Optics flowchart (after Nesse, 1986)

1) If available, examine the hand sample. Ascertain the number of different minerals, and tentatively identify each based on *color*, *luster*, *streak*, *hardness*, *cleavage/fracture* and *crystal habit*. Classify rock as precisely as possible, as this will offer clues to likely *mineral associations*.

2) Scan the thin section at low magnification, switching between uncrossed polars and crossed polars frequently, and rotating the stage as needed. Determine the number of different minerals present. Use *relief*, *crystal habit*, *color/pleochroism*, *cleavage* and *birefringence* to differentiate minerals, keeping in mind that some of these properties can vary depending on the grain orientation.

3) **For each mineral**, make note of:
- *color* and *pleochroism* (if any)
- *relief* relative to the epoxy (check along thin section edges), and if the *relief changes* with rotation.
- *mineral habit*, *textures*, and any *alteration.*
- whether mineral is *isotropic or anisotropic*.
- nature of *twinning*, if present.
- nature of *cleavage* or *fracture*, if present.

IF ISOTROPIC

4a) Consult identification tables and mineral descriptions, using *color*, *cleavage*, *relief (estimate R.I. if possible)*, *crystal habit* and *associations*.
DONE

IF ANISOTROPIC

4b) Find a grain oriented to give the **lowest** birefringence. Obtain an optic axis figure (or a Bxa figure) and determine if mineral is *uniaxial or biaxial*.

IF UNIAXIAL

5a) Determine:
- *optic sign*.

Under orthoscopic conditions with uncrossed polars, determine:
- *color*
- *relief (estimate R.I. if possible)*

(in this orientation, **these are associated with** ω).

IF BIAXIAL

5b) Determine:
- *optic sign*
- *2V°*
- *dispersion* (if present).

Rotate stage to orient Y parallel to lower polar. Under orthoscopic conditions with uncrossed polars, determine:
- *color*
- *relief (estimate R.I. if possible)*

(in this orientation, **these are associated with Y**).

6) Find a grain oriented to give the **highest** birefringence. Determine:
- *birefringence*.

Use the accessory plate to identify ε (uniaxial), or X and Z (biaxial). Systematically align each vibration direction with the lower polar, and under orthoscopic conditions with uncrossed polars, for each determine:
- *color*
- *relief (estimate R.I. if possible)*

7) If mineral is enlongate or has cleavage, measure: *extinction angles*
If mineral is enlongate, determine: *sign of enlongation.*

8) If crystallographic axes can be identified, determine: *optic orientation*.

9) Consult identification tables and mineral descriptions. Be flexible and allow that some measured values may be atypical or incorrectly determined. **DONE**