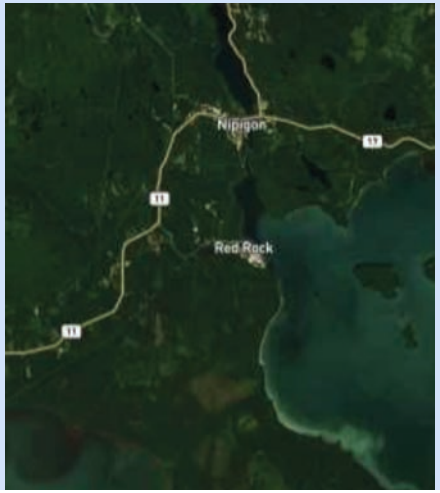
Examination of Migmatites Near Nipigon Bay Area

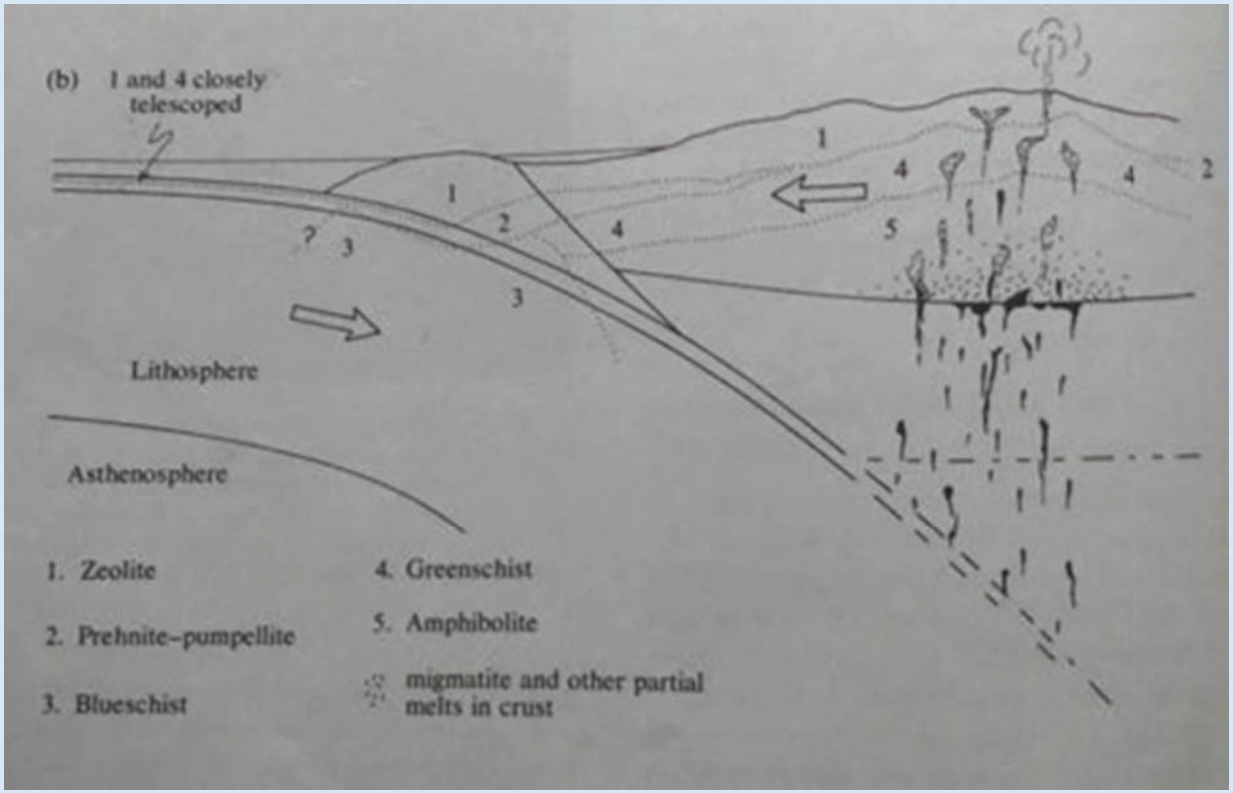
Haley Marston and Sara Gibbs-Schnucker



Background

- Occur on scales of high grade regional metamorphism.
- Contact metamorphism causes injections of granitic liquid into adjacent metamorphic rocks.
  - This causes the borders of the granitic and metamorphic rocks to be gradual and indistinct
- The most likely for our samples, and the area, is regional metamorphism
- The black minerals are typically a type of amphibolite
- Over all migmatites are of felsic composition

Background cont.



Where migmatites often form due to regional metamorphism

Other examples

Heavily foliated migmatite

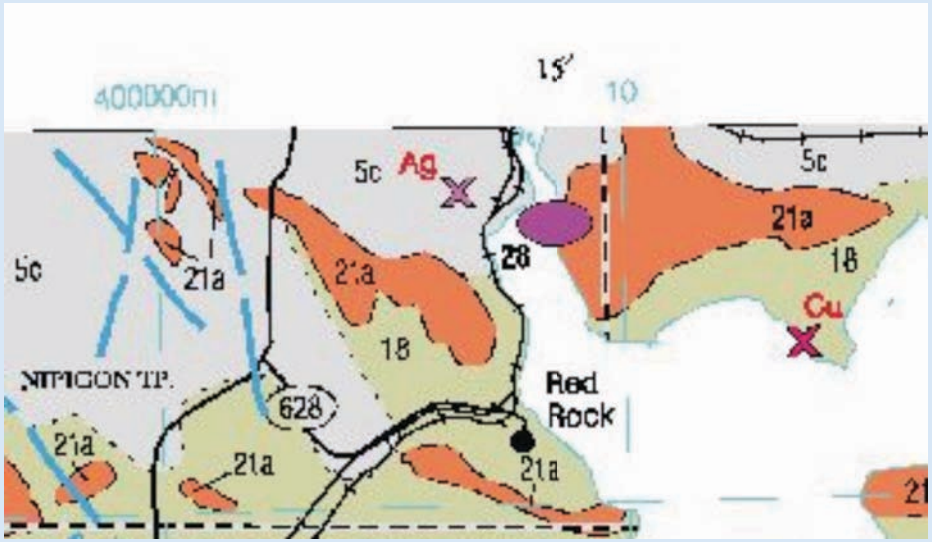
http://coloradoearthscience.blogspot.com/search?q=migmatite,
Photo date Aug 2004, by S. Veatch

Lensoidal migmatite, consisting of garnet schist.

http://web.pdx.edu/~ruzickaa/migmatite-centralWA.jpg

What are the differences between the two migmatites?

Locality



LEGEND[ab]

PRECAMBRIAN[c]

PROTEROZOIC

MESOPROTEROZOIC (0.9 to 1.6 Ga)

21 Mafic Intrusive Rocks (Keweenawan age)

21a Gabbro (diabase): sills and associated dikes; minor anorthosite and granophyre, locally composite, reverse magnetic polarity (Logan and Nipigon sills, 1109 Ma)

21b Gabbroic to granophyric intrusive rocks: dikes; ultramafic, gabbroic, leucocratic, pegmatoidal and granophyric intrusions (Crystal Lake and Moss Lake intrusions)

21c Gabbro (diabase): dikes; olivine bearing; normal magnetic polarity (Pigeon River intrusions)

Keewatin-Type Supracrustal Rocks

5 Mixed Clastic Sedimentary Rocks: wacke-dominated, lesser conglomerate, mudstone and carbonate rocks; includes associated paragneiss and migmatite

5a Wacke: (argillite) minor siltstone and polymictic conglomerate, arkose

5b Conglomerate: polymictic; locally derived

5c Migmatite: biotite-quartz-feldspar paragneiss

UNCONFORMITY

Sibley Group (~1340 Ma)

18 Clastic and Carbonate Sedimentary Rocks: red and white sandstone, red shale; calcareous shale and mudstone; local dolostone and limestone

Background on the “White” Migmatite

- The white migmatite is from the Keewatin Formation.
- Approximately 2.6 Ga
- Collected on the North Shore field trip
- 9/13/17

Background on the “pink” migmatite

From the Keewatin formation

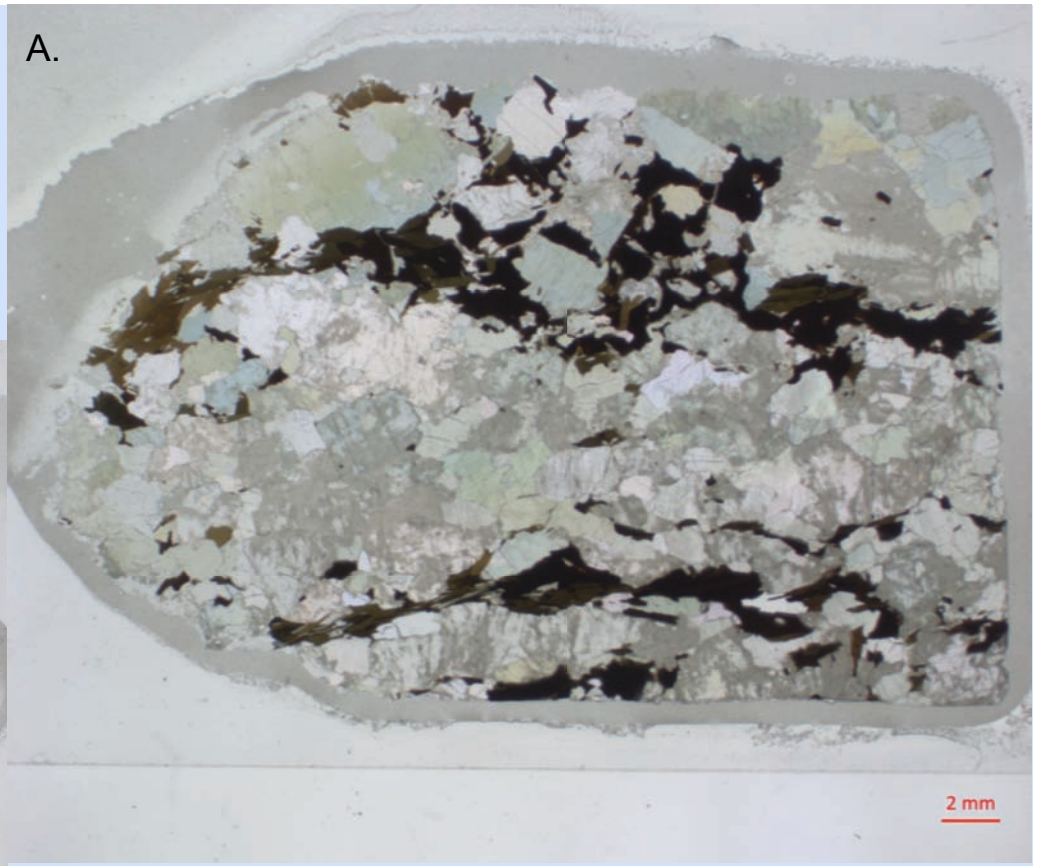
Approximately 2.6 Ga

Collected on the North Shore trip

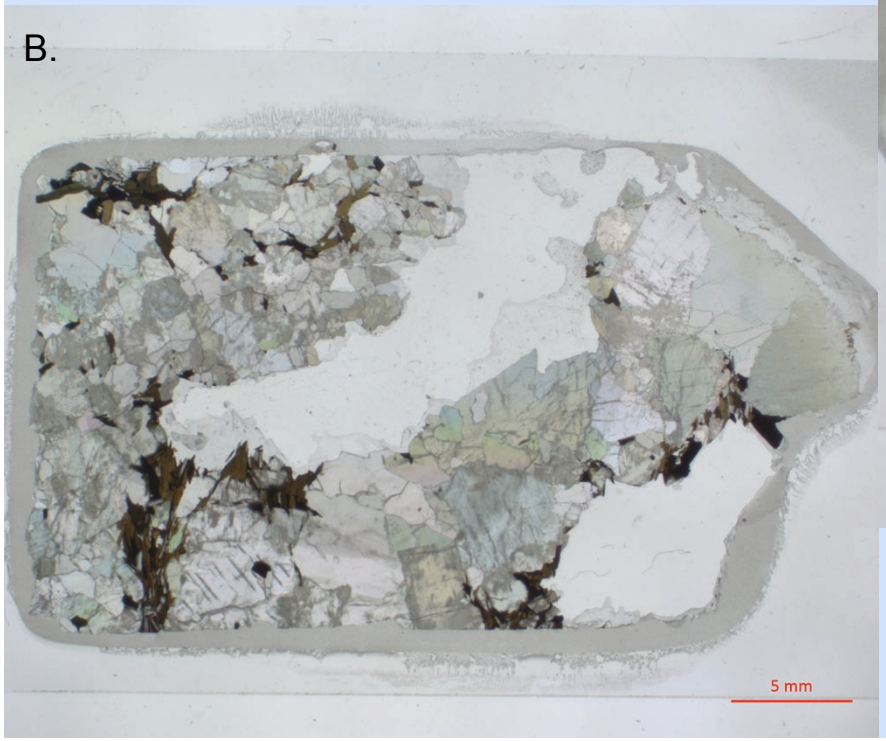
9-13-17

Slide A and B of the plagioclase migmatite.

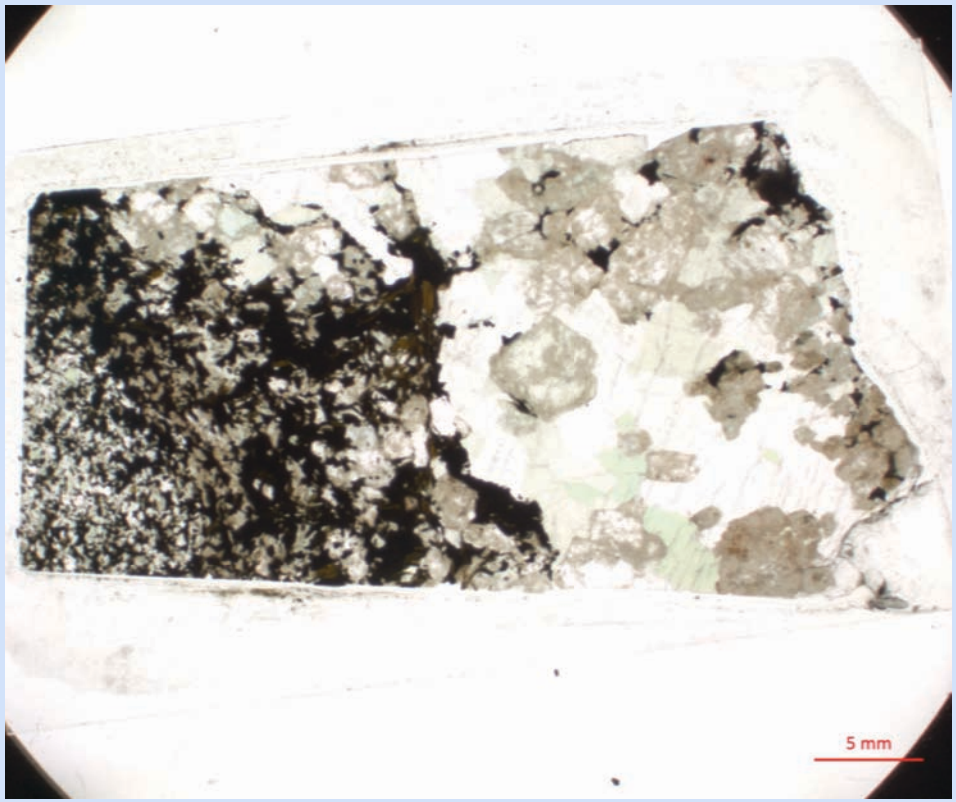
A.



B.



Thin section slide for k-spar thin sections



Grain Size Distribution for plagioclase sample

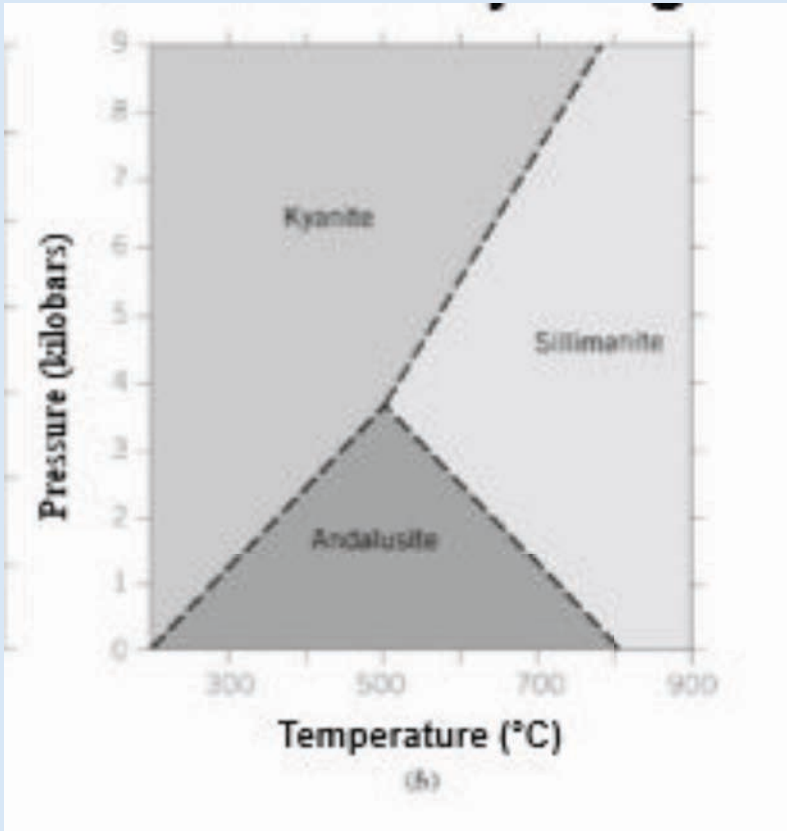
Measurement	Area	Perimeter	Length	Unit
Area	2.54349	7.61342	3.08406	mm
Area	8.47912	15.695	4.26398	mm
Area	2.40437	7.36133	2.3371	mm
Area	0.84526	3.63076	1.34999	mm
Area	2.33677	8.63861	2.94467	mm
Area	0.30393	2.61239	1.07528	mm
Area	0.90583	4.80474	1.76799	mm
Area	5.79191	16.1587	4.883	mm
Area	0.4202	2.95988	1.08927	mm
Area	1.80896	6.40576	2.31828	mm
Area	0.23903	1.96589	0.69765	mm
Area	1.71107	6.77667	2.57386	mm
Area	0.855	3.94797	1.26948	mm
Area	2.21726	6.69555	2.62709	mm
Area	0.96856	4.03749	1.4358	mm
Area	1.21192	5.23602	1.8792	mm
Area	1.27628	4.88942	1.69777	mm
Area	2.51902	8.61318	2.57868	mm
Area	4.24848	13.1265	3.51543	mm
Area	1.80625	7.56607	2.14753	mm
Area	5.06887	12.8686	4.24083	mm
Area	1.86304	5.91477	2.26327	mm
Area	3.97646	12.6883	3.42362	mm

Average area: 2.33918 mm
Average length: 2.41147 mm
Average Perimeter: 7.4003mm

Grain size distribution for potassium feldspar sample

Area	16.363	15.303	5.129			mm
Area	1.679	4.998	1.744			mm
Area	0.750	3.651	1.416			mm
Area	2.474	6.481	2.729			mm
Area	6.550	9.643	3.185			mm
Area	7.696	10.389	3.936			mm
Area	3.756	8.117	3.246			mm
Area	7.561	10.945	3.619			mm
Area	3.441	7.436	2.615			mm
Area	10.199	13.493	4.765			mm
Area	8.865	12.474	4.446			mm
Area	9.724	14.303	4.903			mm
Area	6.509	12.042	4.361			mm
Area	6.877	11.821	4.322			mm
Area	7.043	13.123	5.575			mm
Area	13.211	16.210	5.154			mm
Area	11.327	14.314	5.659			mm
Area	3.565	7.407	2.584			mm
Area	2.102	6.059	2.507			mm
Area	7.010	10.286	3.588			mm
Area	5.062	11.942	3.573			mm
Area	17.817	18.355	6.329			mm

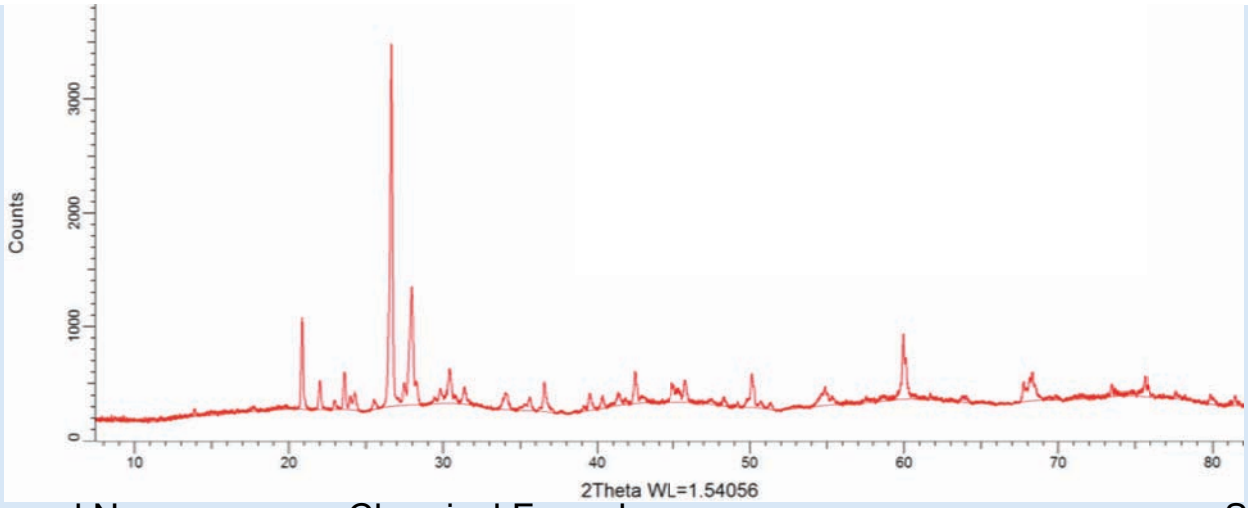
Average area: 5.6179 mm
Average length: 3.2928 mm
Average perimeter: 9.1899 mm



Kyanite's presence indicates that the migmatite was under great pressures, ranging from 4 to 8.5 kilobars, and temperatures about 400-700 degrees Celsius.

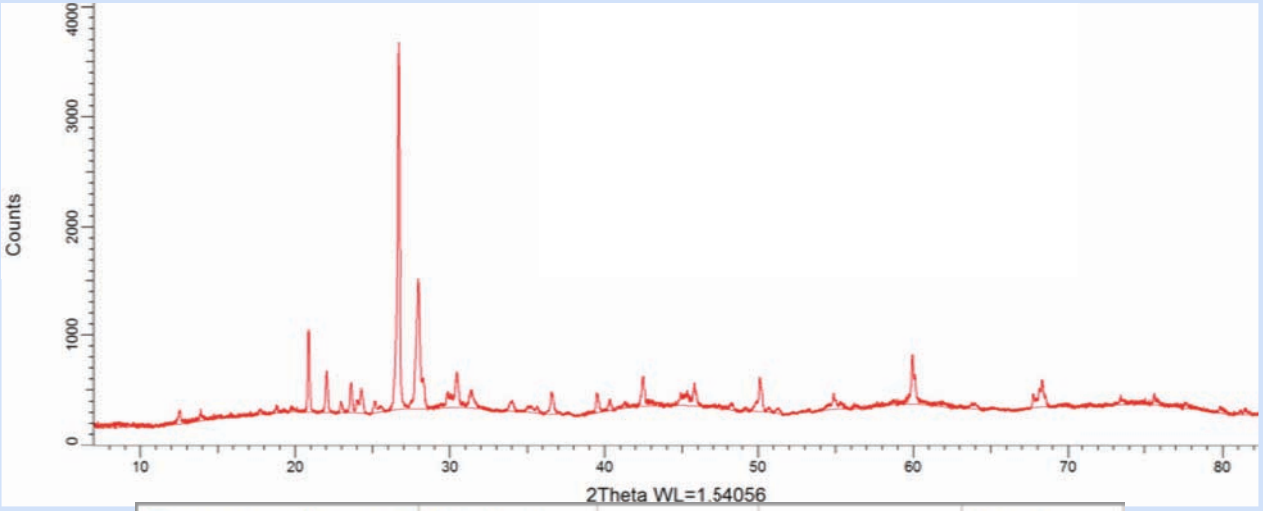
If Andalusite was present it would indicate that the rock had undergone contact metamorphism. Sillimanite indicates high temperature, 500 degrees celcius and up,regional metamorphism.

White

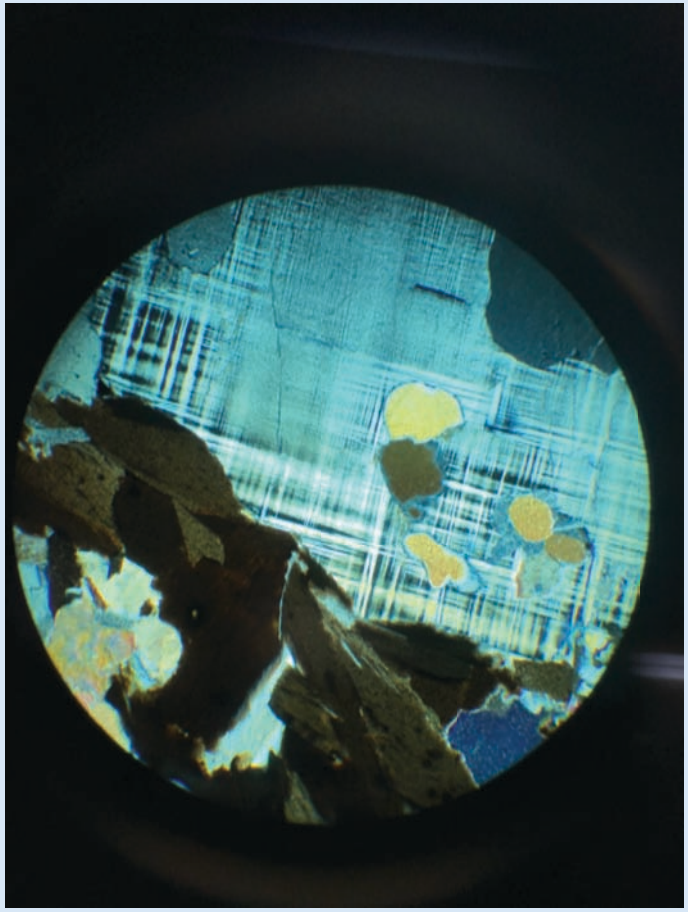


Number	Compound Name	Chemical Formula	Score
1	Quartz (low)	SiO_2	61
2	Albite, ordered, calcian	$(Na, Ca)AlSi_3O_8$	24
3	Microcline, ordered	$KAlSi_3O_8$	12
4	Biotite	$K(Mg,Fe^{3+})_3(Al,Fe^{3+})Si_3O_{10}(OH)_2$	12
5	Kyanite	Al_2SiO_5	9
6	Anorthite, ordered	$CaAl_2Si_2O_8$	12

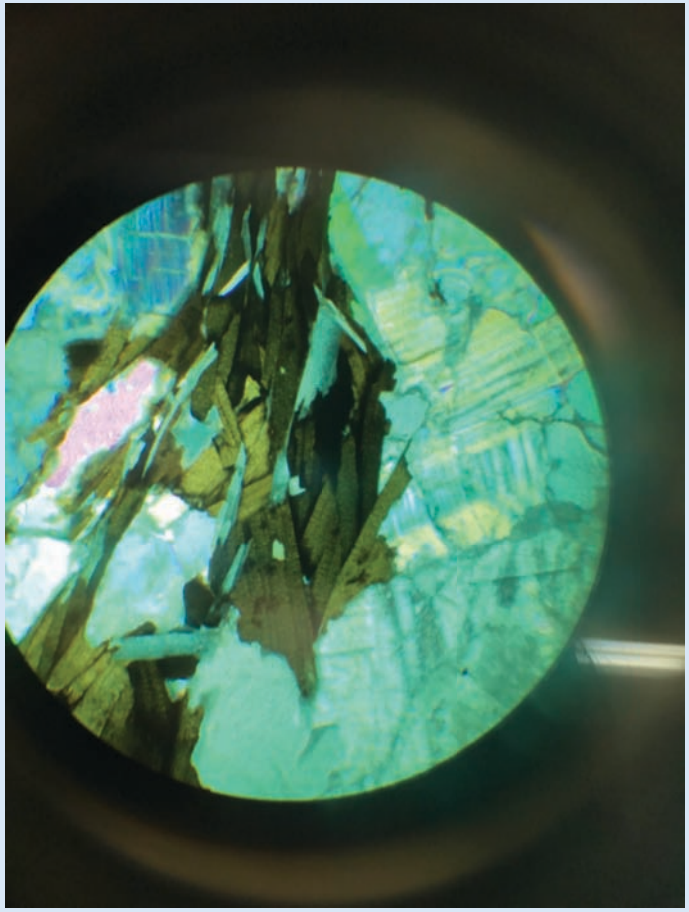
Pink



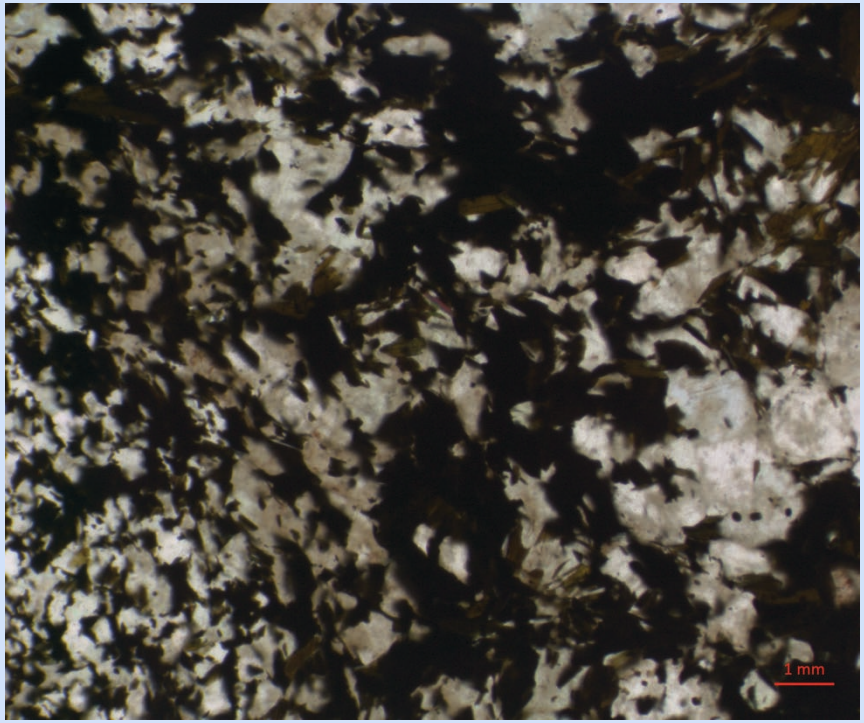
Compound name	Formula	Score
Silica	SiO_2	69
Albite	$(Na, Ca)Al(Si,Al)_3O_8$	44
Anorthite	$CaAl_2Si_2O_8$	12
Biotite	$K(Mg,Fe^{2+})_3(Al, Fe^{3+})Si_3O_{10}(OH, F)_2$	6
Microcline	$KalSi_3O_8$	4
Augite	$Ca(Mg, Fe^{3+},Al)(Si,Al)_2O_6$	7
Graphite	C	22
Enstatite	$(Fe,Mg)SiO_3$	5



FOV: 5mm Slide A



FOV: 5mm Slide B



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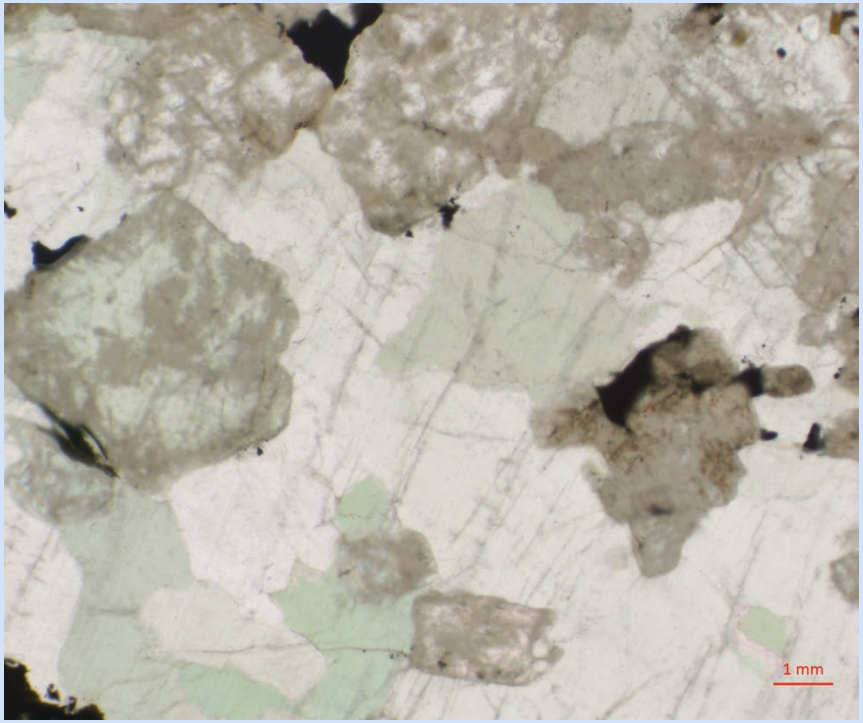

FOV: 5mm

Microscope view of “pink” samples

Methods

- Thin Section
  - Rock Saw and Buehler Machine

For XRD and XRF:

- Puck and Ring Mill
- XRD Slides
- Compressor
- Power Circles

References

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