Penetrative Fabrics

Specific structures:

folds, faults, joints, veins, etc.

Scale: typically outcrop to map

Structural features can be numerous and small on the scale of observation

Penetrative:

A feature is said to be penetrative if on the scale of observation it occurs over and over again in a reproducible manner.

Fabric is:

a descriptive term referring to the complete spatial and geometrical configuration of all those components that make up the rock.

It covers texture, structure, and preferred orientation.

Fabric element: any feature that defines a fabric is said to be a **fabric element**.

Planar vs Linear Fabric

Foliation: a descriptive term for planar features in mostly (but not necessarily) metamorphic rocks, produced as a result of deformation, metamorphism, or inherited primary features.

Foliation can be defined by:

1. Composition (compositional layering
2. Grainsize/texture variation
3. Closely-spaced fractures
4. Shape of mineral grains, clasts, pebbles etc.
5. Alignment of platy minerals (e.g., mica)
6. A combination of above

Foliation or Cleavage

Foliated rocks tend to break apart (*cleave*) along the foliation. In this case the foliation is often called a cleavage. Some foliations such as compositional banding in metamorphic rocks do not cleave along the foliation easily.

Foliations associated with folds

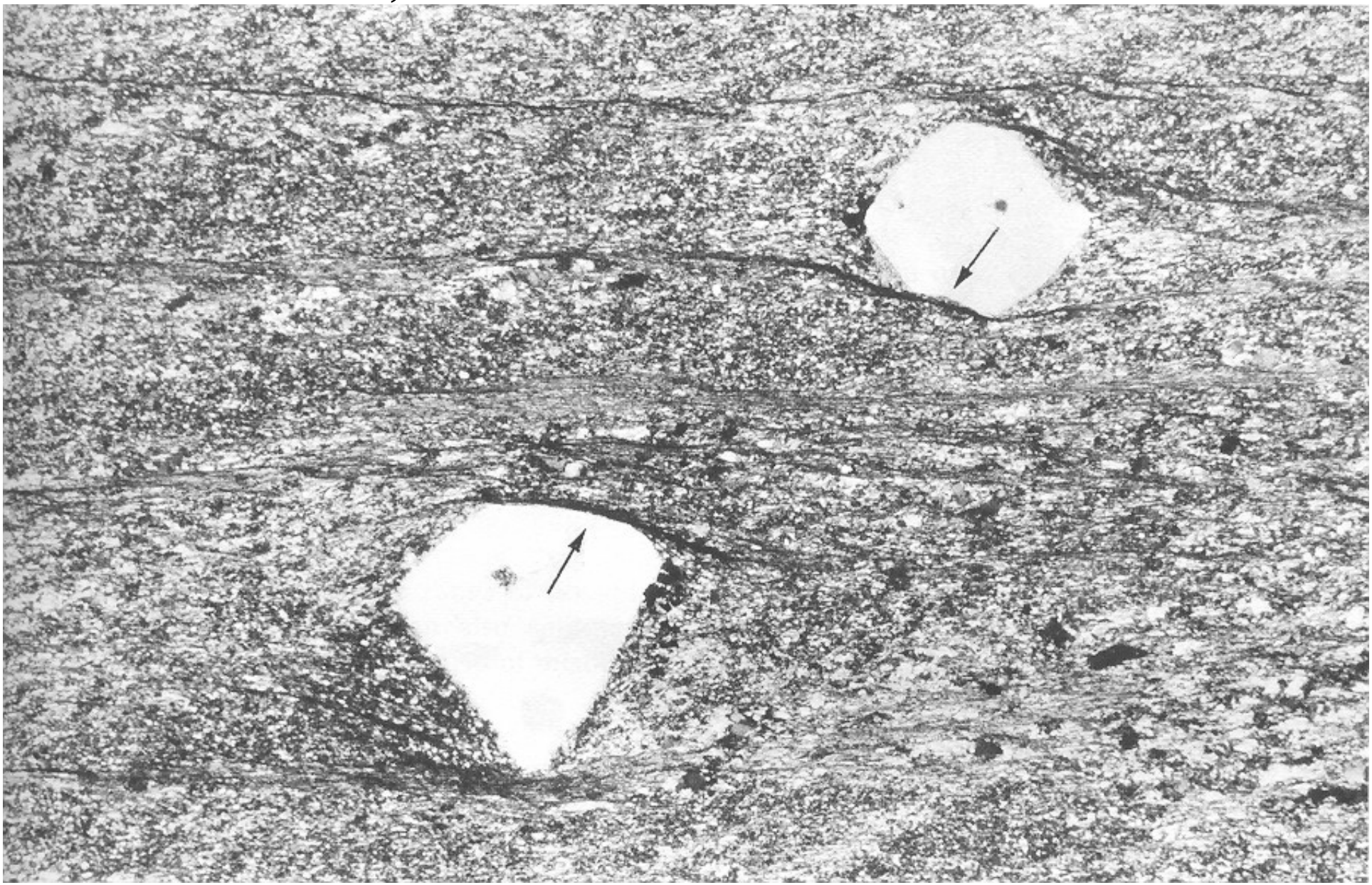
Axial plane foliations

- slaty cleavage (in slates)
- crenulation cleavage
  - microlithon
  - cleavage domain
- schistosity
- differentiated layering
- transposition foliation

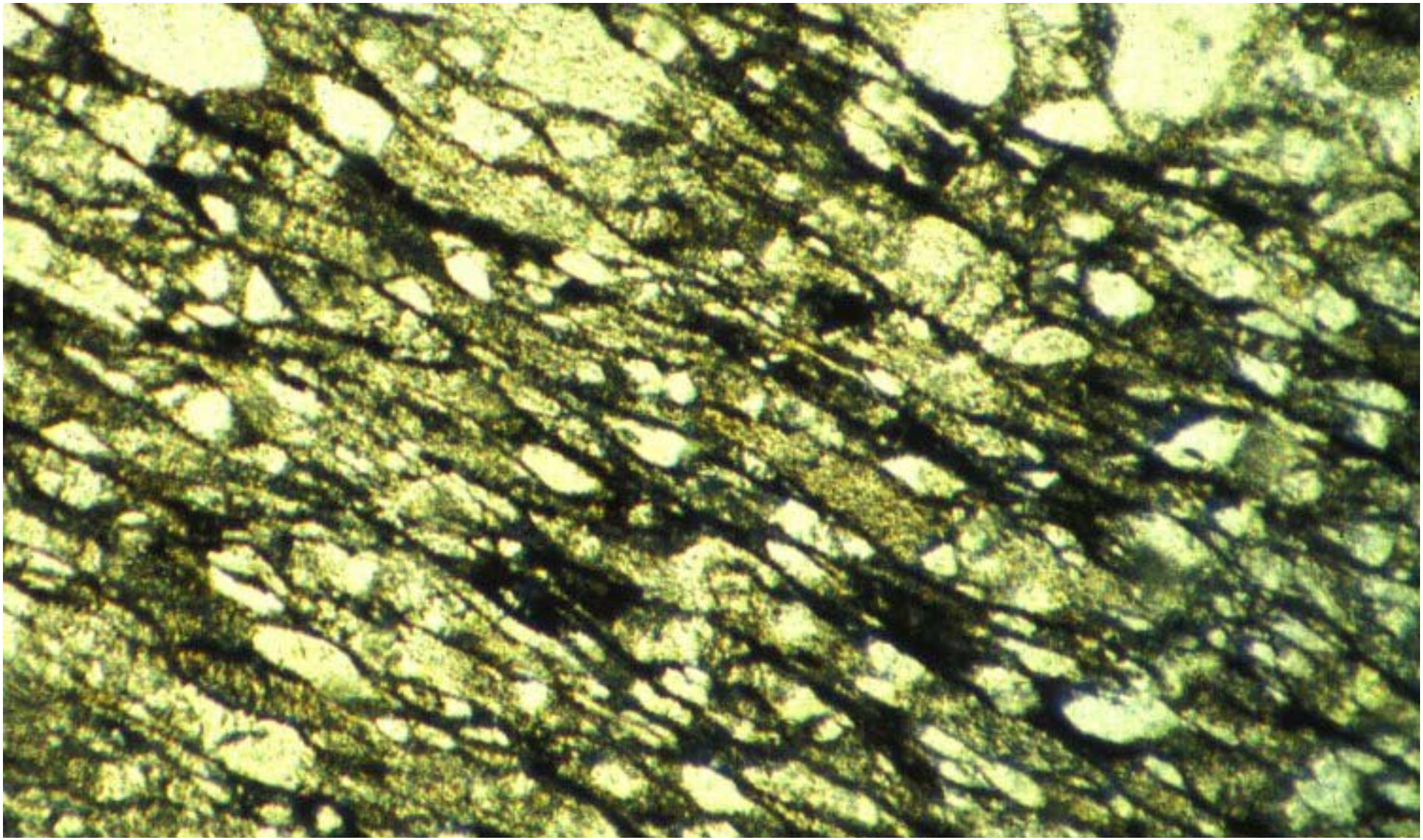
Slaty Cleavage

- The concept of Pressure solution
- Pressure shadow, Solution seam
- Solution-precipitation process
- Rotation of elongate grains

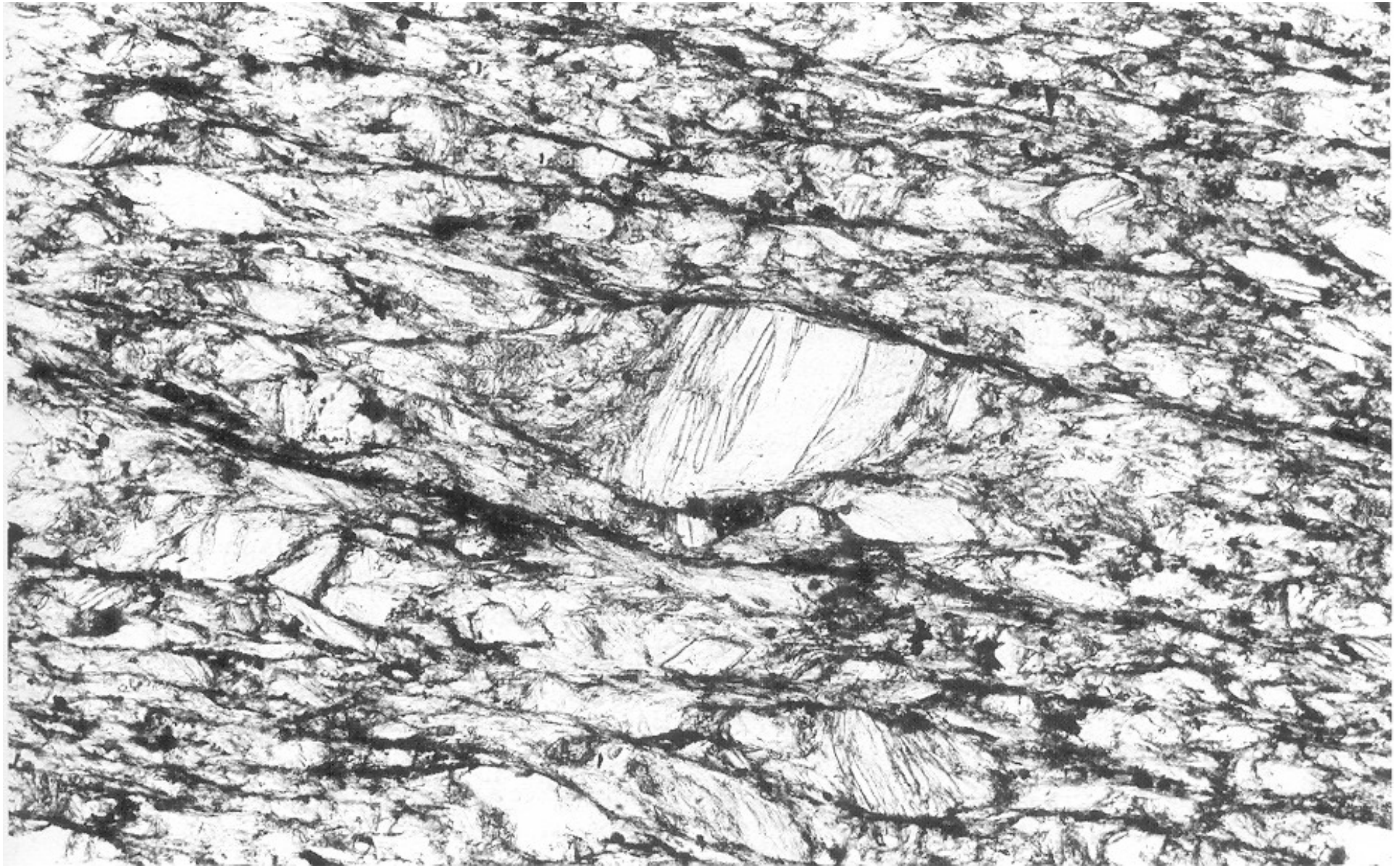
Pressure solution of qz grains. Dark solution seams consist of insoluble material, FOV=4mm



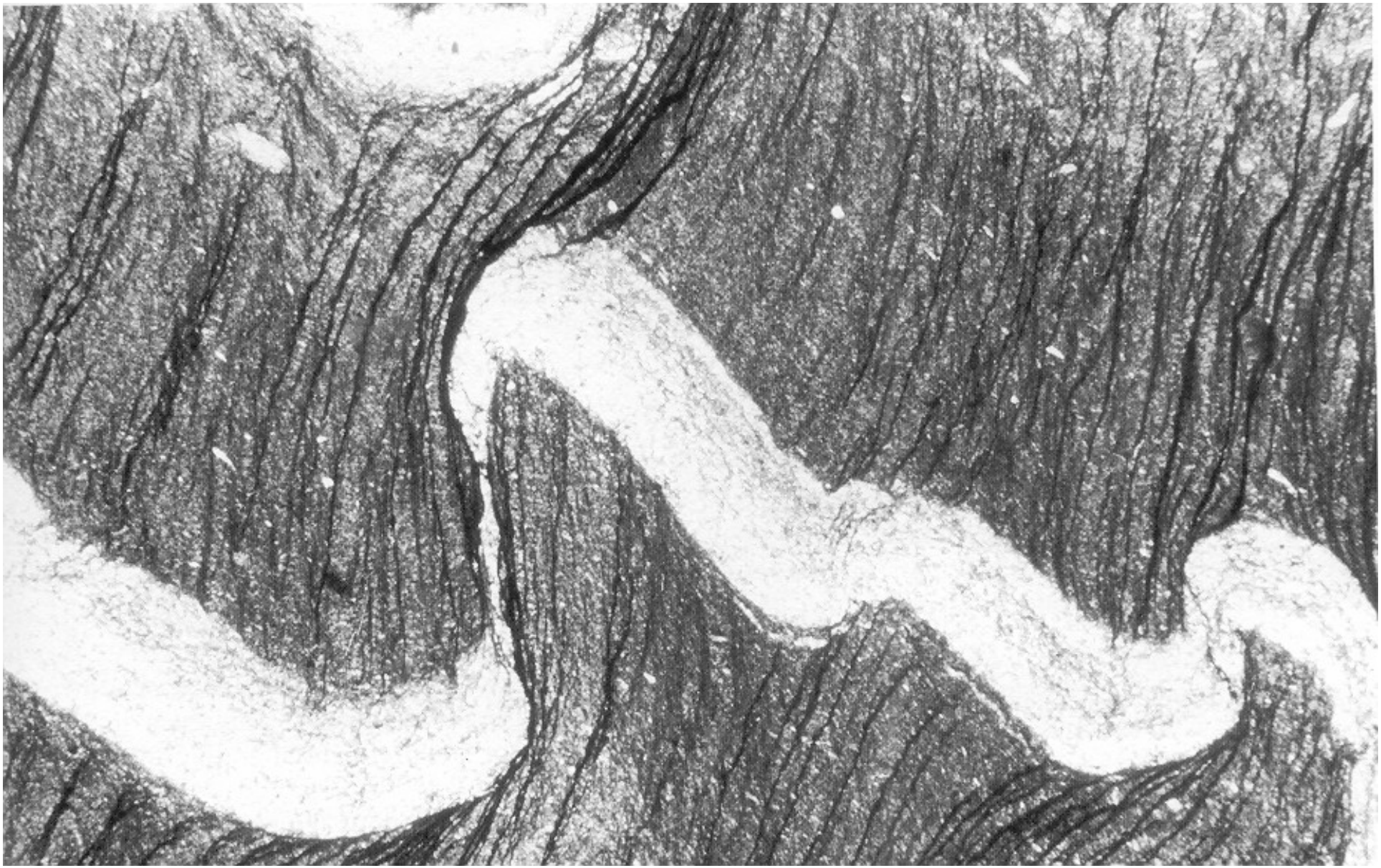
The elongate shape of qz grains is due to pressure solution and very limited internal deformation; the alignment of the grains is due to the pressure solution plus rotation. Note the solution seams (black).



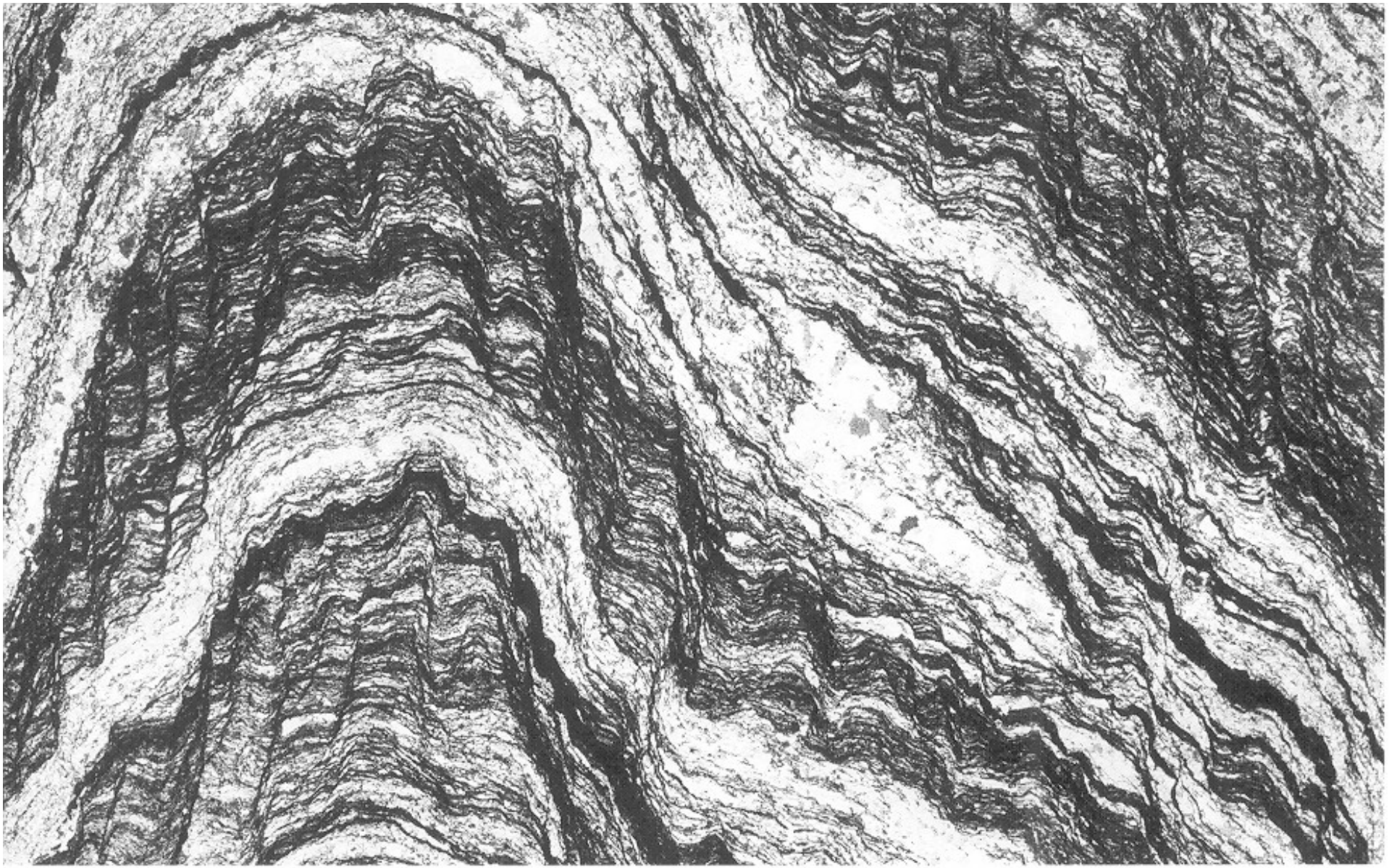
Slaty cleavage with chlorite stacks in the microlithon
(note the solution seams)
FOV=1.8mm



FOV 5 mm



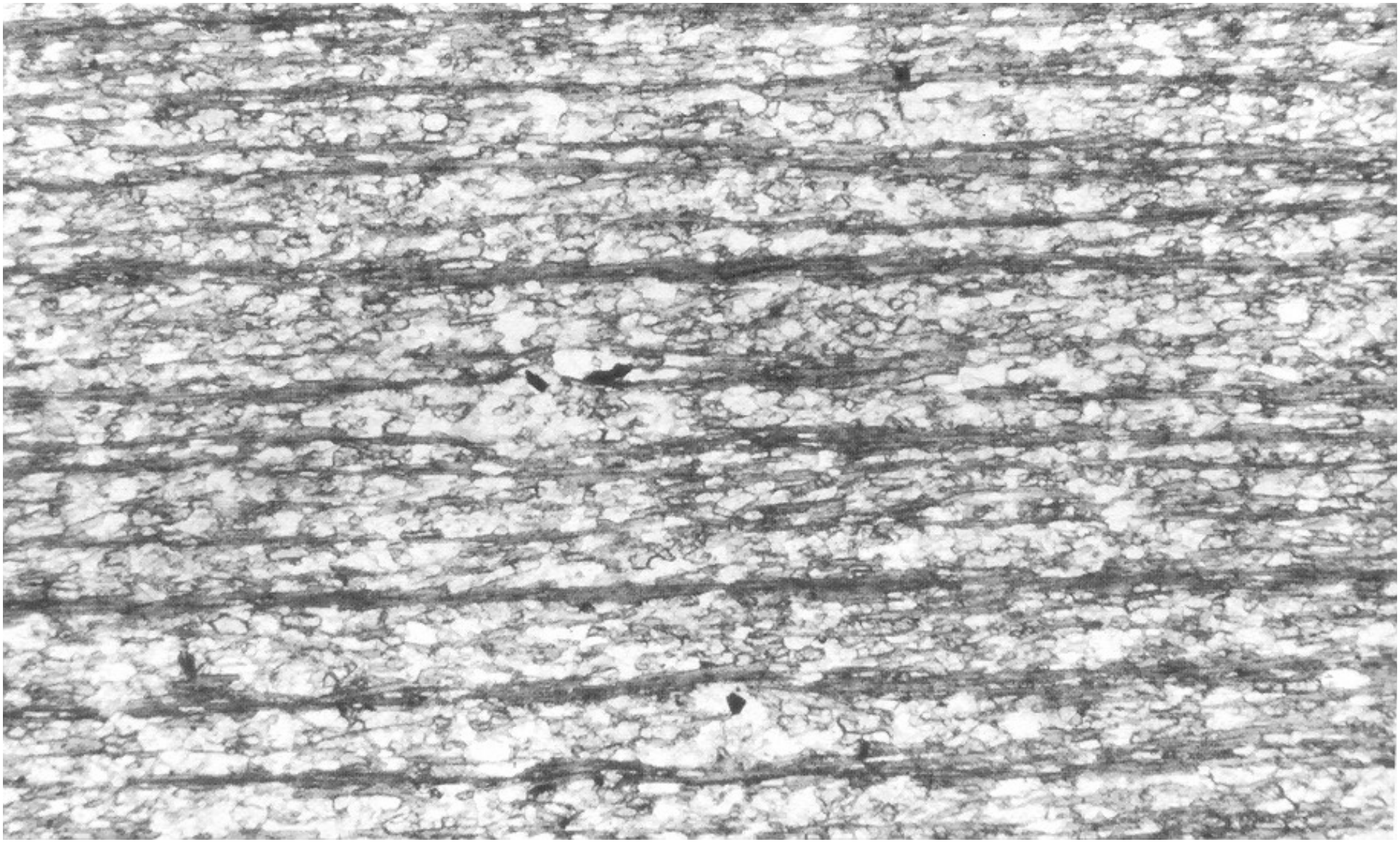
Name the foliations and describe their origin, FOV=10mm



Crenulation Cleavage

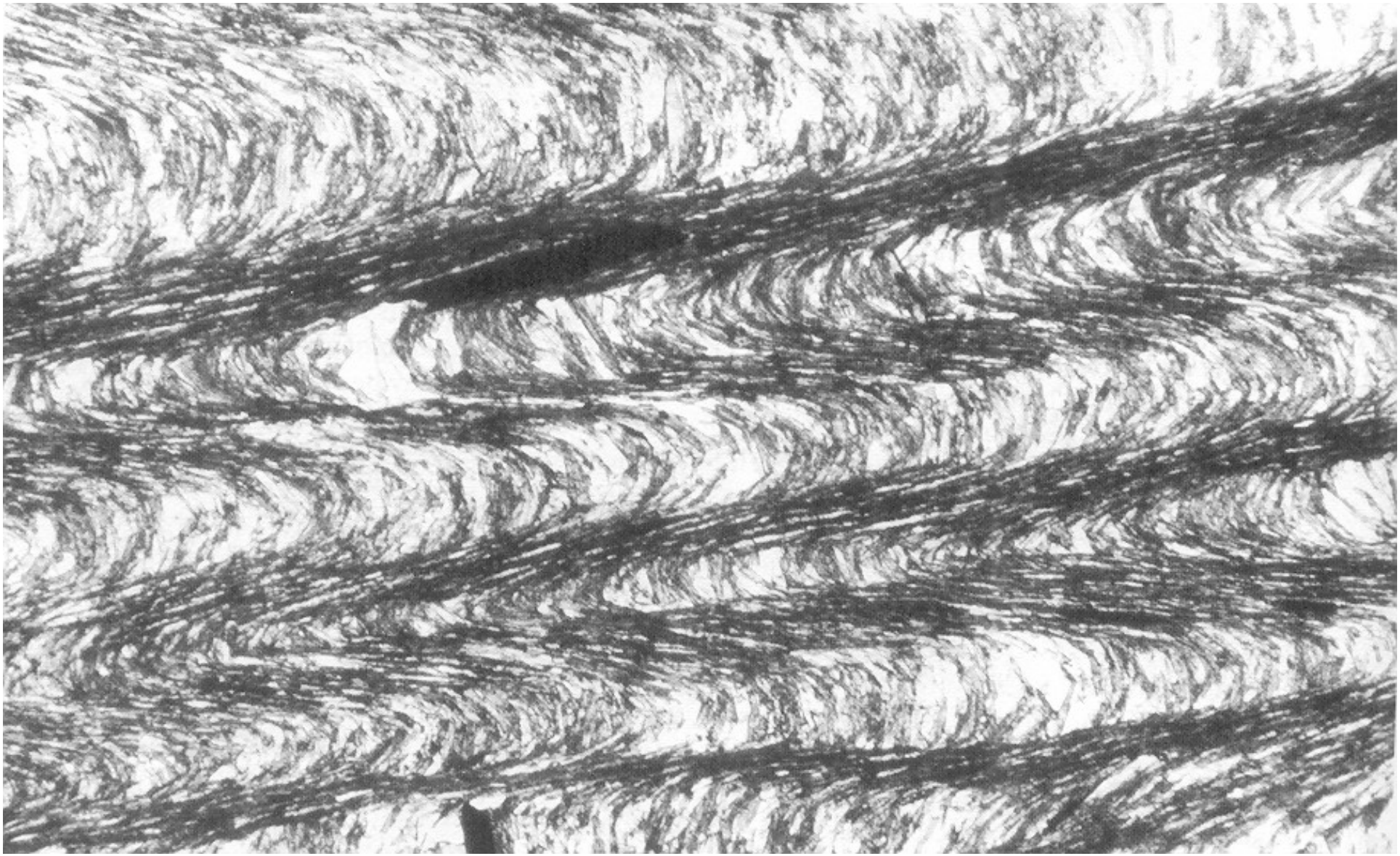
Crenulation cleavage means a cleavage that “crenulates” an existing foliation.

The nature of the crenulation cleavage itself can be a slaty cleavage, a differenticated layering, or a schistosity

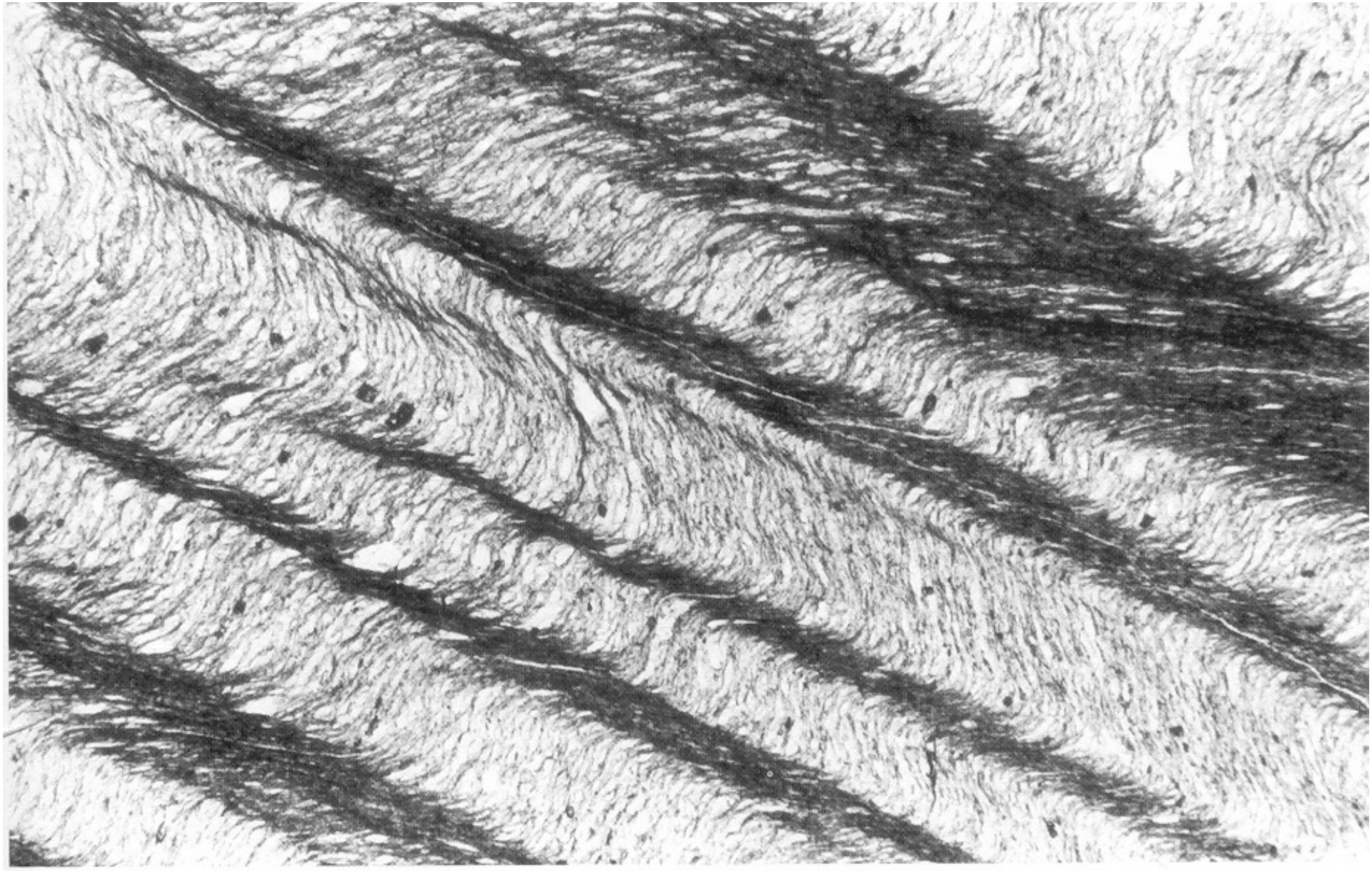


Foliation in quartz-mica phyllite, FOV=4mm
If the grains are better recrystalized, this rock is called a qz-mica schist

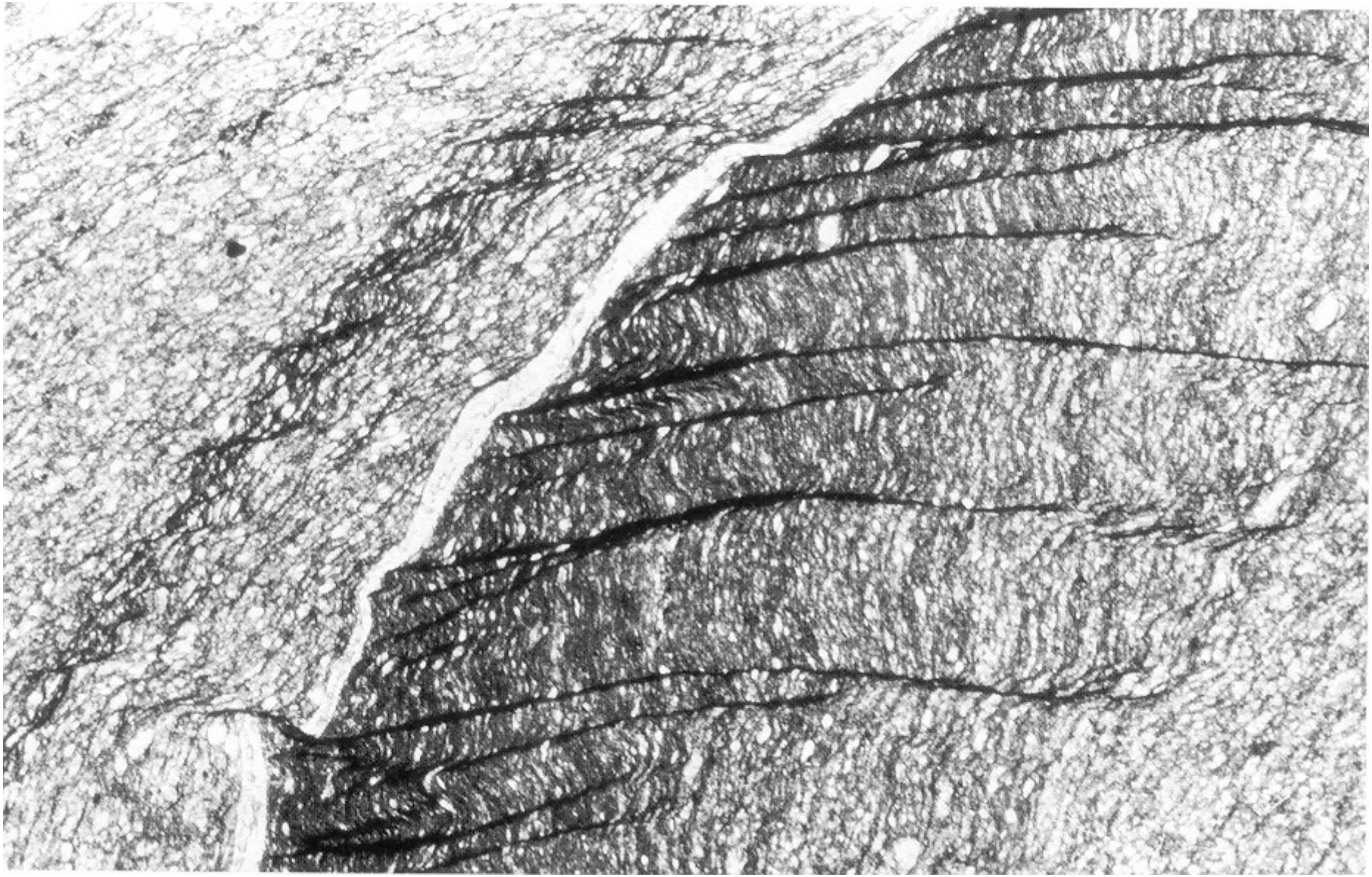
Differentiated crenulation cleavage in phyllite
Note the symmetric (M-shaped) microfolds
Also note the differntiation of the rock into P- and Q- domains
FOV=4mm

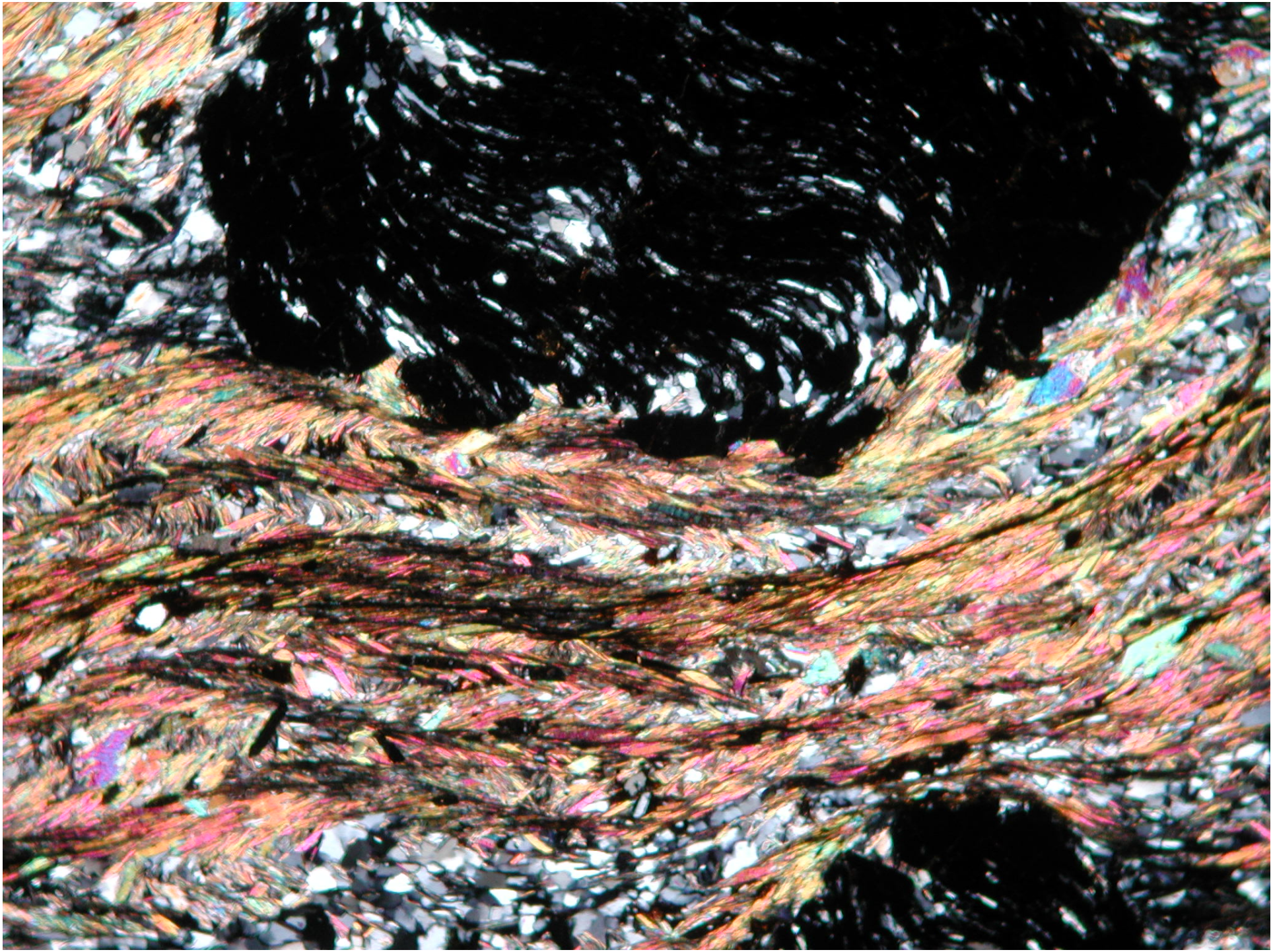


Differentiated crenulation cleavage with the P-domains of variable width
FOV=4mm

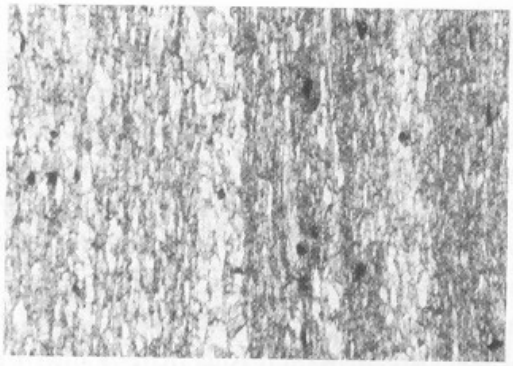


Discrete crenulation cleavage. The cleavage is more developed in more pelitic material.
FOV=4mm

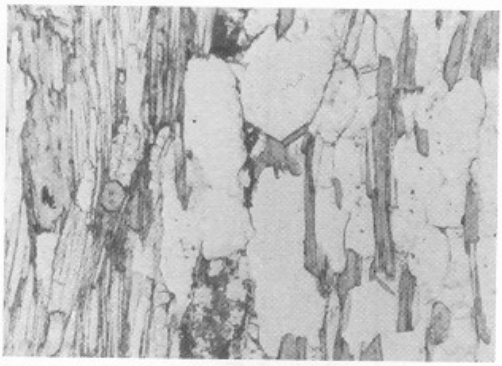




a1



b1



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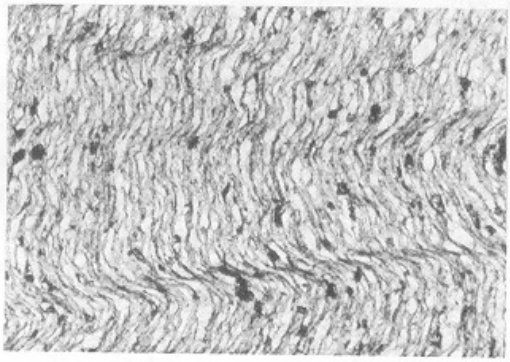

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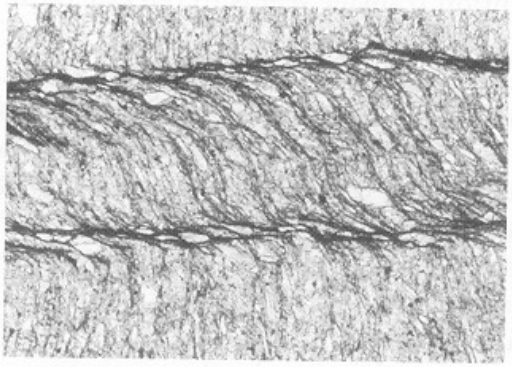
3



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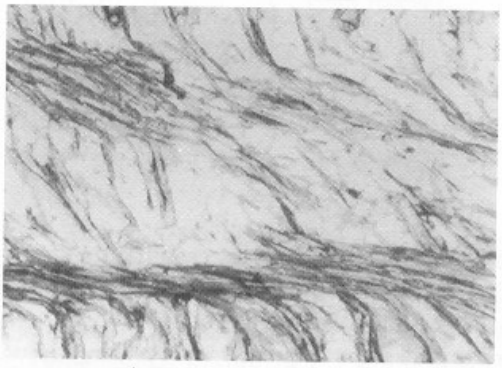

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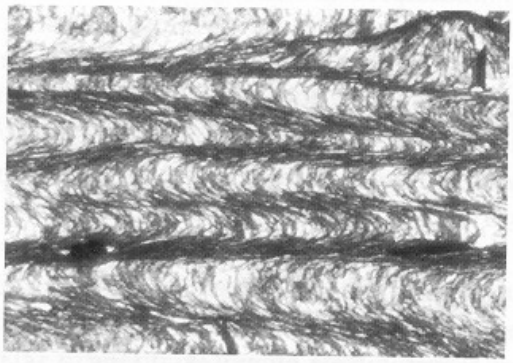

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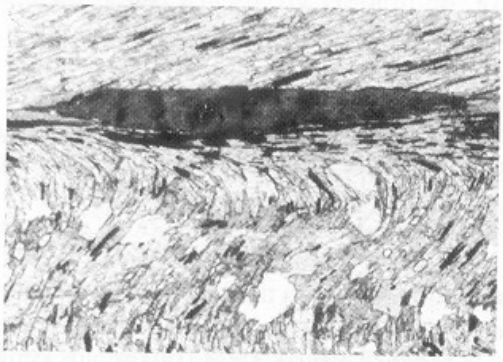

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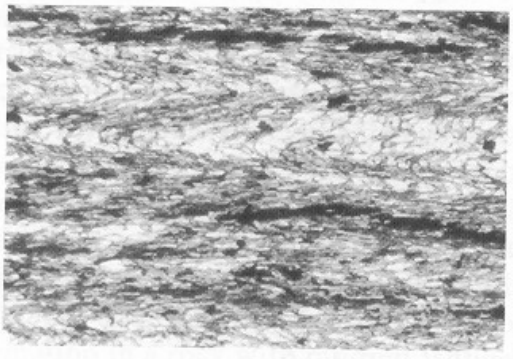

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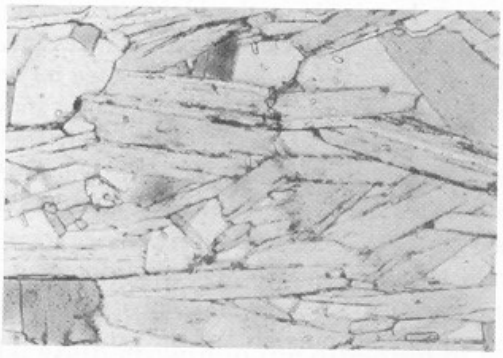
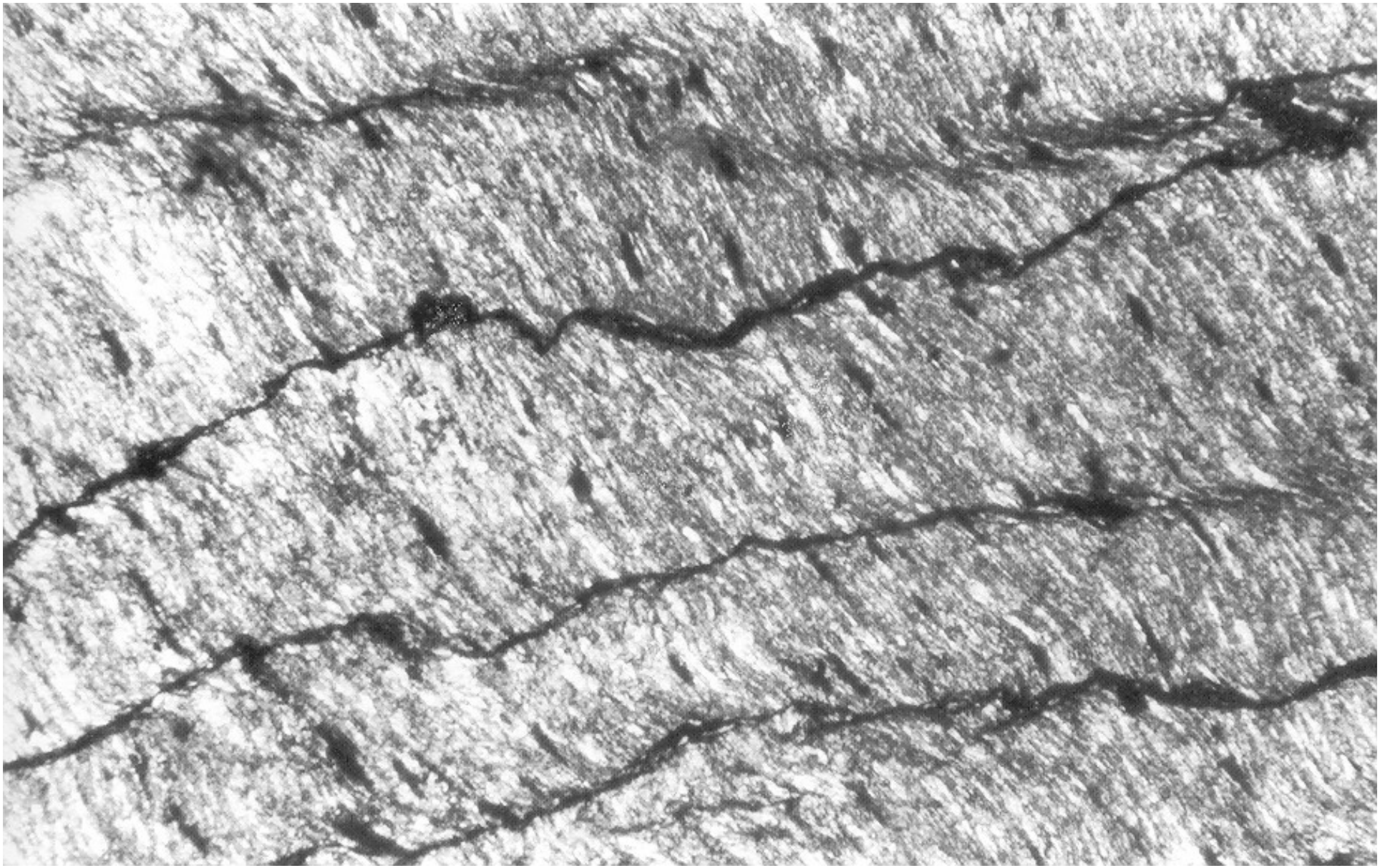
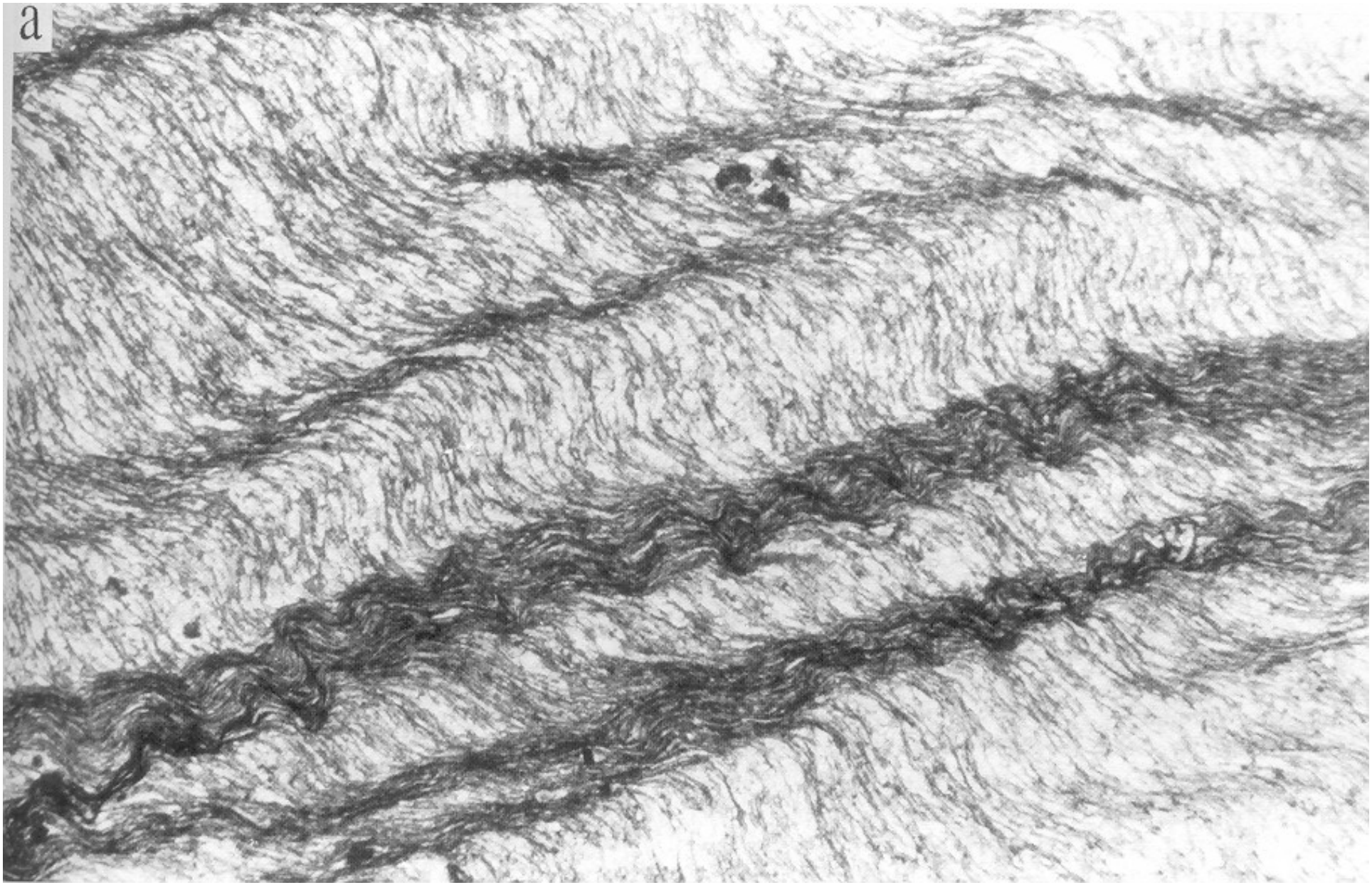


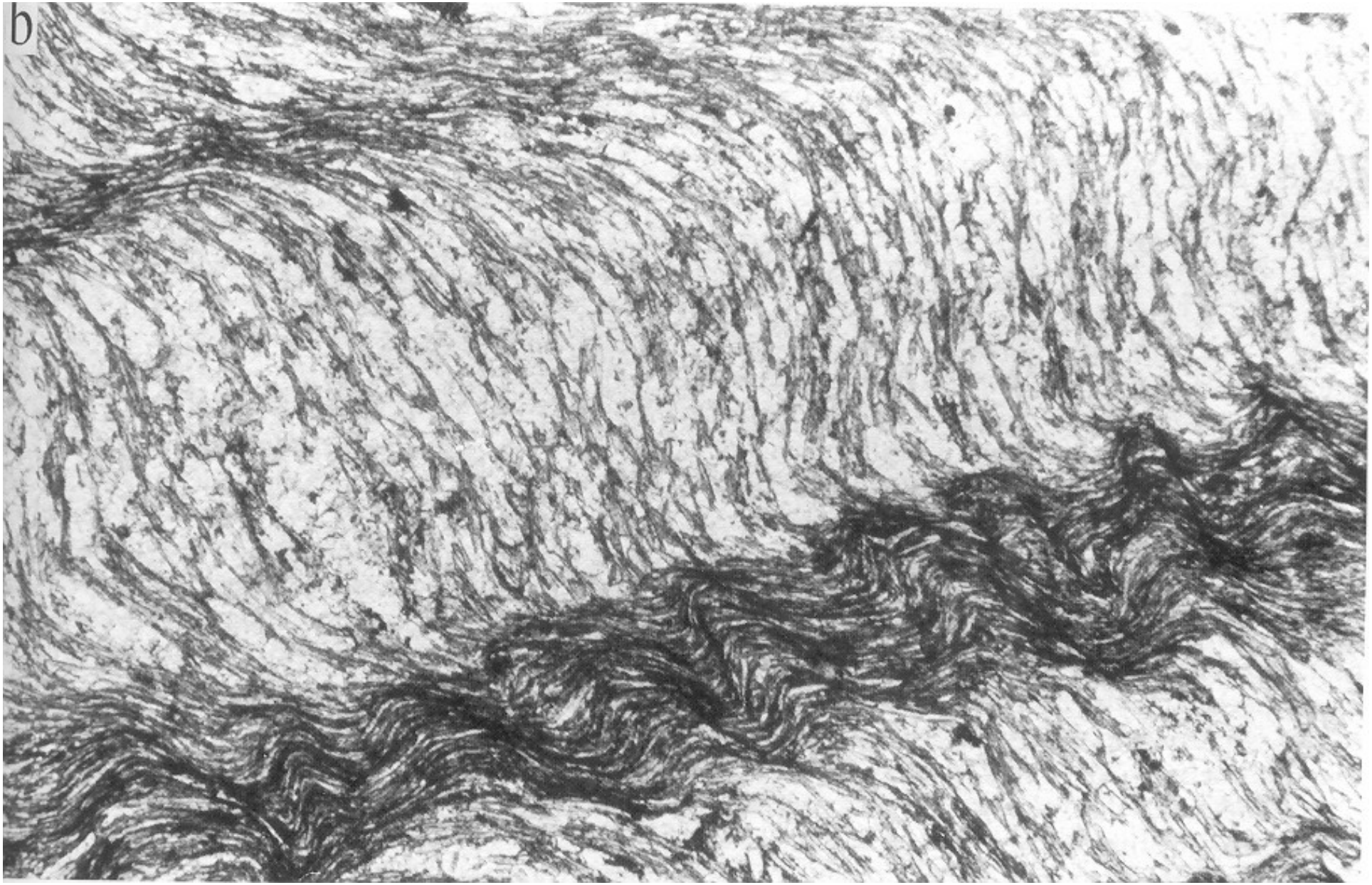
Discrete crenulation cleavage
FOV=1.8mm

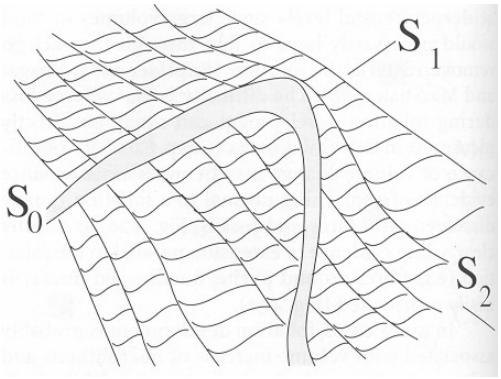


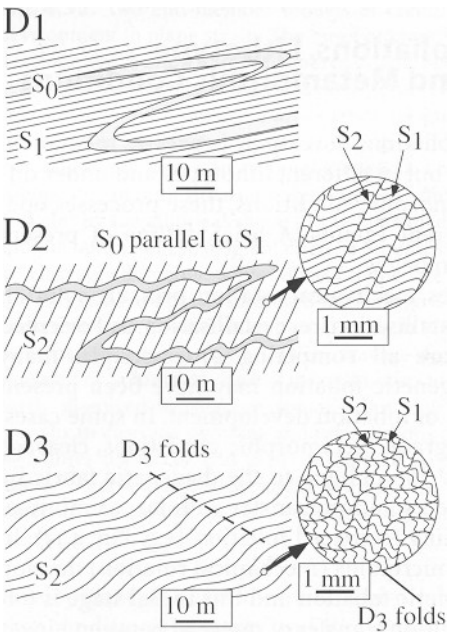
Multi-generations of crenumation cleavage, FOV=4mm



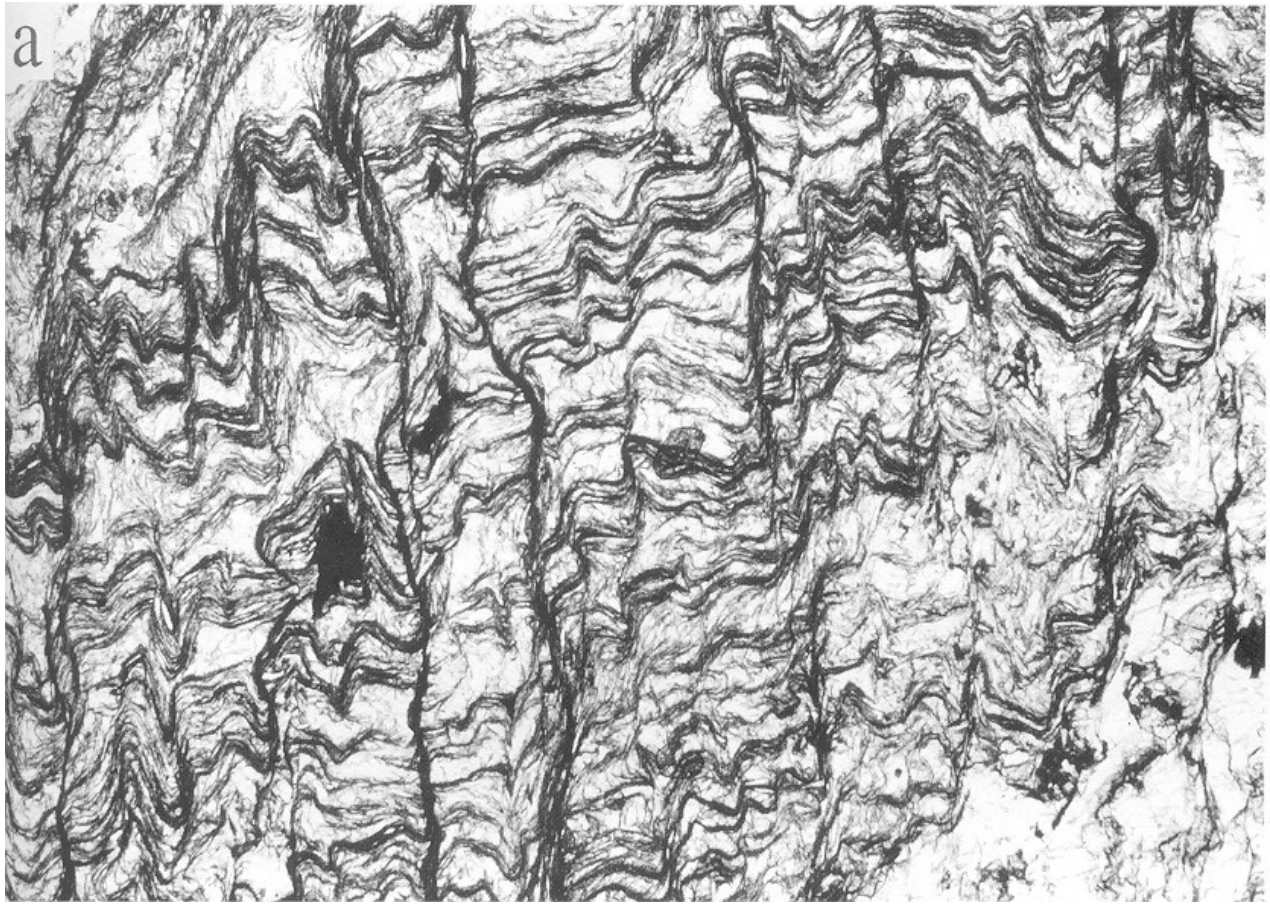
FOV=1.8mm





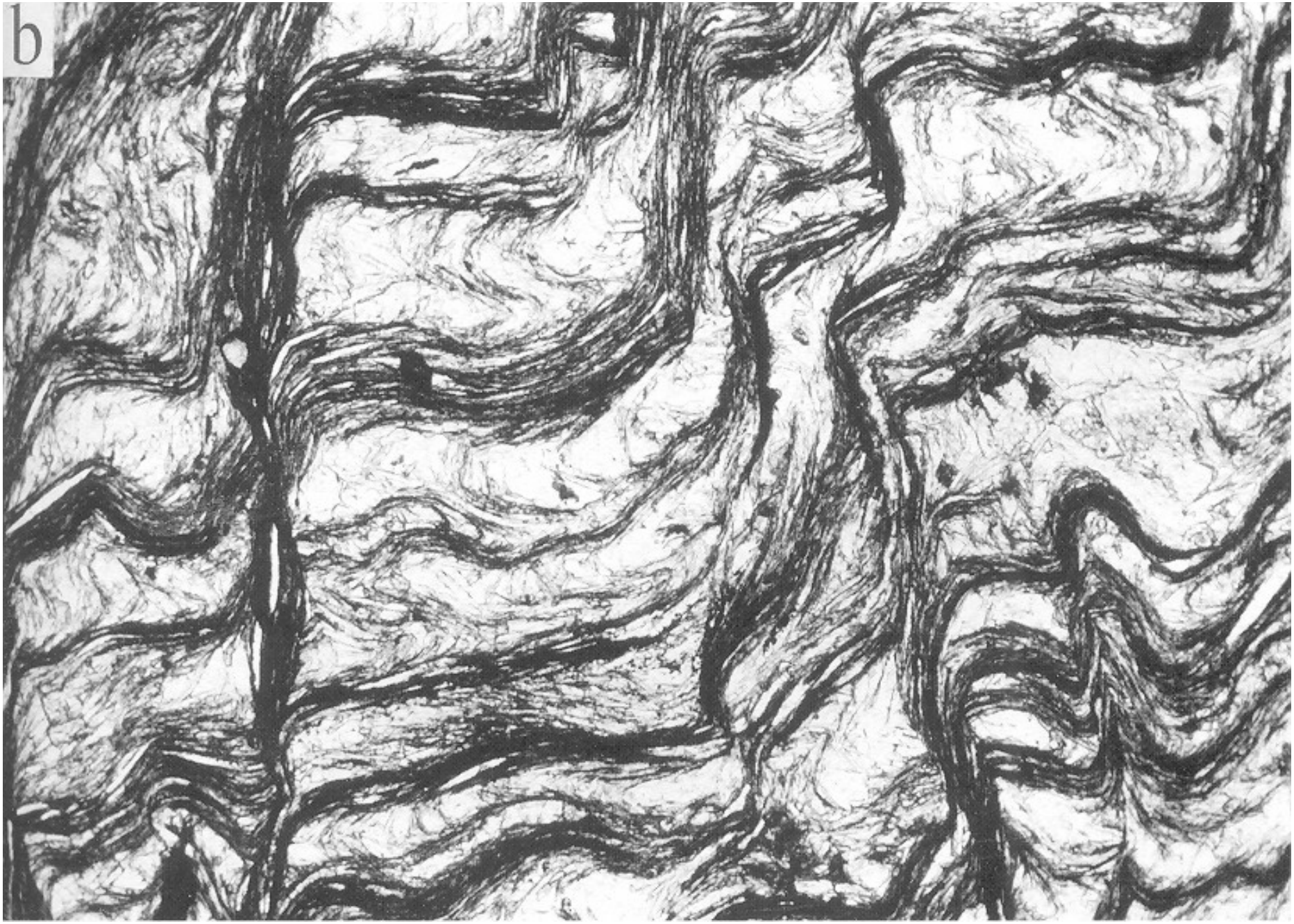


FOV=1.5mm

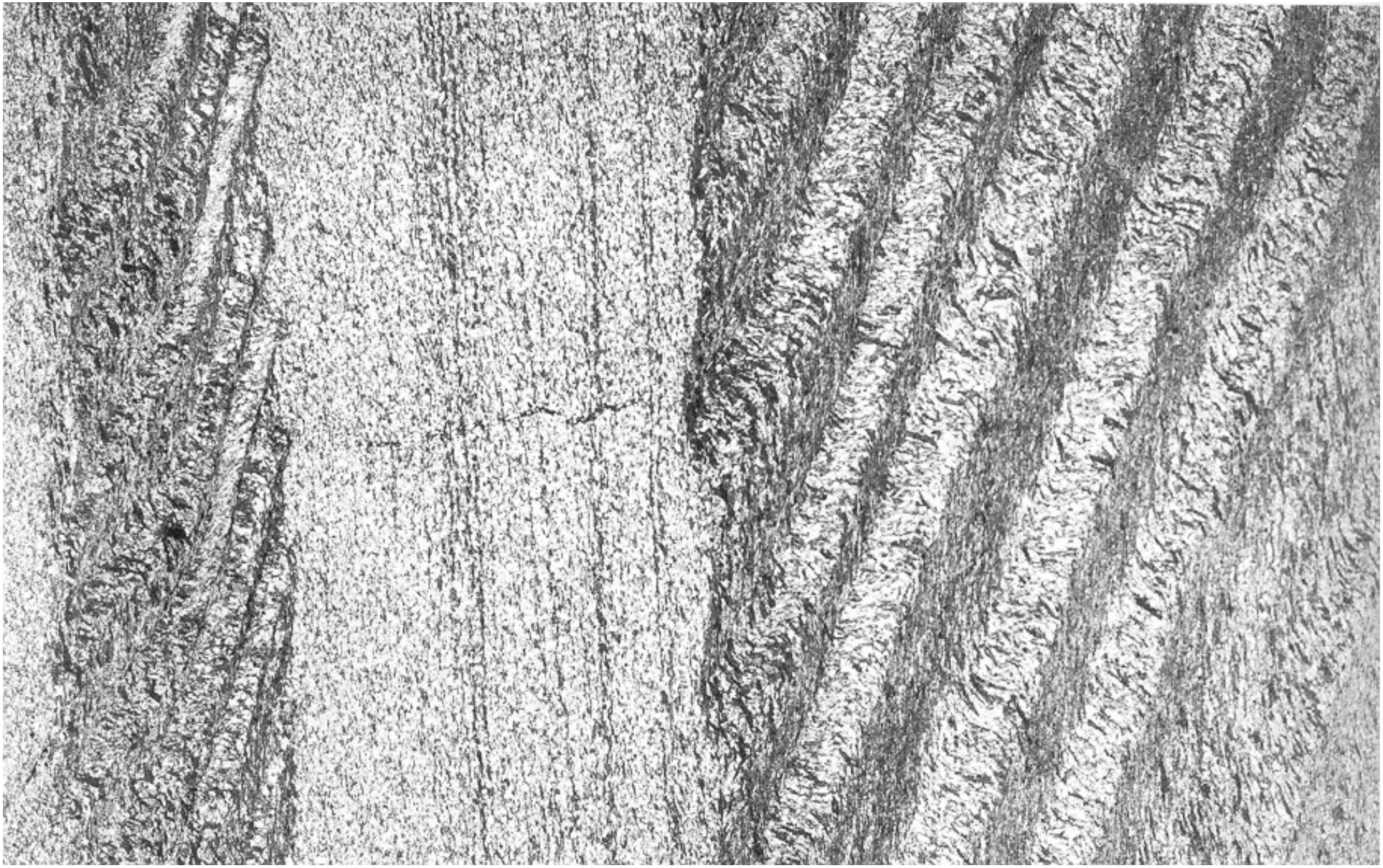


How many cleavages can you recognize?

FOV=0.3mm



Name the foliation and describe their origin, FOV=16mm



Gneissosity (or continuous foliation) in micaceous quartite, Ribeira Belt, Rio de Janeiro State, Brazil
FOV=18mm