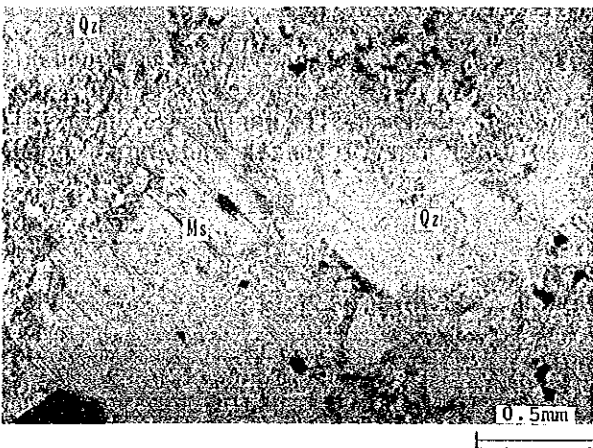
(29)



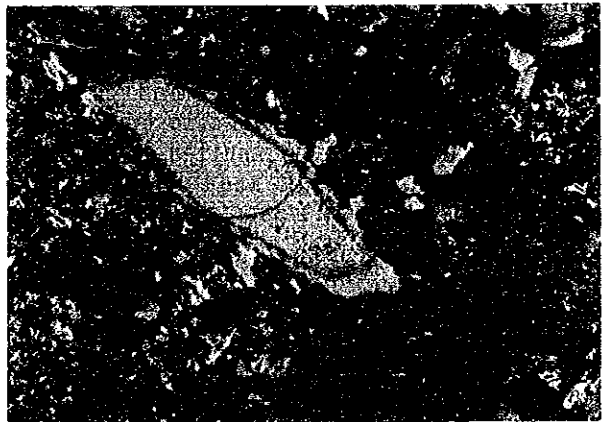
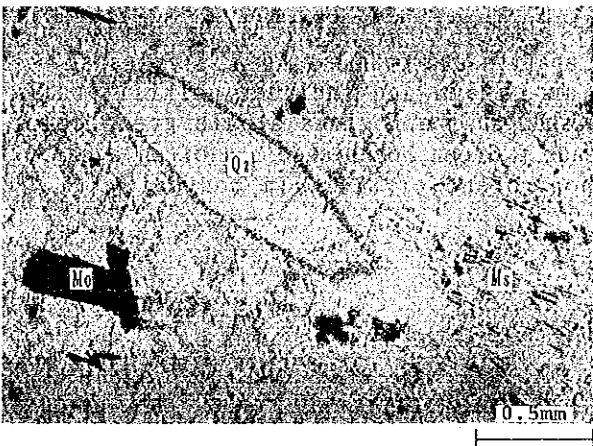
(30)



(31)



(32)



(33)

Sample No. : 3NS12

Locality : Tsentr

Rock name : Greisenized granite

Observation note :

This specimen is grayish white, medium-grained granite which has undergone an intensive greisenization. It consists of quartz, plagioclase(oligoclase), muscovite and topaz in a decreasing order. Quartz, 0.5-5mm across, is granular or anhedral, interstitial between plagioclase crystals. Muscovite, 0.2-3mm across, retains often a pale brown color with pleochroic halo around zircon crystals, suggesting that some of muscovite have been formed in situ from biotite by metasomatism. Topaz is anhedral crystal, smaller than 1mm in length, and mostly replaces plagioclase.

(34)

Sample No. : 3RS2

Locality : Lugiingol

Rock name : Hornfels

Observation note :

This is pale yellowish brown, fine-grained hornfels, probably derived from aluminous sediment. It consists of plagioclase(oligoclase), quartz, K-feldspar, corundum, biotite, muscovite and opaque oxide(hematite?) with minor spinel. These minerals excluding corundum are fine-grained, nearly equigranular (about 0.1mm across), forming a granoblastic texture. Corundum occurs as large poikiloblasts, up to 3mm across, rimmed with muscovite.

(35)

Sample No. : 3RS3

Locality : Lugiingol

Rock name : Carbonatite

Observation note :

This specimen is reddish brown, fine-grained carbonatite with abundant small cavities. It consists of quartz, "synchysite", muscovite, calcite and opaque mineral(goethite?) with minor fluorite. "Synchysite"(optically uniaxial positive) occurs as tabular crystals up to 0.5mm in length and shows conspicuously a sector zoning and twinning.

(36)

Sample No. : 3RS4

Locality : Lugiingol

Rock name : Syenite

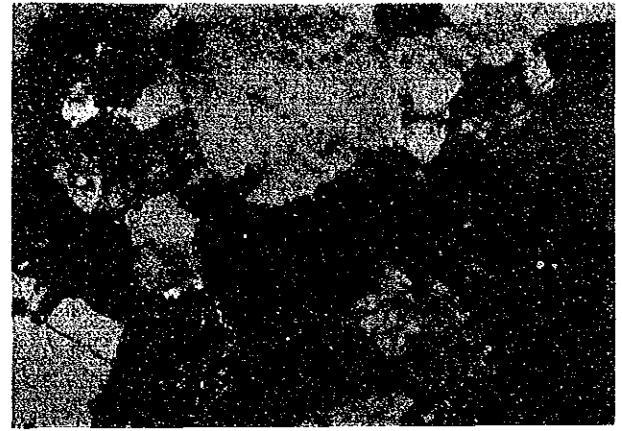
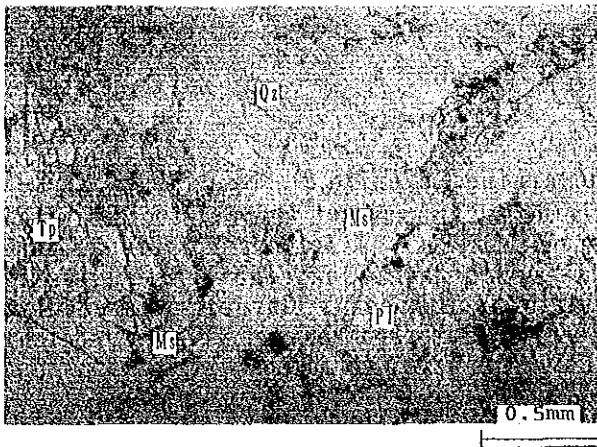
Observation note :

This specimen is gray, medium-grained syenite. It consists of K-feldspar(orthoclase), green hornblende, plagioclase (oligoclase), augite and biotite with a minor amount of sphene, apatite and opaque oxide. K-feldspar occurs as large anhedral crystals up to 5mm and includes poikilitically plagioclase and mafic crystals. Augite(soda augite?) gives a pale green color and is mostly mantled by green hornblende. Green hornblende has often a narrow reaction rim made up of minute clinopyroxene crystals in contact with K-feldspar.

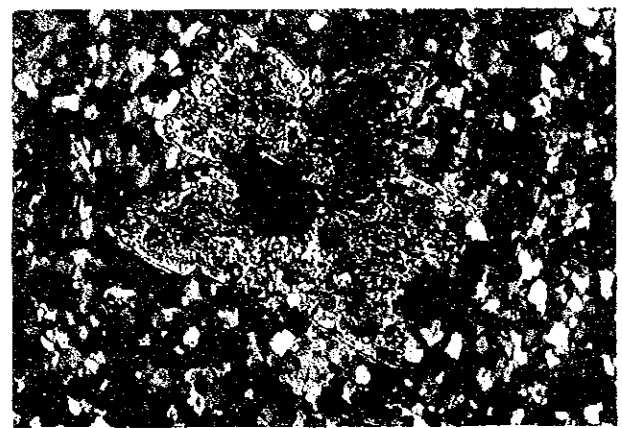
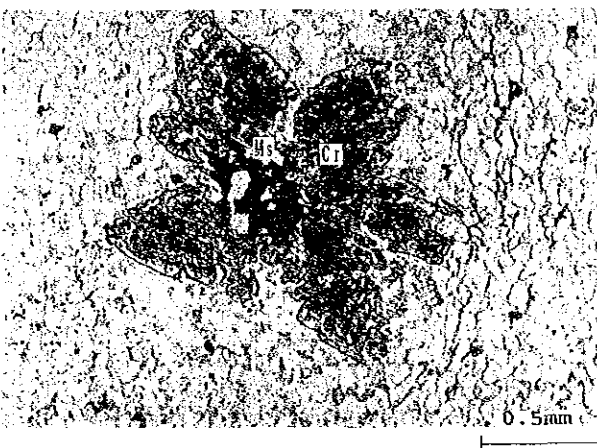
Plane polarized light

Crossed polarized light

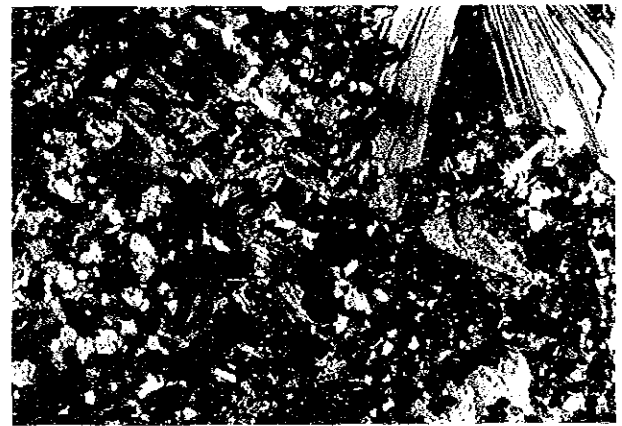
(33)



(34)



(35)



(36)



(37)

Sample No. : 3RS6
Locality : Lugiingol
Rock name : Syenite
Observation note :

This specimen is dark gray, fine-grained syenite. It consists of K-feldspar(orthoclase-microperthite), aegirine-augite, garnet and plagioclase with a small amount of sphene, opaque oxide and apatite. K-feldspar occurs as anhedral granular to poikilitic crystals up to 3mm. Aegirine-augite gives a pleochroic color from brownish yellow to deep green. Garnet, presumably melanite(Ti-andradite), occurs as cubic crystals up to 2mm and gives a reddish brown color. Plagioclase is mostly sericitized.

(38)

Sample No. : 3RS7
Locality : Lugiingol
Rock name : Lamprophyre
Observation note :

This specimen is reddish gray, fine-grained lamprophyre. It consists of K-feldspar(sanidine or orthoclase), augite, biotite and a small amount of brown hornblende(or barkevikite), apatite, sphene and opaque oxide. K-feldspar is clouded by minute hematite inclusions. Brown hornblende partly grades into blue-green species, probably alkali amphibole. Small cavities filled with calcite, sericite and K-feldspar are observed.

(39)

Sample No. : 3RS9
Locality : Lugiingol
Rock name : Nepheline syenite
Observation note :

This specimen is light bluish gray, coarse-grained nepheline syenite. It consists of K-feldspar(orthoclase), nepheline, biotite and a minor amount of cancrinite, calcite, garnet(andradite), sphene, fluorite and opaque oxide. K-feldspar occurs as subhedral elongated crystals, about 5mm in length, and poikilitically includes nepheline and mafic crystals. Nepheline is partly replaced by cancrinite and zeolite(natrolite?).

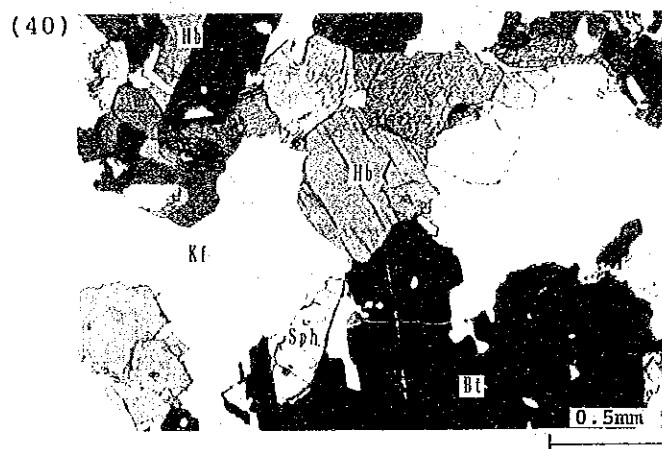
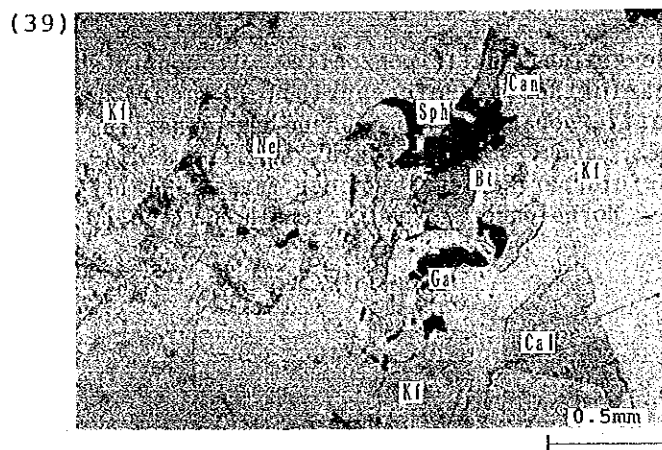
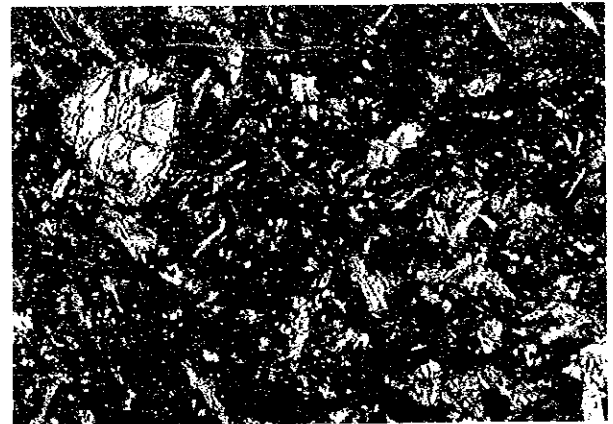
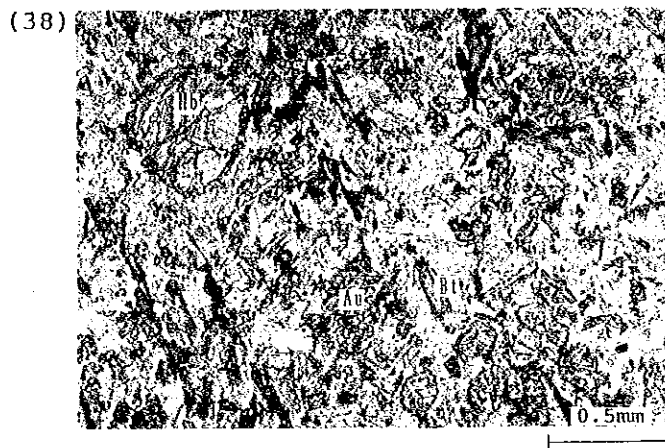
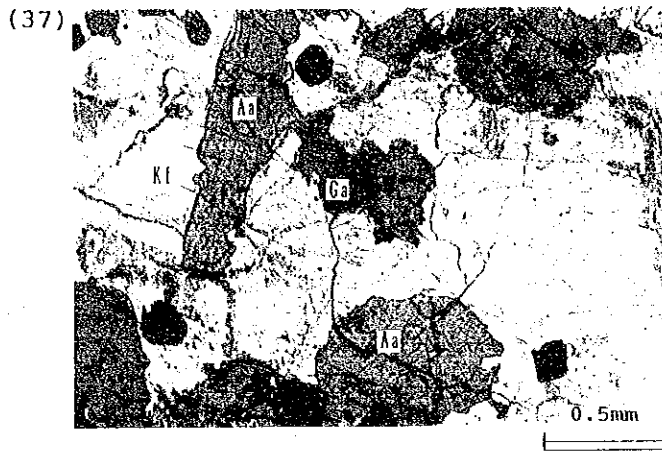
(40)

Sample No. : 3RS14
Locality : Lugiingol
Rock name : Syenite
Observation note :

This specimen is light gray, coarse-grained syenite. It consists of K-feldspar(orthoclase-microperthite), green hornblende, biotite, plagioclase (andesine-oligoclase) and a small amount of clinopyroxene, apatite, sphene, fluorite, cancrinite and zircon. K-feldspar occurs as anhedral crystals up to 1cm and includes poikilitically plagioclase and mafic crystals. Fibrous zeolite (natrolite?) crystals are observed as cavity-filling minerals.

Plane polarized light

Crossed polarized light



(41)

Sample No. : 3RS15

Locality : Lugiingol

Rock name : Nepheline syenite

Observation note :

This specimen is light bluish gray, medium-grained nepheline syenite. It consists of K-feldspar(orthoclase-microperthite), nepheline; green hornblende, biotite and a small amount of cancrinite, calcite, sphene, fluorite and opaque oxide. K-feldspar occurs as anhedral elongated crystals and includes poikilitically nepheline and mafic crystals. Nepheline is partly replaced by cancrinite, calcite, sericite and zeolite(natrolite?).

(42)

Sample No. : 3SN2

Locality : Tsagaansuvraga

Rock name : Meta-dacite

Observation note :

This specimen is brownish gray, fine-grained dacite which has undergone conspicuously an argillization and zeolitization. Phenocryst minerals are plagioclase (oligoclase), hornblende and opaque oxide. Plagioclase phenocrysts, 0.5-2mm in length, are mostly altered to zeolite(laumontite). Hornblende phenocrysts, 0.5-2mm in length, are opacitized. Groundmass shows a felsitic texture but is wholly altered to zeolite(laumontite) and clay mineral(smectite?).

(43)

Sample No. : 3SN10

Locality : Tsagaansuvraga

Rock name : Quartz monzonite

Observation note :

This specimen is pale pink, coarse-grained quartz monzonite. It consists of plagioclase(oligoclase), K-feldspar(orthoclase-microperthite), quartz, hornblende and a small amount of apatite, opaque oxide, sphene and monazite. Plagioclase occurs as euhedral crystals, about 5mm in length, and it is distinctly zoned with sericitized core. K-feldspar and quartz occur interstitially between plagioclase and mafic crystals. Hornblende, 1-2mm in length, is wholly chloritized.

(44)

Sample No. : 3SN21

Locality : Tsagaansuvraga

Rock name : Greisen

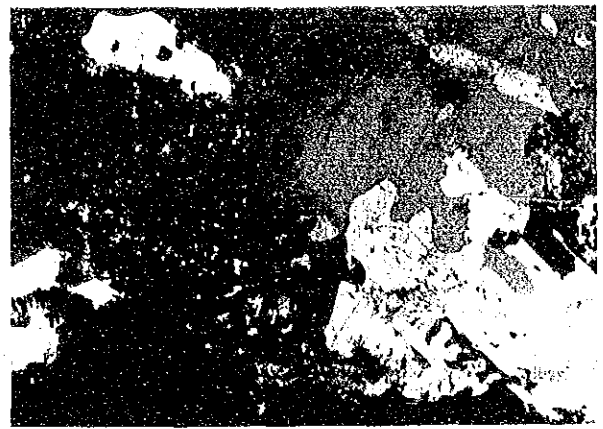
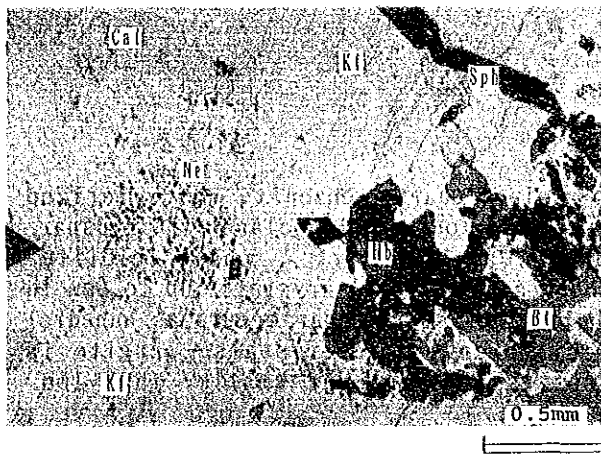
Observation note :

This specimen is gray chalcopyrite-muscovite-quartz greisen. It consists principally of anhedral quartz, up to 2mm in diameter, and fibrous muscovite, 0.1-0.4mm in length, and subordinately of K-feldspar(orthoclase), calcite, fluorite and chalcopyrite. K-feldspar is mostly replaced by quartz and muscovite.

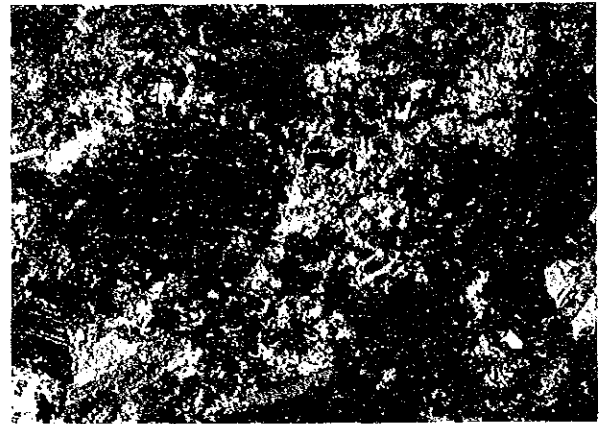
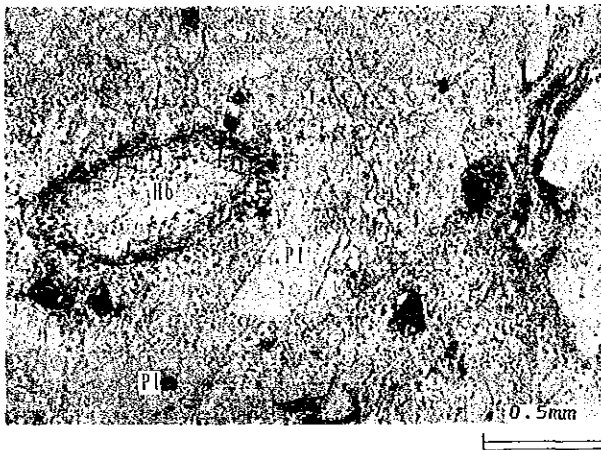
Plane polarized light

Crossed polarized light

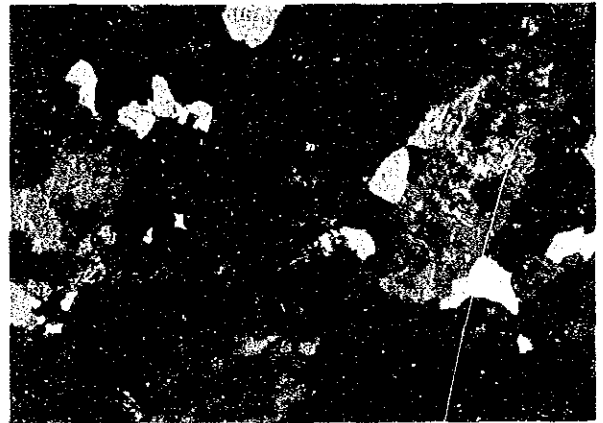
(41)



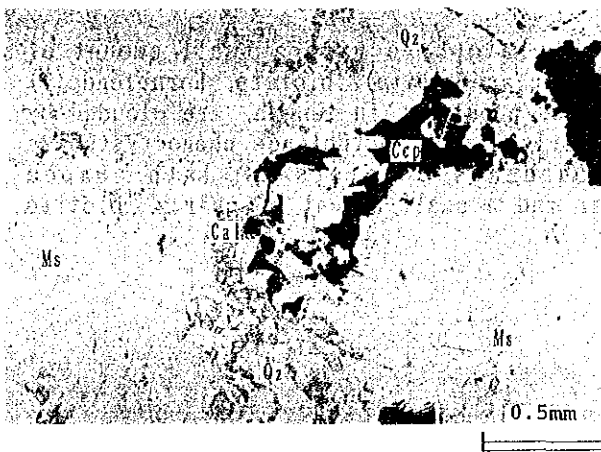
(42)



(43)



(44)



(45)

Sample No. : 3SN22

Locality : Tsagaansuvraga area

Rock name : Quartz monzonite

Observation note :

This specimen is pale pink, coarse-grained quartz monzonite characterized by the monzonitic texture. It consists of plagioclase(oligoclase), K-feldspar, (orthoclase-microperthite), green hornblende, augite, quartz, sphene, biotite, opaque oxide and apatite. Plagioclase occurs as euhedral crystals, up to 5mm in length, and is weakly zoned and sericitized. K-feldspar occurs as anhedral crystals, interstitial between plagioclase and mafic crystals. Augite is usually mantled by hornblende. Quartz is anhedral and smaller than 1mm. Biotite is mostly chloritized.

(46)

Sample No. : 3SS7

Locality : Tsagaansuvraga

Rock name : Keratophyre

Observation note :

This specimen is reddish brown keratophyre with plagioclase phenocryst. Plagioclase phenocryst is long prismatic, 0.5-4mm in length, probably of albite composition but clouded by minute hematite and sericitized. A small amount of mafic phenocryst, probably pyroxene, are wholly altered to calcite. Groundmass consists principally of small euhedral plagioclase(albite), about 0.1mm in length, and subordinately of altered mafic mineral, quartz, opaque oxide and apatite.

(47)

Sample No. : 3SS24

Locality : Tsagaansuvraga

Rock name : Quartz monzonite

Observation note :

This specimen is light pink, porphyritic quartz monzonite injected by quartz vein. Phenocryst minerals are mainly of plagioclase(albite), 1-5mm in length, showing an antiperthitic structure characterized by dominant orthoclase lamellae within a host plagioclase crystal. A small amount of quartz, biotite (chloritized) and apatite phenocrysts are present. Groundmass shows a fine-grained(0.1-0.2mm across) granular texture and consists of subhedral K-feldspar (orthoclase), quartz and plagioclase.

(48)

Sample No. 3SS34

Locality : Tsagaansuvraga

Rock name : Keratophyre

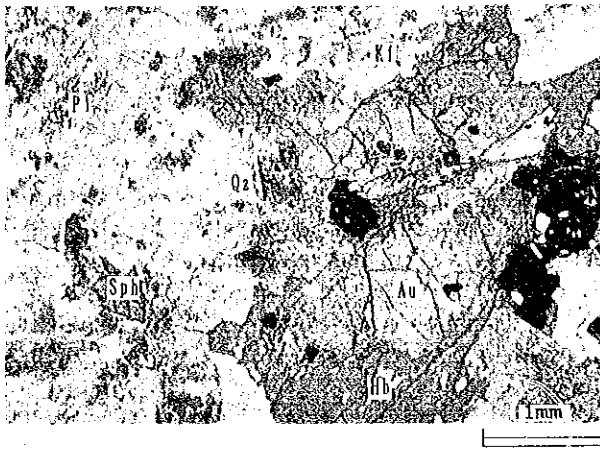
Observation note :

This specimen is reddish brown keratophyre with a small amount of phenocryst. Phenocryst minerals are plagioclase(albite), biotite, hornblende(?) and opaque oxide. Plagioclase phenocrysts, about 1mm in length, are clouded by minute hematite crystals and highly sericitized. Hornblende phenocrysts are wholly altered to smectite. Groundmass consists of lath-shaped plagioclase(albite), anhedral K-feldspar and a small amount of quartz, biotite and opaque oxide.

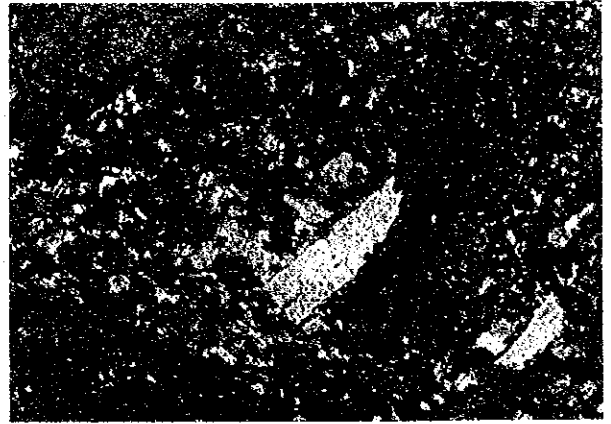
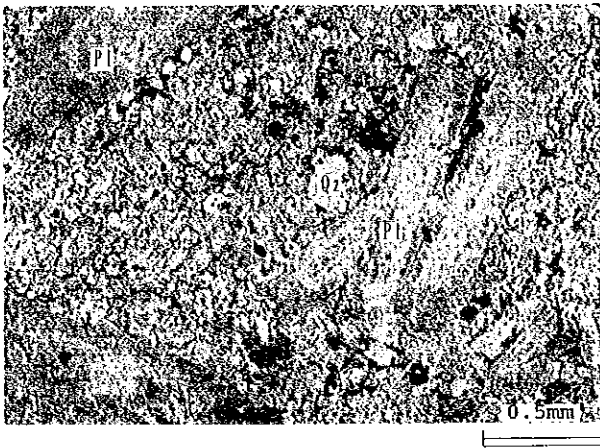
Plane polarized light

Crossed polarized light

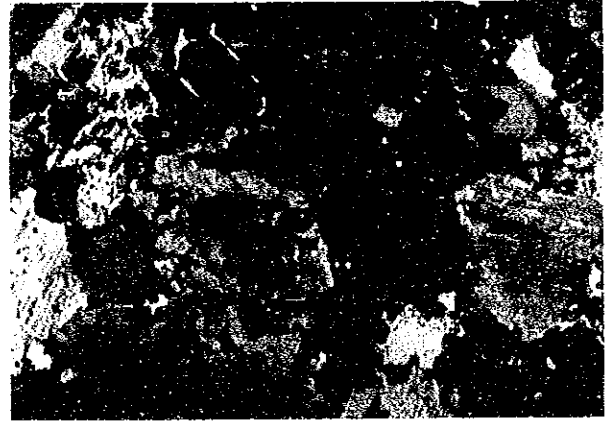
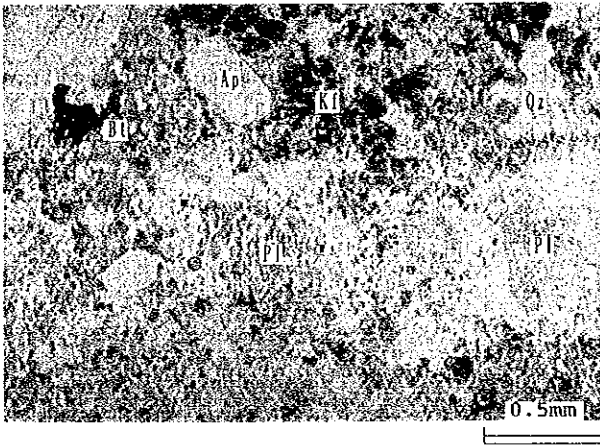
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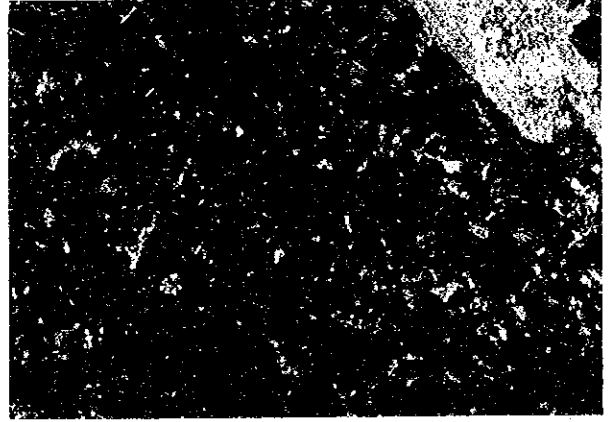
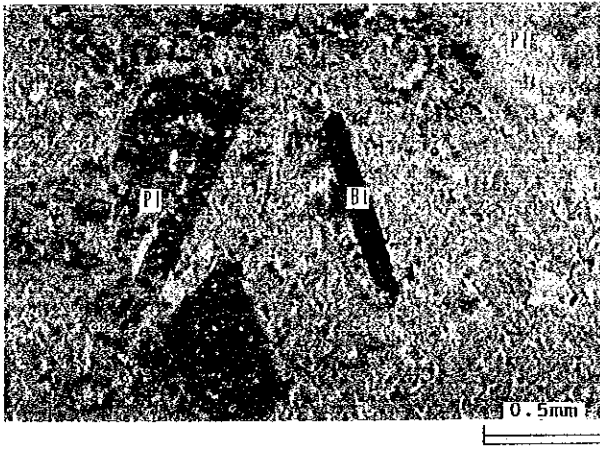
(46)



(47)



(48)



(49)

Sample No. 3TN1

Locality : Tumurtiin- Ovoo

Rock name : Skarn

Observation note :

This specimen is black to greenish gray skarn. It consists of garnet (andradite) and opaque oxides (magnetite and hematite). It is highly brecciated and replaced by network veinlets consisting of calcite and quartz.

(50)

Sample No. : 3TN3

Locality : Salaa

Rock name : Granite

Observation note :

This is pale pink, coarse-grained granite. It consists of K-feldspar (orthoclase-microperthite), quartz, plagioclase (oligoclase), muscovite, biotite and a small amount of opaque oxide, monazite and fluorite. Plagioclase occurs as euhedral short prismatic crystals, 1-5mm in length. Quartz occurs as euhedral to anhedral crystals, 1-5mm across. K-feldspar occurs as anhedral interstitial crystals with 5-10mm length between plagioclase and quartz crystals. Both plagioclase and K-feldspar are partly replaced by anhedral muscovite crystals.

(51)

Sample No. : 3TN4

Locality : Salhiit core strage

Rock name : Skarn

Observation note :

This specimen is yellowish gray garnet skarn with opaque mineral-calcite vein. Garnet (andradite) is weakly anisotropic and shows a zonal structure. It is highly brecciated and replaced by network veinlets consisting of calcite and quartz.

(52)

Sample No. 3TN7

Locality : Salhiit core strage

Rock name : Cortlandite

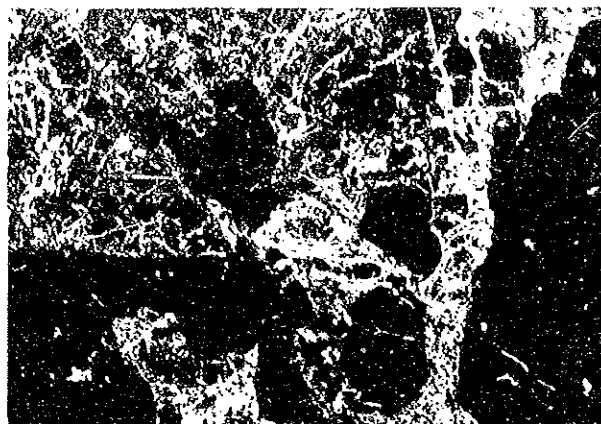
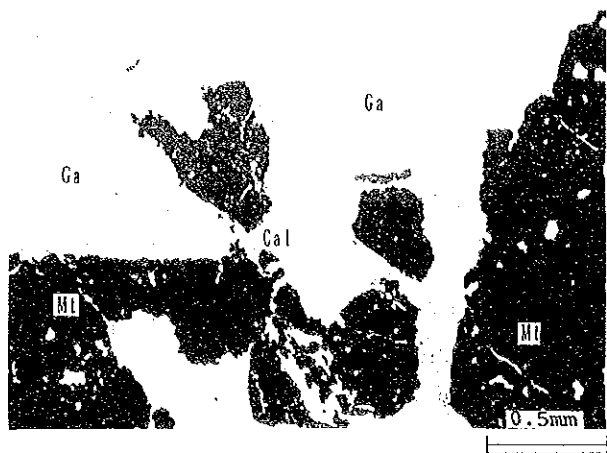
Observation note :

This specimen is dark gray, coarse-grained cortlandite. It consists principally of brown hornblende, olivine, augite, apatite, biotite and opaque oxide in a decreasing order. Hornblende occurs as large anhedral crystals, up to 1cm in length, poikilitically including olivine and other mafic crystals. Olivine is euhedral crystal, 0.5-2mm across, and its rim is replaced by fibrous colorless amphibole, probably tremolite. Apatite is enriched in some parts as euhedral elongated crystals, up to 4mm in length. Secondary minerals, such as serpentine and talc, are observed.

Plane polarized light

Crossed polarized light

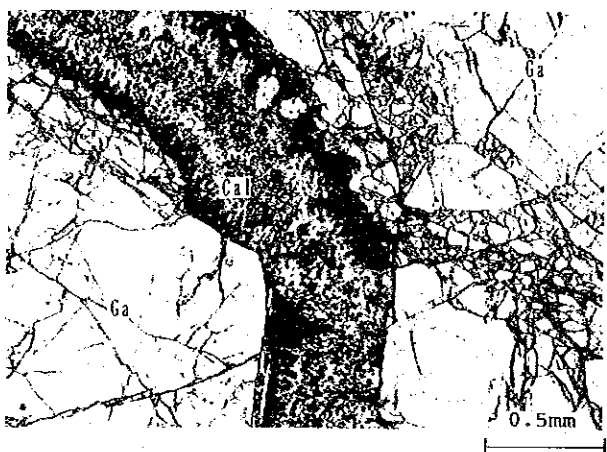
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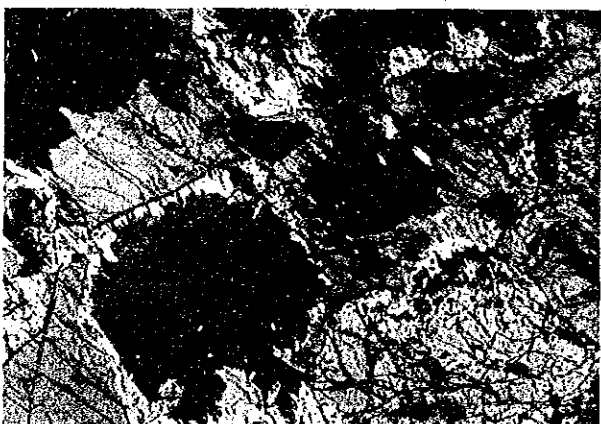
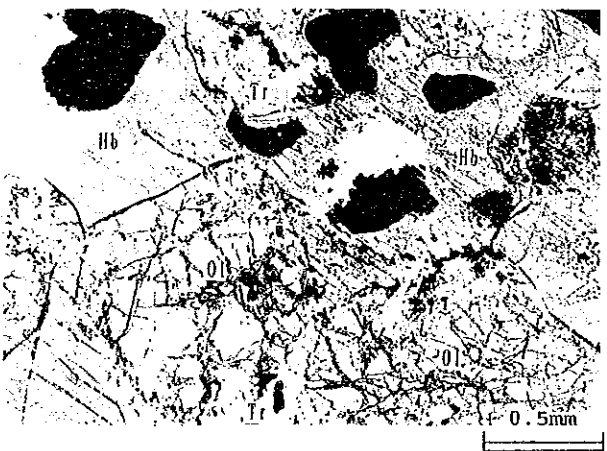
(50)



(51)



(52)



(53)

Sample No. 3TS2

Locality : Arin-Nuul

Rock name : Granite

Observation note :

This specimen is light yellow-orange, coarse-grained leucocratic granite. It consists of quartz, K-feldspar(orthoclase-microperthite), plagioclase (oligoclase) and a small amount of biotite, muscovite, apatite, calcite and molybdenite. Quartz occurs as subhedral granular crystals, 5-10mm across, usually an aggregate of quartz subgrains. K-feldspar is subhedral, 5-10mm in length and includes plagioclase crystals. Plagioclase occurs as subhedral tabular crystals, smaller than 5mm, and highly sericitized. Molybdenite occurs as platy crystals closely associated with muscovite.

(54)

Sample No. : 3TS7

Locality : Arin-Nuul

Rock name : Granite

observation note :

This specimen is light yellow-orange, coarse-grained leucocratic granite. It consists of quartz, K-feldspar(orthoclase), plagioclase, biotite, muscovite and a small amount of molybdenite, apatite and zircon. Quartz occurs as large anhedral crystals, up to 2cm across and includes plagioclase and K-feldspar crystals. Plagioclase is mostly replaced by muscovite. Biotite is rimmed with muscovite or intergrown with muscovite.

(55)

Sample No. : 3TS29

Locality : Tumurtiin-Ovoo

Rock name : Marble

Observation note :

This specimen is light yellowish gray, schistose marble. It is made up almost exclusively of recrystallized calcite, smaller than 2mm, showing a preferred orientation. Fine-grained opaque minerals and quartz are arranged as thin layers parallel to the schistosity.

(56)

Sample No. : 3TS30

Locality : Tumurtiin-Ovoo

Rock name : Skarn

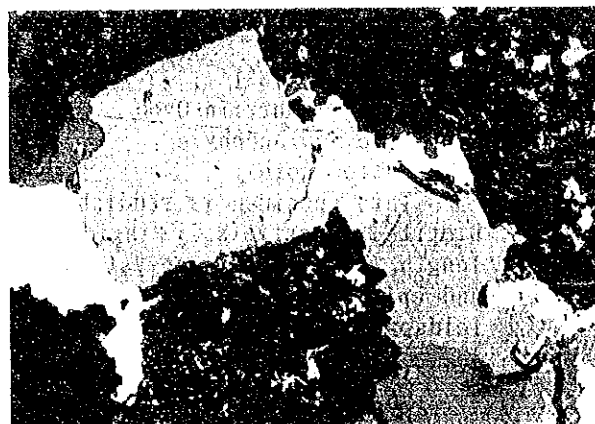
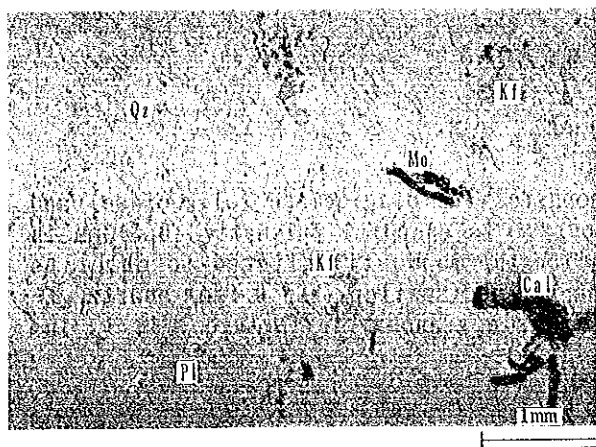
Observation note :

This specimen is greenish gray skarn. It consists principally of garnet(andradite), sphalerite and magnetite. Garnet is brecciated and replaced by network veinlets of calcite. Magnetite is partly changed into hematite.

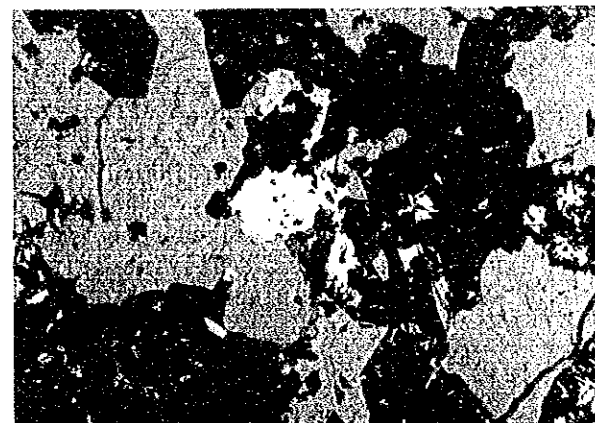
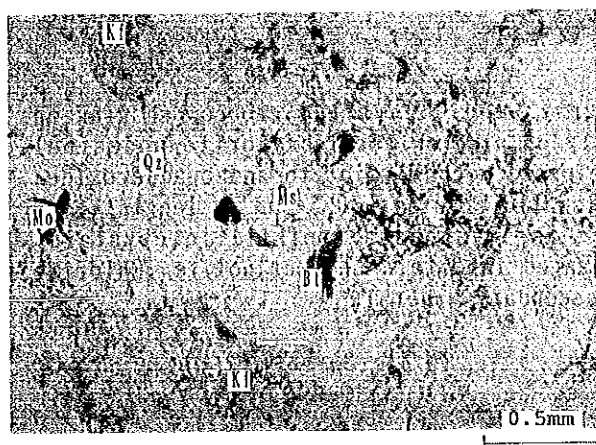
Plane polarized light

Crossed polarized light

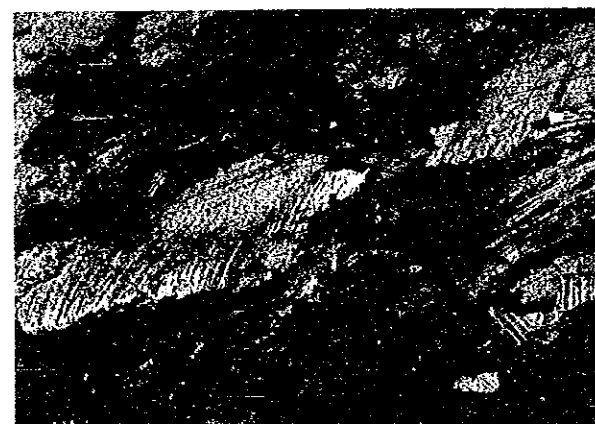
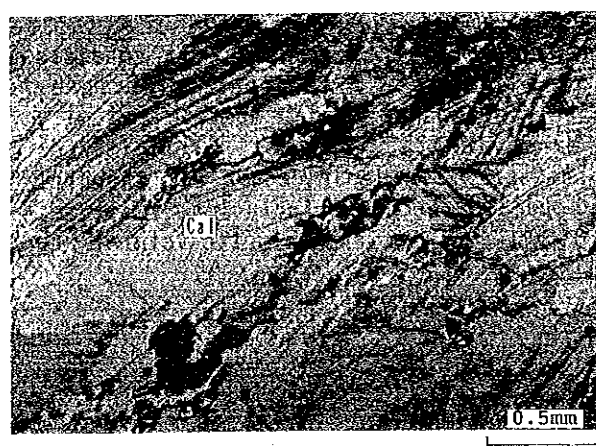
(53)



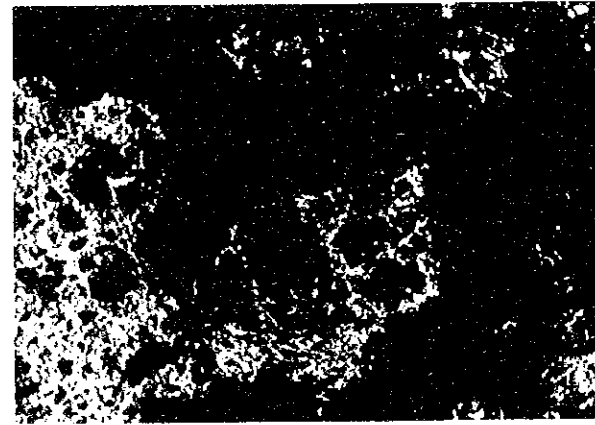
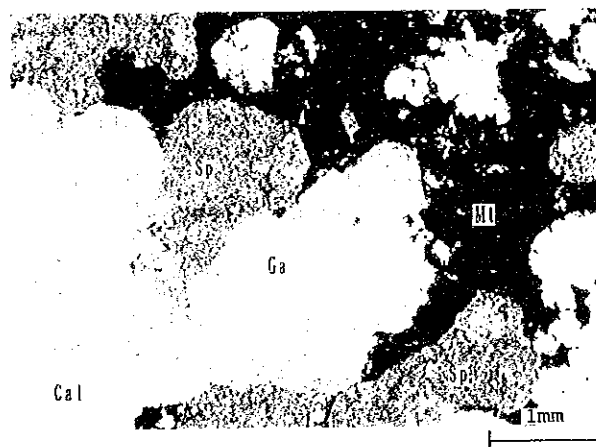
(54)



(55)



(56)



(57)

Sample No. : 3TS31

Locality : Tumurtiin-Ovoo

Rock name : Granophyre

Observation note :

This specimen is reddish gray granophyre with plagioclase (oligoclase) and biotite phenocrysts. Plagioclase phenocryst is euhedral prismatic, 0.5-2mm in length. Biotite phenocryst, 0.2-1mm in length, is mostly altered to chlorite and epidote. Groundmass consists of fine-grained (smaller than 0.1mm) quartz, K-feldspar, plagioclase and biotite, and shows a granophyric texture. It is injected by an epidote vein.

(58)

Sample No. : 3TS32

Locality : Salaa

Rock name : Gabbro

Observation note :

This specimen is dark greenish gray, medium-grained gabbro, showing an ophitic texture. It consists principally of plagioclase (labradorite-andesine) and augite and subordinately of olivine (pseudomorph), biotite and opaque oxide. Plagioclase occurs as euhedral long prismatic crystals, 0.5-2mm in length, commonly with sericitized core. Augite occurs as anhedral poikilitic crystals, 0.5-2mm across. Olivine is wholly changed into talc and actinolite. Chlorite and carbonate minerals are observed as secondary minerals.

(59)

Sample No. : 3TS40

Locality : Salhiit core strage

Rock name : Granite

Observation note:

This specimen is pale reddish brown, coarse-grained granite. It consists principally of plagioclase (oligoclase), quartz, K-feldspar (orthoclase-microperthite) and biotite and subordinately of opaque oxide, apatite and zircon. Plagioclase is subhedral, 0.5-5mm in length, distinctly sericitized. Quartz is subhedral to anhedral, 2-5mm across. K-feldspar occurs as anhedral porphyritic crystals up to 1cm, highly clouded by hematite inclusion. Biotite, 0.5-1mm across, is mostly chloritized. Calcite veinlet and chlorite veinlet are recognized.

(60)

Sample No. : 3TS42

Locality : Salhiit core strage

Rock name : Granite

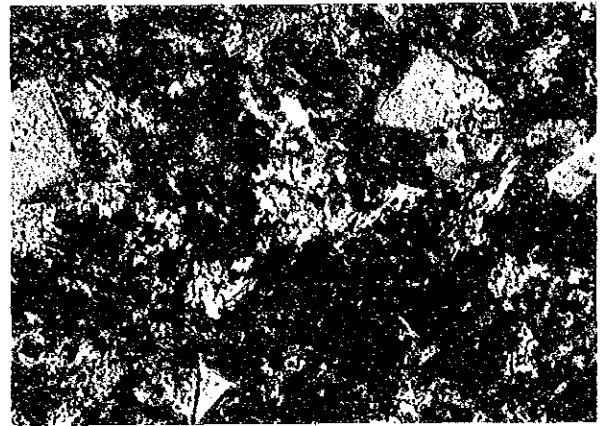
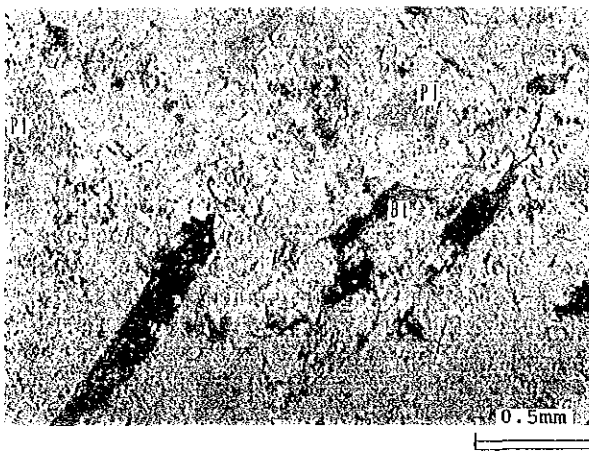
Observation note :

This specimen is pale pink, coarse-grained granite. It consists principally of plagioclase (oligoclase), quartz, K-feldspar (orthoclase-microperthite) and biotite and subordinately of opaque oxide, apatite and zircon. Plagioclase occurs as euhedral to subhedral crystals, 1-5mm in length, replaced by sericite and calcite. Quartz occurs as subhedral to anhedral interstitial crystals, up to 1cm across. K-feldspar occurs as anhedral interstitial crystals, up to 1cm across, highly clouded by minute hematite inclusion. Biotite is mostly altered to chlorite, calcite and siderite(?).

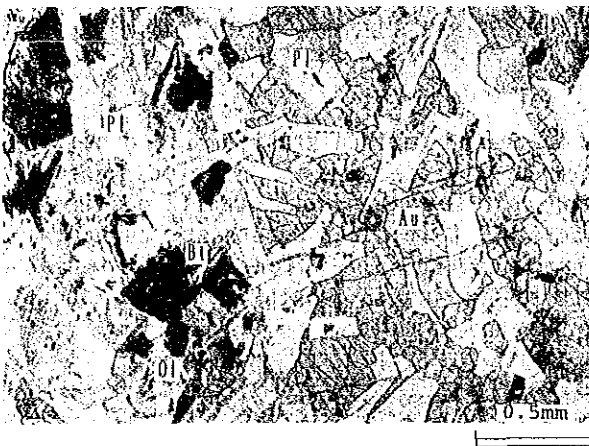
Plane polarized light

Crossed polarized light

(57)



(58)



(59)



(60)

