

Indian River Petrographic Descriptions

By Dr. Tim Liverton, May 2, 2010

(TS No. field description)

IND 1 Sample 253122 – epidote, garnet, actinolite calc-silicate skarn

This rock is an obvious exoskarn. About $\frac{3}{4}$ of the slide is tremolite-actinolite skarn and since the amphibole is colourless it is close to the tremolite end-member. It forms subhedral crystals up to 1mm long in a fairly random orientation. Interstitial to the amphiboles are grains of feldspar of 0.5-1mm size, $\leq 10\%$ of the rock and probably a calcic plagioclase, but twinning is too indistinct for composition to be determined (it is optically negative). Rare carbonate and opaques are also present. The opaques have subhedral cubic and possibly pyritohedron forms and appear 'brassy' if illuminated with oblique source (the thin section was not polished), so they are likely pyrite. One 10mm, very corroded diopside-hedenbergite crystal is replaced by the tremolite. The remaining quarter of the slide consists of subhedral diopside-hedenbergite that has been heavily replaced by carbonate and much smaller tremolite crystals. The pyroxene is colourless, so it is likely close to the diopside end-member.

IND 2 Trench 2, south end – more mica rich granite

This rock is a granite *sensu stricto*. It is composed of coarse orthoclase phenocrysts, quartz and subordinate amounts of plagioclase. Biotite is the only ferromagnesian mineral with a little muscovite as alteration. Occasional ≤ 0.15 mm long monazite crystals are included in the biotite, together with a few tiny (0.05mm long) brown, high relief subhedral crystals that are possibly cassiterite. The biotite is pleichroic from red-brown to golden. Where the biotite crystals occur in clusters they have a mantle of 0.1mm garnet grains. Orthoclase constitutes about 40% of the volume of this rock, plagioclase about 15% and biotite forms 5-15% of any field of view. The rock is clearly a syenogranite according to Streckeisen's classification. With one small thin section it is of little use to attempt a quantitative modal analysis (but please note the amount of stained K-feldspar in the scanned image of the offcut block).

IND 3**Trench 2, south end –metased contaminated granite, at contact**

This is a biotite-rich hydrothermally or deuterically altered granitic rock. The fabric is dominated by subhedral prismatic muscovite (sericite) pseudomorphs of what were likely originally plagioclase crystals. These are up to 7mm long. Individual randomly oriented sericite 'flakes' are up to 0.03 long. Anhedral polygonized quartz and orthoclase to 2mm size are interstitial to the large pseudomorphed phenocrysts, together with 'ragged' red-brown to golden biotite that appears quite unaltered. Opaques, both 'brassy' and black in incident light i.e., possibly both pyrite and magnetite, occur with clusters of small (0.3mm) biotite crystals (25% of the sericite-altered lithofacies) and occupy from 1-10% of any field of view. These clusters of the finer grained biotite and opaques tend to mantle the sericite pseudomorphs. A few tiny yellow-brown, highly birefringent crystals and ≤ 0.06 mm long acicular opaques are included in the individual coarse biotite crystals and some also surround biotites. No pleichroic halos are produced in the biotite by the yellow-brown minerals, so these could be cassiterite rather than monazite. Note: in hand specimen a slight foliation is visible. This is not as obvious in thin section. The matching stained offcut slab of rock shows a contact between the sericite altered rock and a quartz-rich granitic rock showing K-feldspar phenocrysts to 5mm across with some 'mantling' of these by muscovite. In thin section the orthoclase phenocrysts are anhedral, quite 'ragged' and contain inclusions of biotite that is itself 'mantled' by muscovite. In this lithofacies of the granite biotite still constitutes about 25% of the volume, but is in anhedral, equant 2mm grains.

IND 4**Trench 1 – garnet aplite**

This rock is very potassic granite with what is assumed to be an endoskarn alteration. It consists of coarse orthoclase and microcline (to 7 mm long) with quartz intergrowths i.e., it has an incipient granophyric texture. At least 60% of the volume is K feldspar and about 10% quartz. Only occasional plagioclase crystals are seen. A few ragged muscovite crystals to 2mm long are present (<2% of the total volume). No biotite was seen. Masses of quartz from 4 to 16mm long contain garnet grains that form almost a 'net' texture. No monazite or other 'heavy' minerals were noted.

IND 5**Trench 2 – quartz stockwork, silicified granite**

This material is likely from a quartz vein. The section is composed entirely of polygonized quartz, with individual domains up to 3mm grain size. A series of irregular yet subparallel fractures crosses the slide. These contain some limonite staining. No other minerals were noted.

IND 6**Trench 2, north end – clay altered granite**

This is another granite that contains quite altered biotite and some masses of garnet. Single-twinned orthoclase megacrysts up to 5mm across dominate the texture. Compared to specimen 4, this granite has a much higher plagioclase content. Approximate modal composition is K-feldspar 35% plagioclase 30%, quartz 25%, biotite 5% and garnet 5%. The plagioclase crystals are ≤ 1.5 mm grain size and are quite anhedral. Biotite is in very 'ragged' to skeletal grains to 1.5mm grain size and is altered to leucoxene and some limonite. Some 0.01-0.03 mm grains of opaques, probably ilmenite or magnetite are contained within the altered mica. Most of the garnets are from 0.8 – 2mm grain size as individual grains, but a few 0.08mm sized grains are clustered amongst the biotite. The garnet is pink and quite isotropic, so it may be almandine rather than a grossular-andradite. One 2mm wide, discontinuous quartz vein crosses the section.

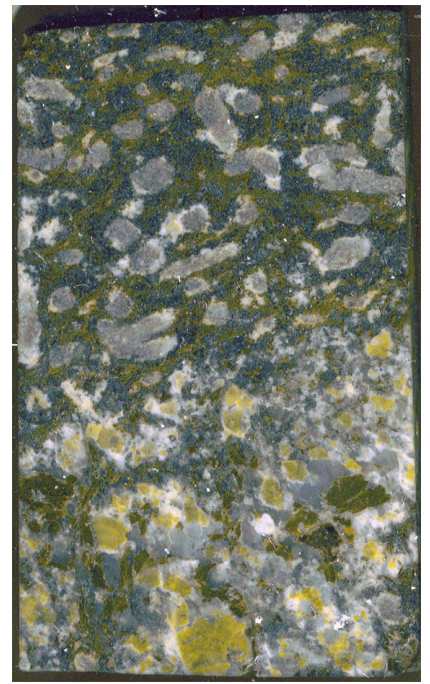


10mm scale bar

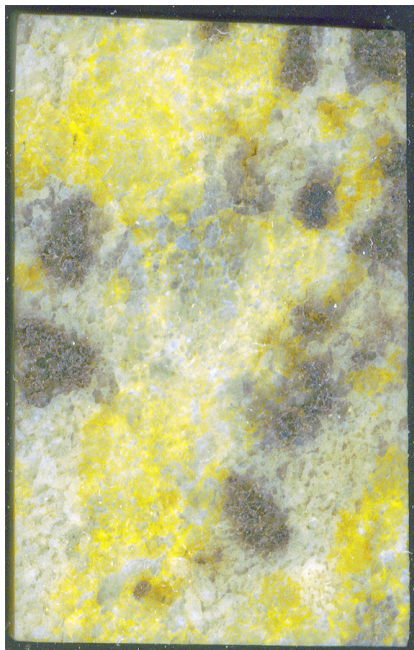
IND 1



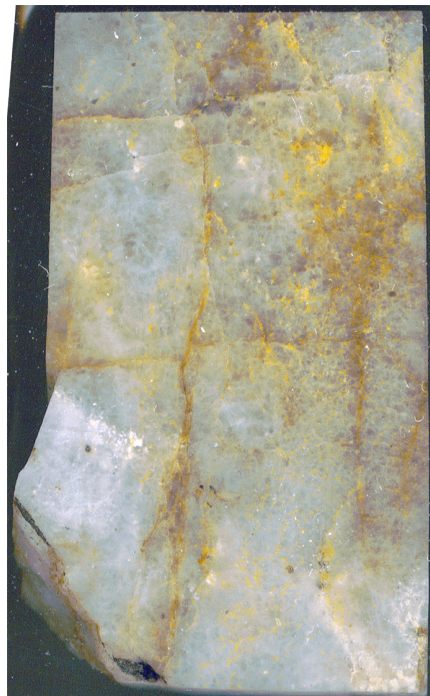
IND 2



IND 3



IND 4



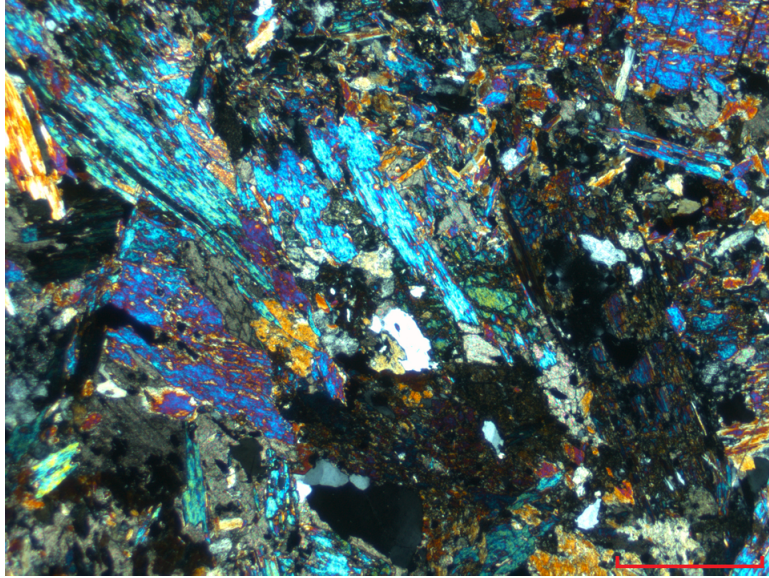
IND 5



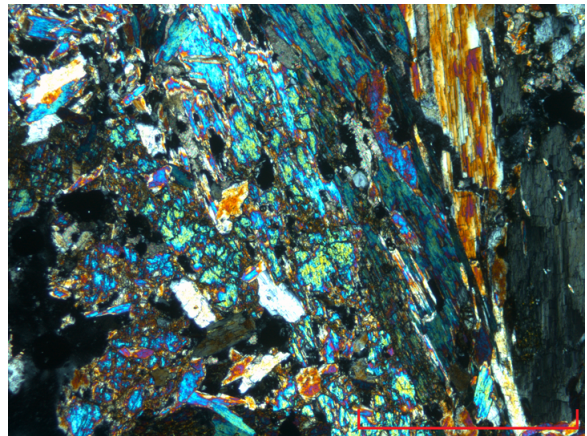
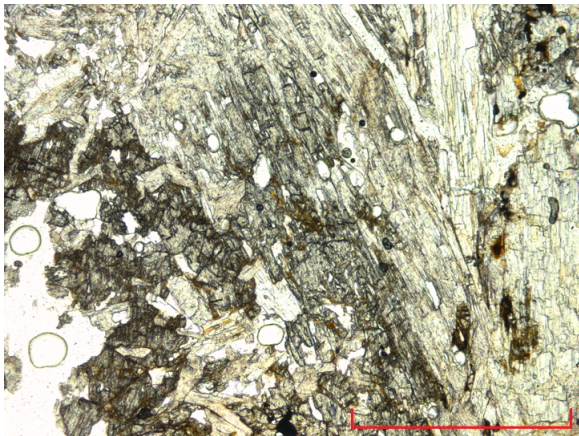
IND 6

IND PETROGRAPHIC SPECIMENS: MATCHING COBALTINITRITE STAINED SLABS

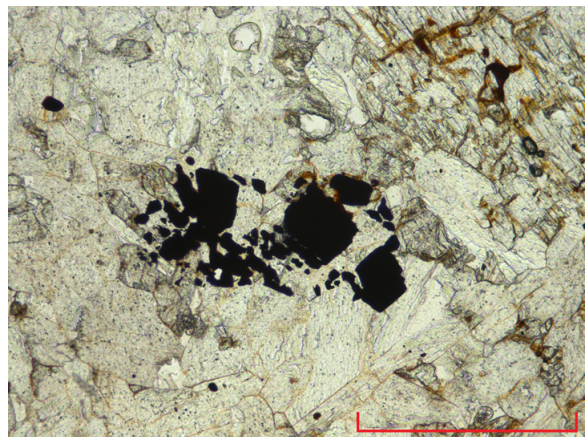
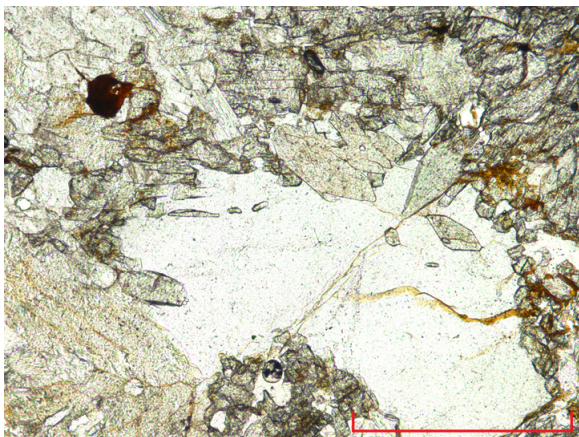
IND 1



1 - General view: mostly subhedral tremolite with two grains of diopside (deep blue). xp

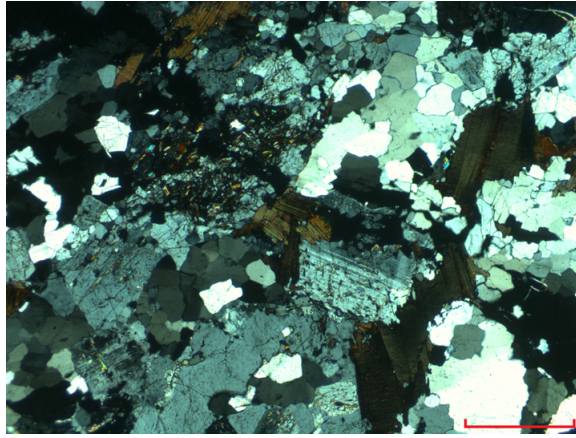


2 & 3 - tremolite with remnant diopside. pp & xp

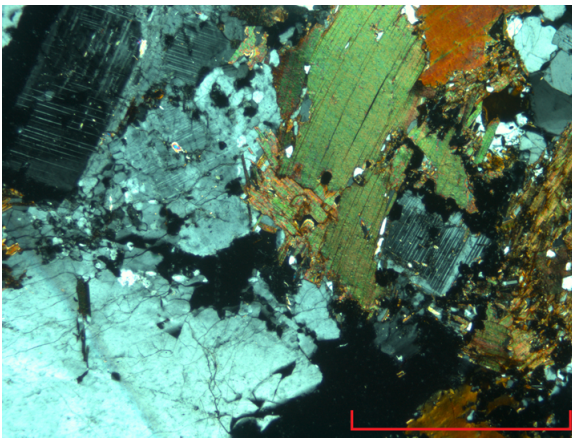


4 - Tremolite (some euhedral) & diopside. pp 5 - sulphides, probably pyrite.

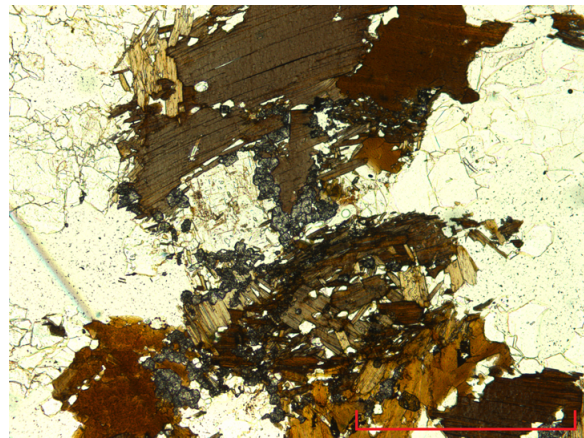
All scale bars represent 1mm.



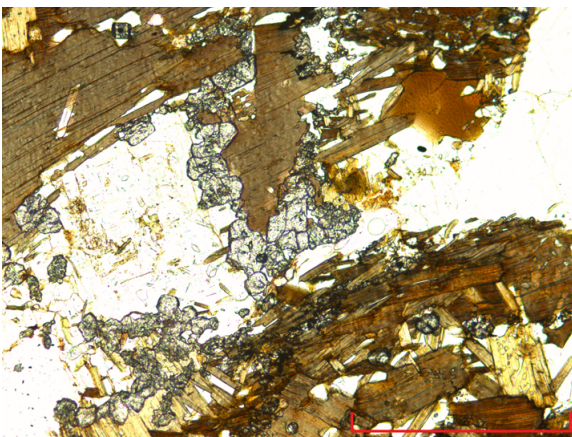
1 - General view: orthoclase, plagioclase, quartz & biotite. xp.



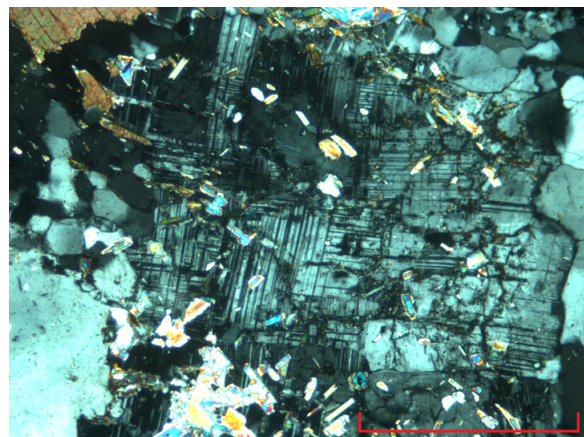
2 - Both feldspars & biotite (deformed). xp



3 - Biotite with a little garnet. pp

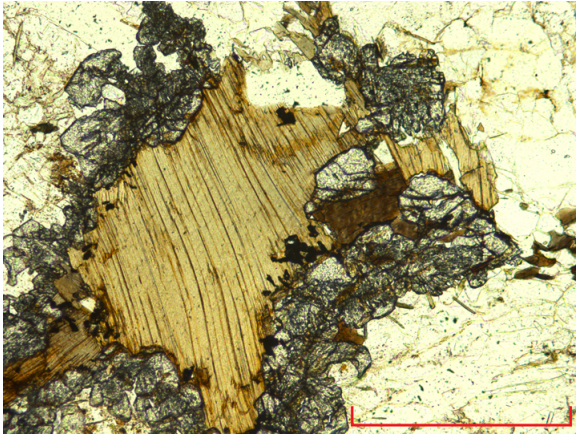


4 - Biotite & garnet. pp.

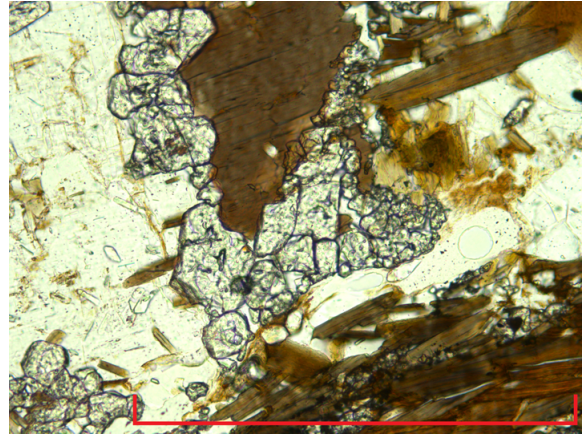


5 - A rather unusual plagioclase. xp.

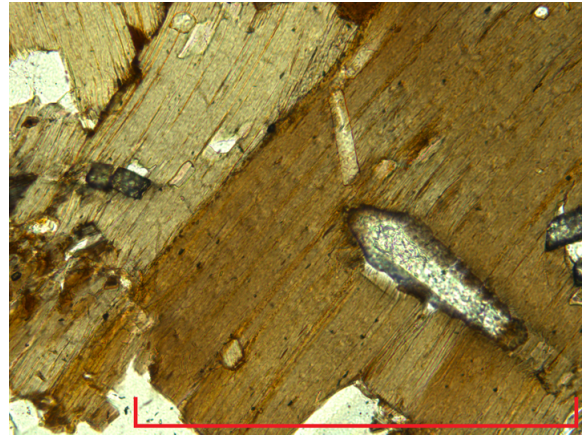
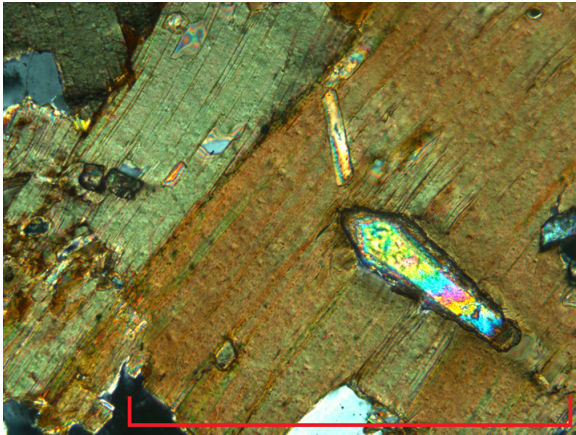
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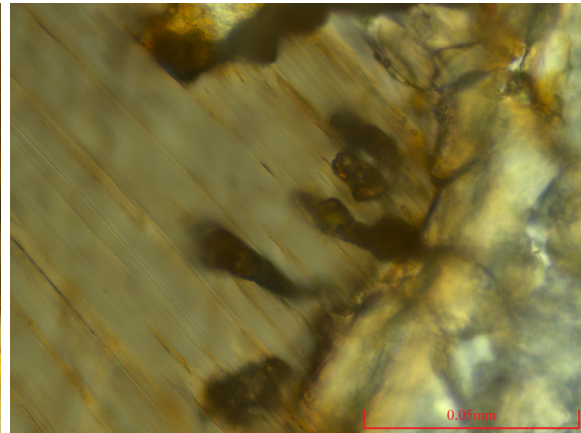
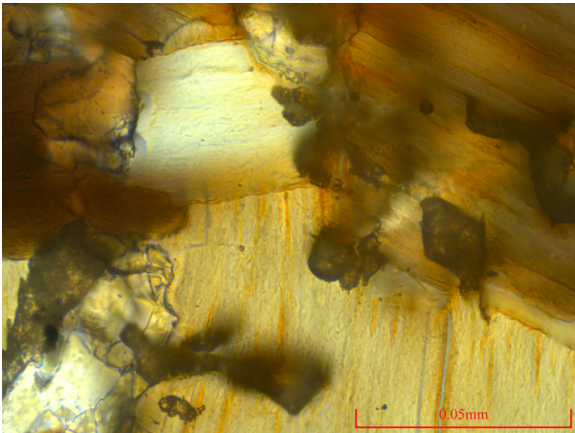
1 - Biotite mantled with garnet. pp.



2 - Biotite mantled with garnet. pp.

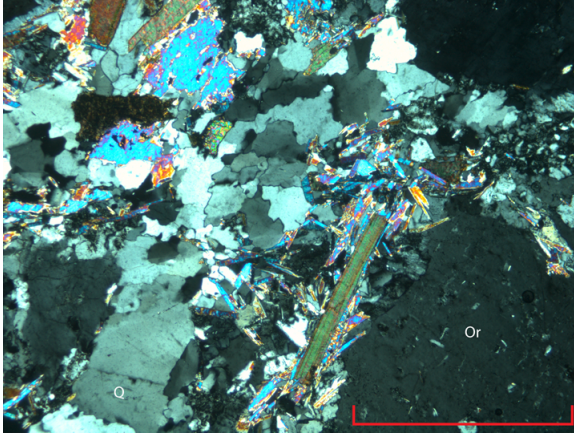


3 & 4 - Zircon in biotite. xp & pp.

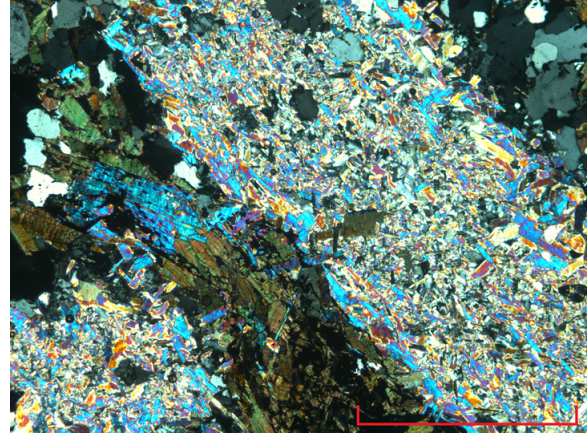


5 & 6 - Inclusions of (?) cassiterite in biotite. Oil immersion, pp.

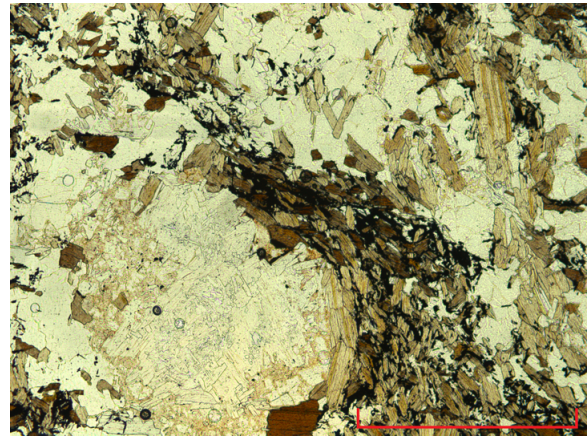
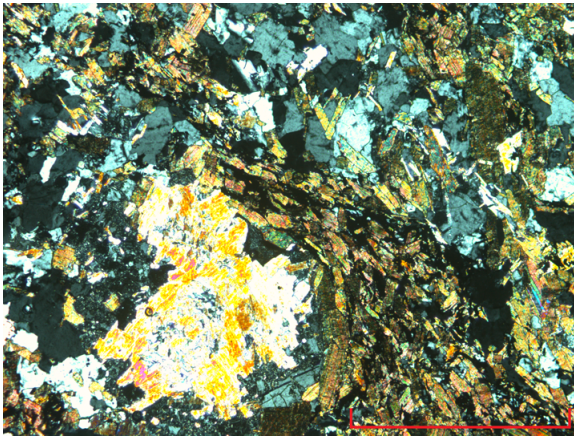
Scale bars for 1-4 represent 1mm; those of 5 & 6, 0.05mm



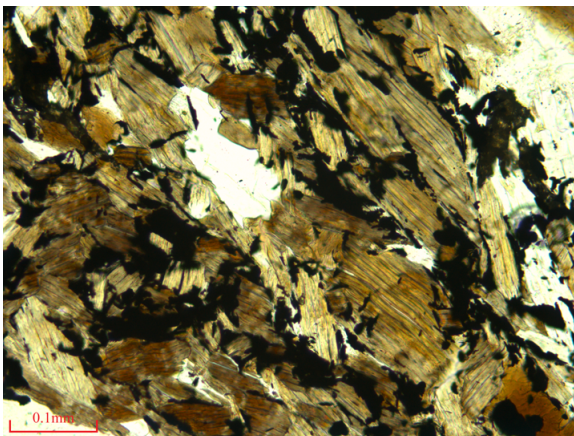
1 - general view: orthoclase, quartz, muscovite. xp.



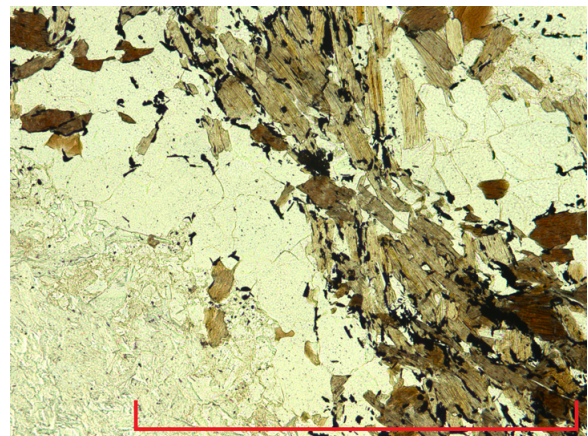
2 - Sericite pseudomorphs of (?) plagioclase with biotite, muscovite. xp



3 & 4 - Biotite & muscovite. xp & pp.

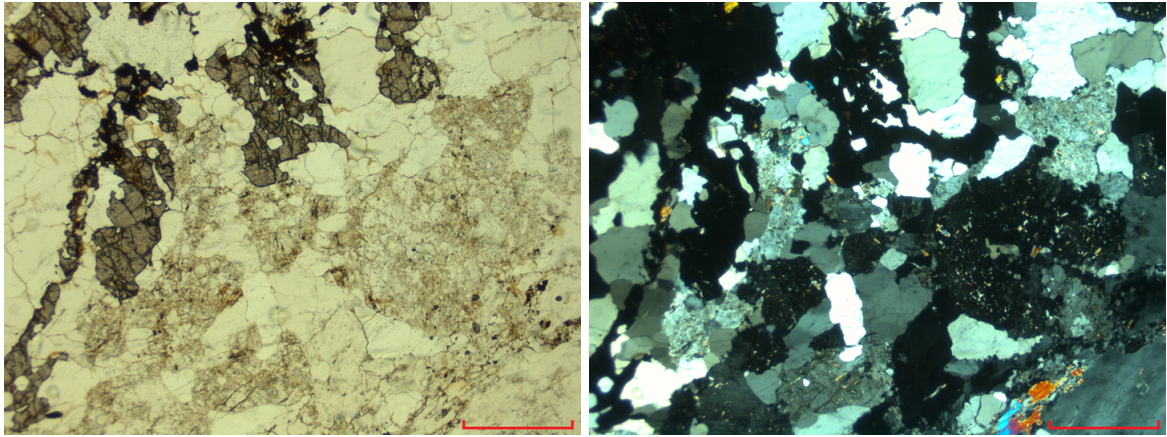


5 - Biotite with ilmenite or magnetite. pp.

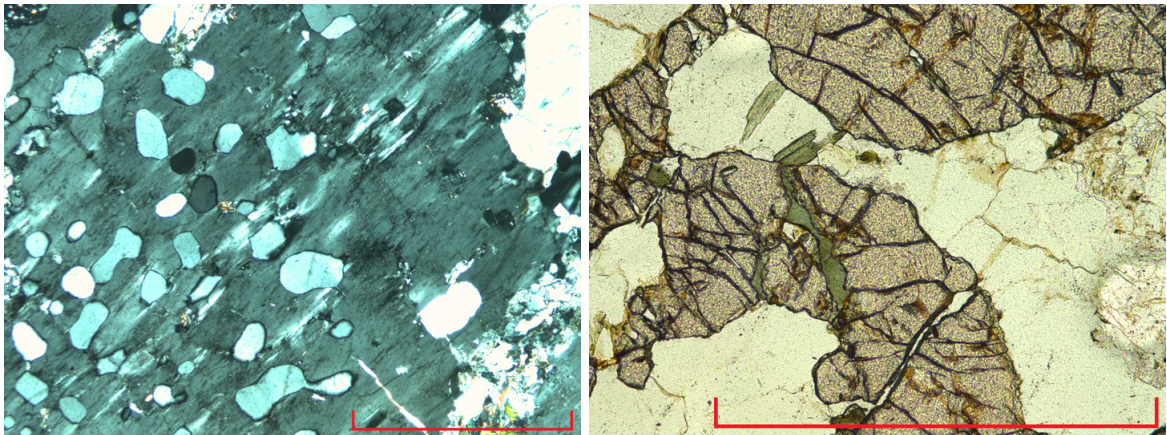


6 - Biotite with ilmenite or magnetite. pp.

All scale bars represent 1mm.

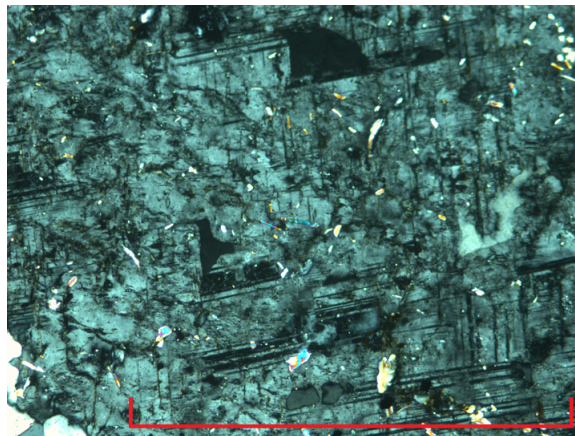


1, 2 - General view: orthoclase. quartz, garnet. pp & xp.



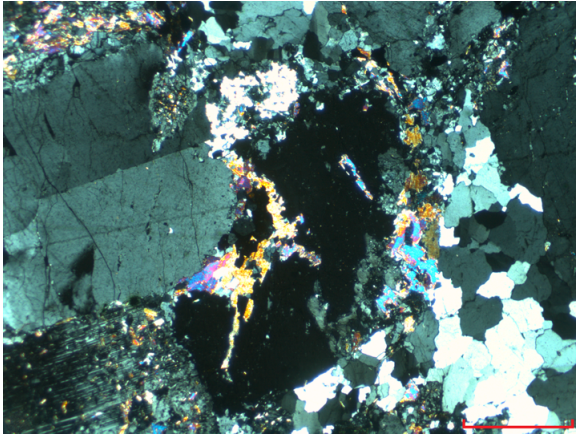
3 - Quartz & orthoclase: incipient granophyre. xp.

4 - Garnet with some chlorite. pp.

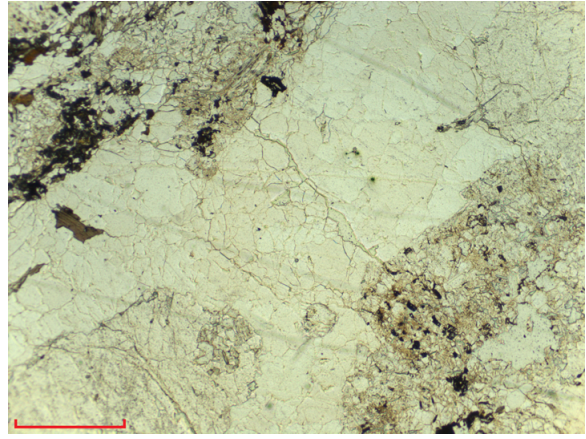


5 - Perthite showing twinned plagioclase intergrowths. xp.

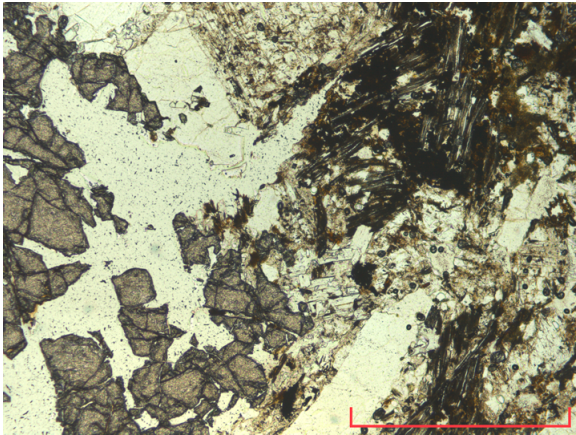
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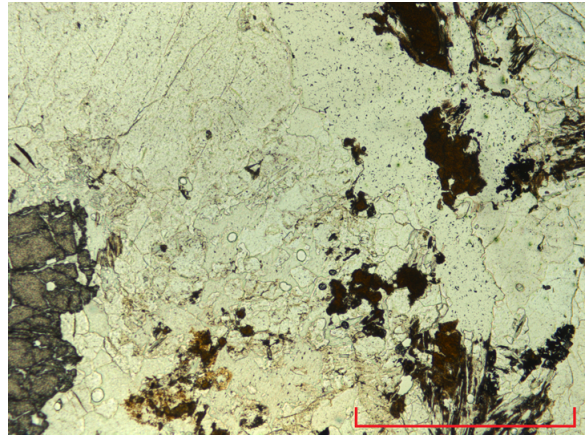
1 - General view. Single-twinned orthoclase carlsbad-albite twinned plagioclase, quartz & muscovite. xp.



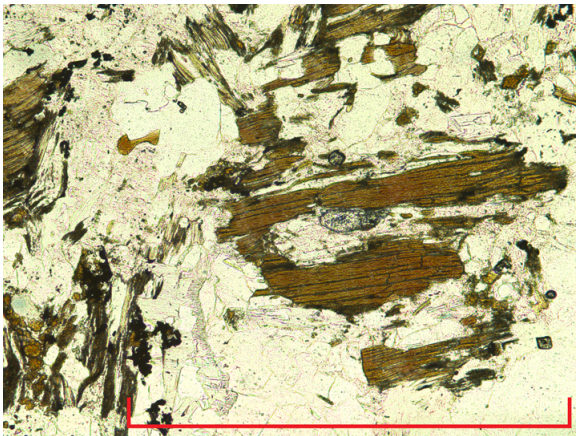
2 - Irregular quartz vein cutting the granite. pp.



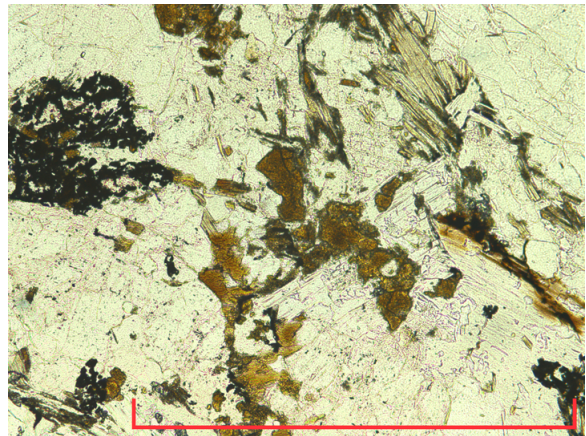
3 - Altered biotite & garnet. pp.



4 - Garnet & altered biotite. pp.



5 - Biotite. pp.



6 - Biotite & opaques. pp.

All scale bars represent 1mm.