

**APPENDIX 2c:**

**EL 2506**

**SOUTH HORN**

**1998**

**COGEMA-GEO-GST**

**Petrographic Study and Ore Minerals #8873**

# **REPORT 8873**

## **AUSTRALIA - AFMEX**

**EL 2506 - South Horn**

**Petrographic study**

**(6 samples)**

**Holes SHD 01, SHRD 04**

**P. BRUNETON**

**COGEMA - GEO - GST**

**June 1998.**

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**Summary of petrographic observations**

Six samples of dolerite are studied in this report, five from hole SHRD 04 being mineralized.

❶ **Sample 6 (SHRD 001 - 76 m)**

It corresponds to an altered doleritic rock : dark green chloritic alteration, pink to reddish hematitic alteration, light green illitic alteration (photo 1a).

The texture is subophitic to ophitic, granophyric. The mineralogical composition is as follows :

- **clinopyroxenes** (augite) phenocrysts (photo 1),
- **plagioclases** lathes,
- brown - green **amphiboles** (photo 4),
- rare **biotites**,
- altered **olivines** (?) (photos 2 - 3),
- **quartzo-feldspathic** (alkali feldspar ?) **granophyres** (photo 4),
- interstitial **quartz**,
- large skeletal and abundant (photos 4 - 5) **titanomagnetites** and **ilmenites** (photos 6 - 7 - 8)
- acicular **apatites**.

Alteration is strong, affecting most minerals :

- augite : local alteration into green hornblende, fibrous actinolite,
- plagioclases : totally saussuritized (photo 1),
- hornblende : actinolite, chlorite (photo 5),
- olivine : epidote, chlorite, actinolite, opaque minerals (photos 2 - 3).

New minerals are **chalcopyrite** (photo 9), associated to amphibole and late **pyrite** (photo 10).

Quartz (granophyre and interstitial quartz) represents 5 to 10 % of the volume of the rock.

Diffuse hematization is affecting the (albitized ?) margins of the plagioclases and the granophyric (alkali ?) feldspar (photo 4).

## ② Samples 1 to 5 (SHD 001)

They correspond to strongly altered, mineralized, granophyric dolerites, crosscut by late quartz veinlets (photos 2a to 11a).

Hydrothermal alteration is marked by the development of CHLORITE - ILLITE / MUSCOVITE - QUARTZ - APATITE - RUTILE, and by URANINITE and various SULFIDES.

**Chlorite** is the main component replacing previous minerals (pale green chlorite, green chlorite) such as pyroxenes, amphiboles, biotites (photos 31, 19, 20) or as a late phase (dark green chlorite) (photos 11-12, 17-18, 26-27) associated to uraninite. From XRD results, samples 1, 2, 3, only contain trioctahedral chlorite (Fe-chlorites).

Other clay minerals correspond to well crystallized **muscovite** (hydromuscovite ?) (photos 17, 18, 19, 20, 38) associated or replaced by fine-grained illite (photos 11, 12, 17, 18, 19, 20). **Illite** is itself locally replaced or cut by the dark green chlorite (photos 11, 12, 17, 19, 20).

**Quartz** (diffuse silicification) is invading some amphiboles (photo 11). It is also present as crosscutting irregular veinlets with mosaic (photo 22) or polygonal (photo 32) textures, with dusty zoned plates (photo 37) and « flamboyant » textures (photo 33). Quartz represents 15 to 20 % of the volume of the rocks.

Quartz veins are corroded and replaced along their margins by the dark green chlorite with uraninite (photos 13, 24, 26-27).

**Apatite** is a main component (3 - 5 %) in all the samples as euhedral isolated zoned and truncated crystals (photos 29, 30, 39, 40) in the clay matrix, or colourless prismatic plates or aggregates of plates (photos 19, 21) along the quartz veinlets margins.

**Ilmenites** and **titanomagnetites** which are originally well represented (4 - 6 %) as large prismatic skeletal to vermicular plates (photos 14, 38, 41) are transformed into Ti-U oxydes (brannerites ?) from ilmenites (photos 16, 35) or into anatase / rutile  $\pm$  sphene (photos 14, 23) from titanomagnetites. Ilmenite lamellae of the titanomagnetites are also pseudomorphed by Mo-rich sulfides (photos 16, 35).

**Uraninite**, as scattered small cubes (photos 24, 27) or aggregates of crystals (photo 28), is abundant and intimately associated to the dark green chlorite.

Other minerals which have been described are dispersed **chalcopryrite**, late **pyrite** veinlets (photo 36), rare small phosphates of the **goyazite** family (only in sample 2).

Quartz veinlets are often microfractured, sometime microbrecciated (photo 34).

**Siderite** / **ankerite** veinlets (only present in sample 5) crosscut all the previous minerals (photo 42).

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**Sample 1 - SHD 01 - 76 m**

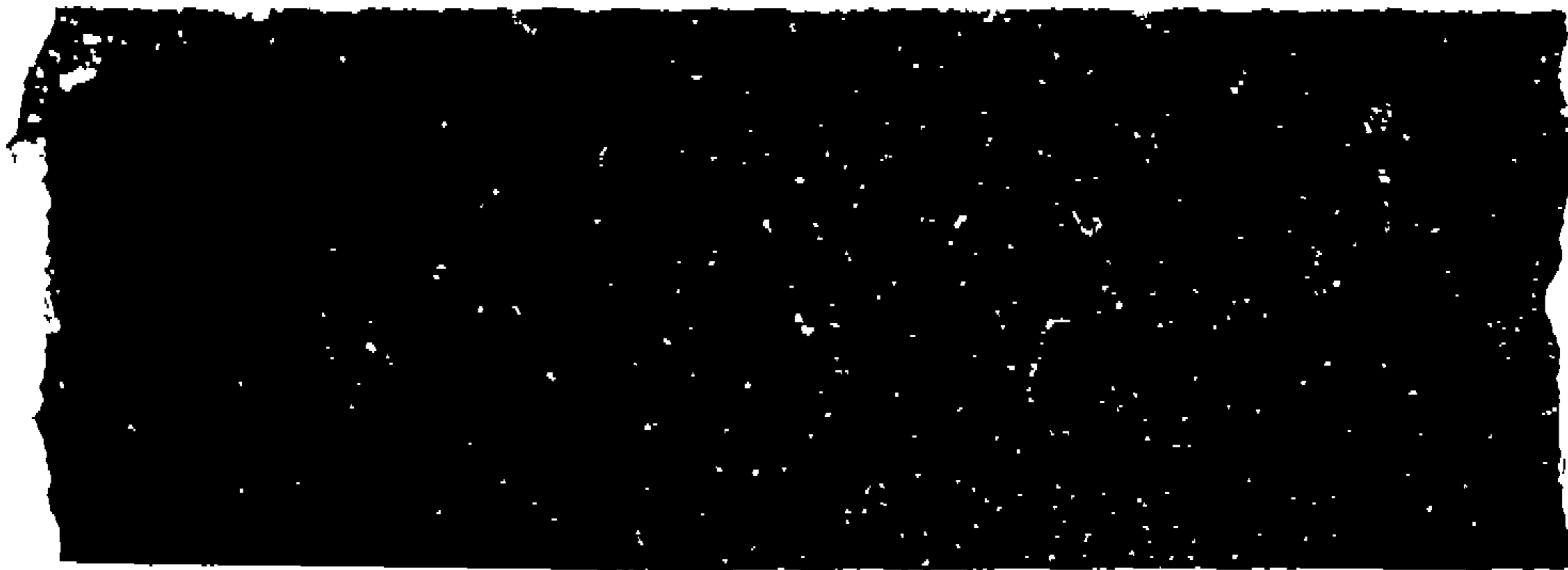
**Photo 1a :** Chloritized and hematized medium-grained, Oenpelli dolerite.

**Sample 2 - SHRD 04 - 65.35 m**

**Photos 2a and 3a :** Strongly chloritized and mineralized dolerite (photo 3), cut by leucocratic irregular quartz veinlets.

On the contact chromatography (Hiller method), uranium (soluble U) appears in brown, iron in blue (photo 2). The rock is iron-rich (abundant Fe-chlorite) and uranium is located along the margins of the quartz veins and along microfractures.

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1a



10



2a



3a



10

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**Sample 3 - SHRD 04 - 72.95 m**

**Photo 4a :** Contact chromatography. The brecciated texture is well marked.  
Uranium (soluble U) is associated to quartz veinlets and microfractures.

**Photo 5a :** Strongly chloritized, brecciated, mineralized dolerite crosscut by discontinuous quartz veinlets.

**Sample 5 - SHRD 04 - 77.95 m**

**Photo 6a :** Contact chromatography.

**Photo 7a :** Strongly chloritized, mineralized dolerite.

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4a



5a



10



6a



7a



10

10

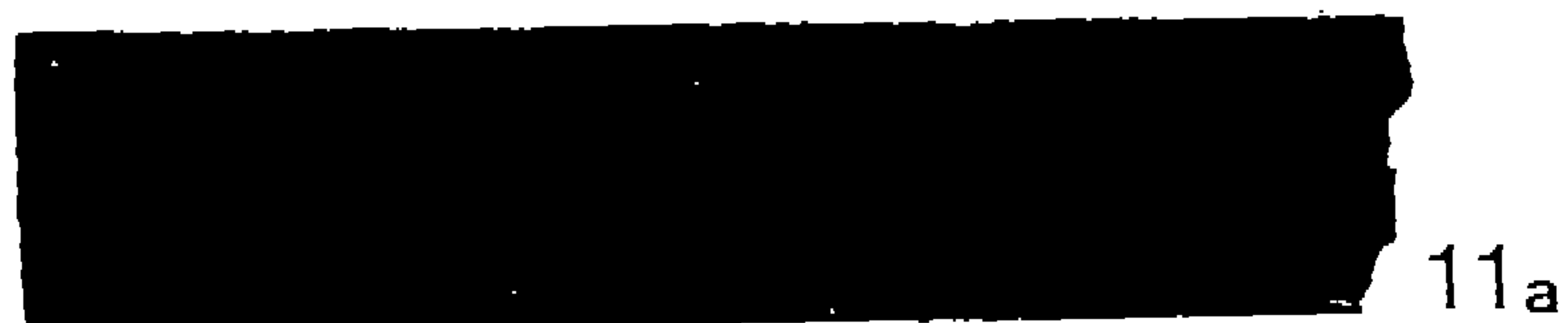
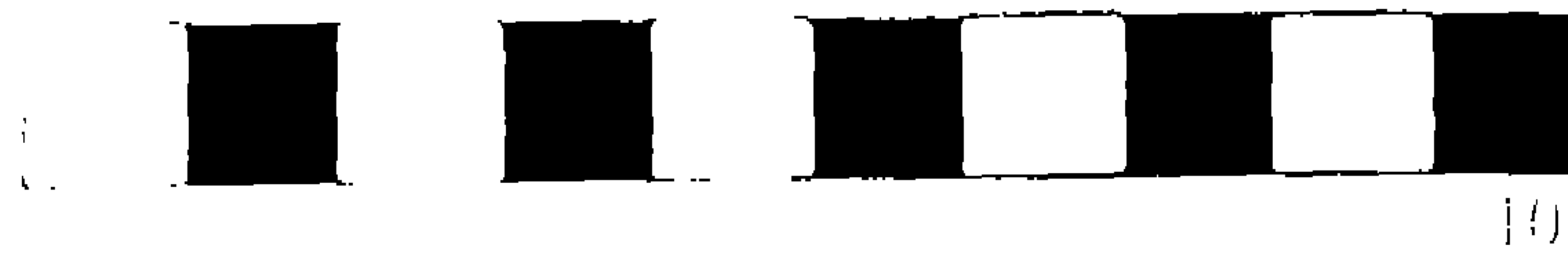
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**Sample 4 - SHRD 04 - 73.65 m**

**Photos 8a and 10a :** Strongly chloritized, mineralized dolerite cut by pink quartz veinlets.

**Photos 9a and 11a :** Contact chromatography.  
The location of soluble uranium along quartz veins is particularly well visualized.

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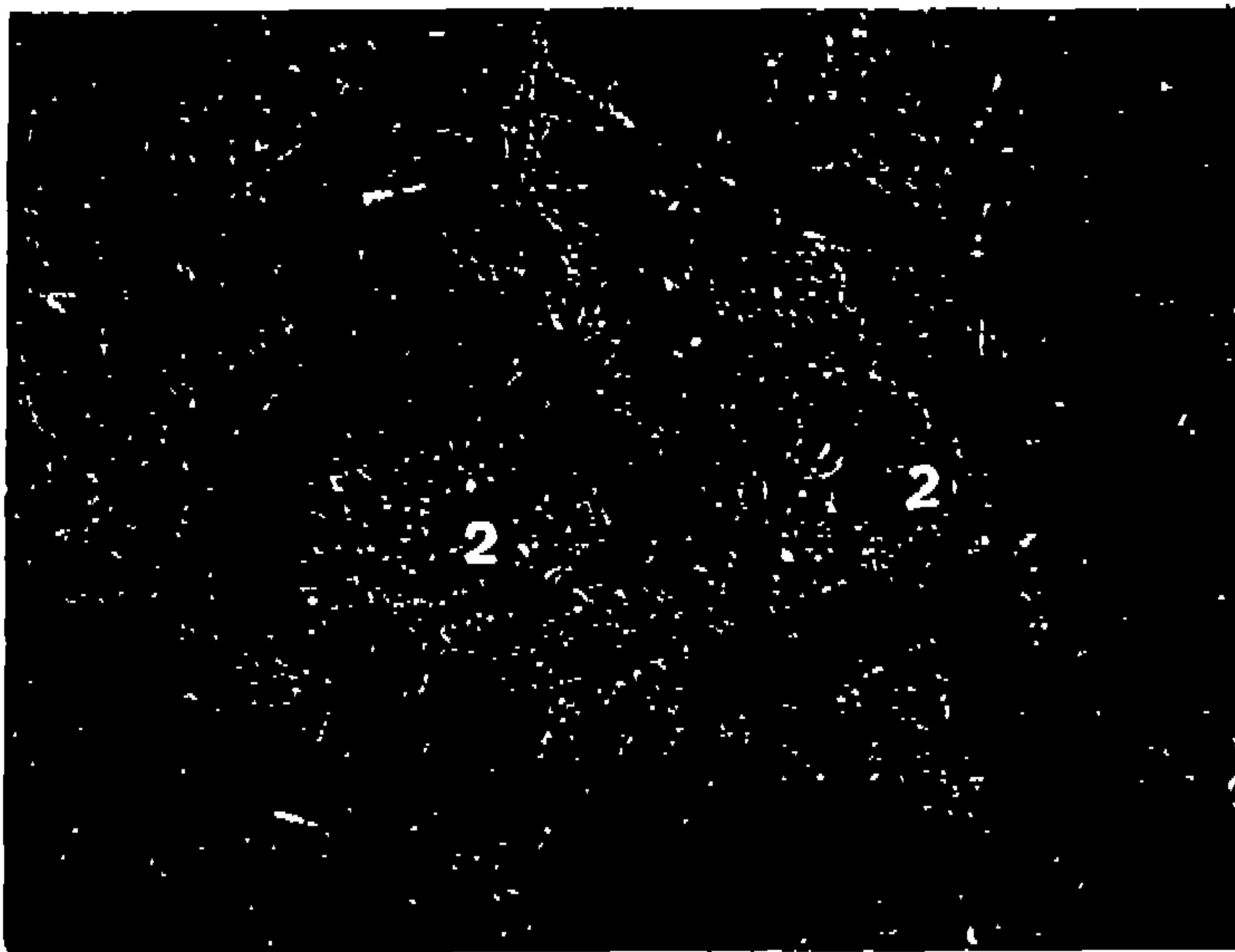


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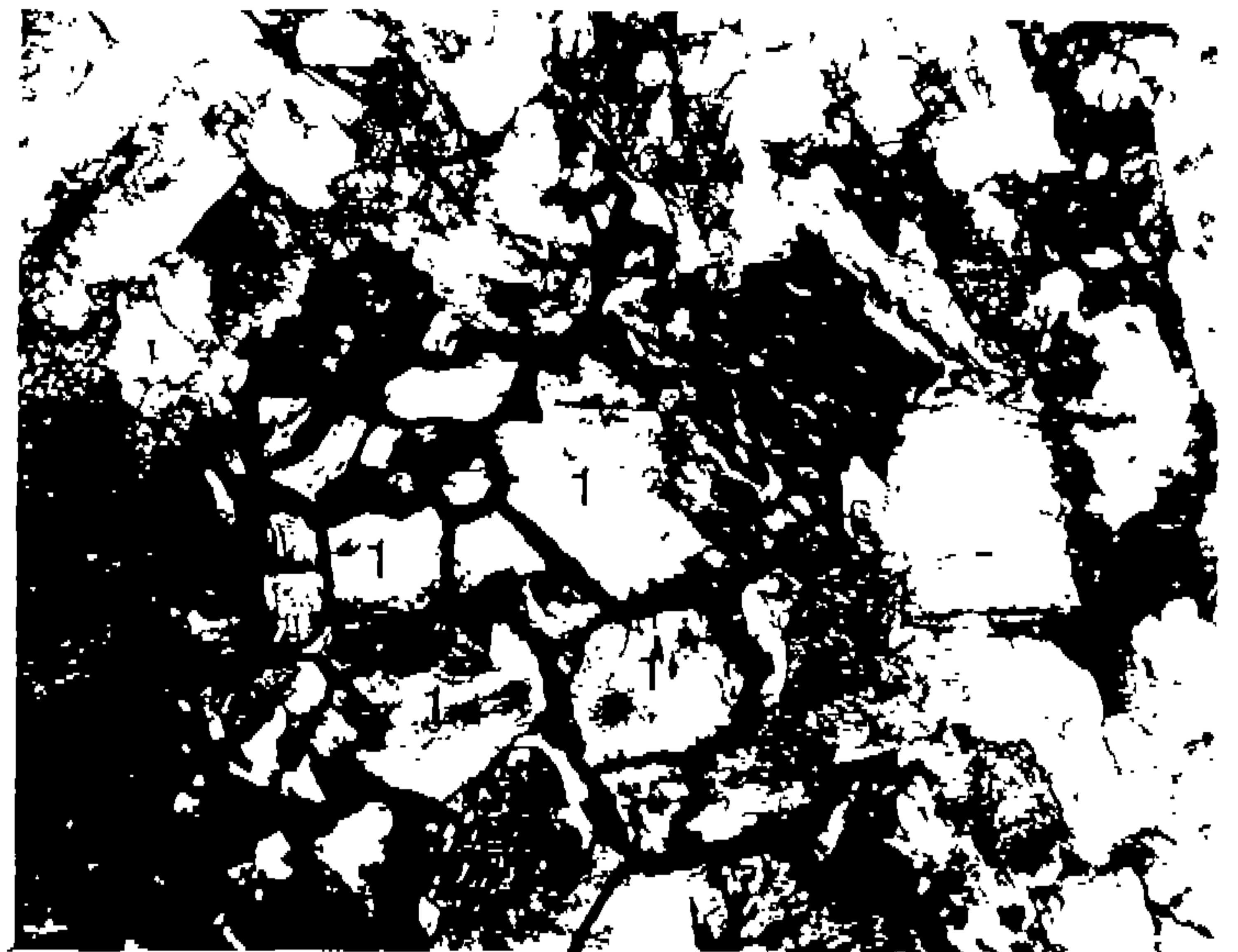
**Sample 6 - SHD 01 - 76 m**

- Photo 1 :** (XPL, x 20)  
Detail of large poekilitic augite (1) containing inclusions of plagioclases laths (2).
- Photo 2 :** (PPL, x 50)  
Aggregate of mafic minerals (1) which may represent olivines, rimmed by an association of Ti-oxydes, Fe-oxydes, late pyrite and granules of chalcopyrite.
- Photo 3 :** (PPL, x 130)  
Ghost olivine ? altered into epidote (1), chlorite (2), colourless amphibole (3) and dark Ti-Fe oxydes.
- Photo 4 :** (PPL, x 50)  
Saussuritized euhedral lathes of plagioclases (1) - brown - green amphibole (2), quartzo-feldspathic granophyre (3) - interstitial quartz (4). Brown hematization along the margins of the plagioclases.
- Photo 5 :** (XPL, x 50)  
Amphibole strongly altered into green microcrystalline Fe-chlorite (1) and bunches of fibrous amphibole (2).
- Photo 6 :** (PPL, x 20)  
Large skeletal plate of ilmenite.

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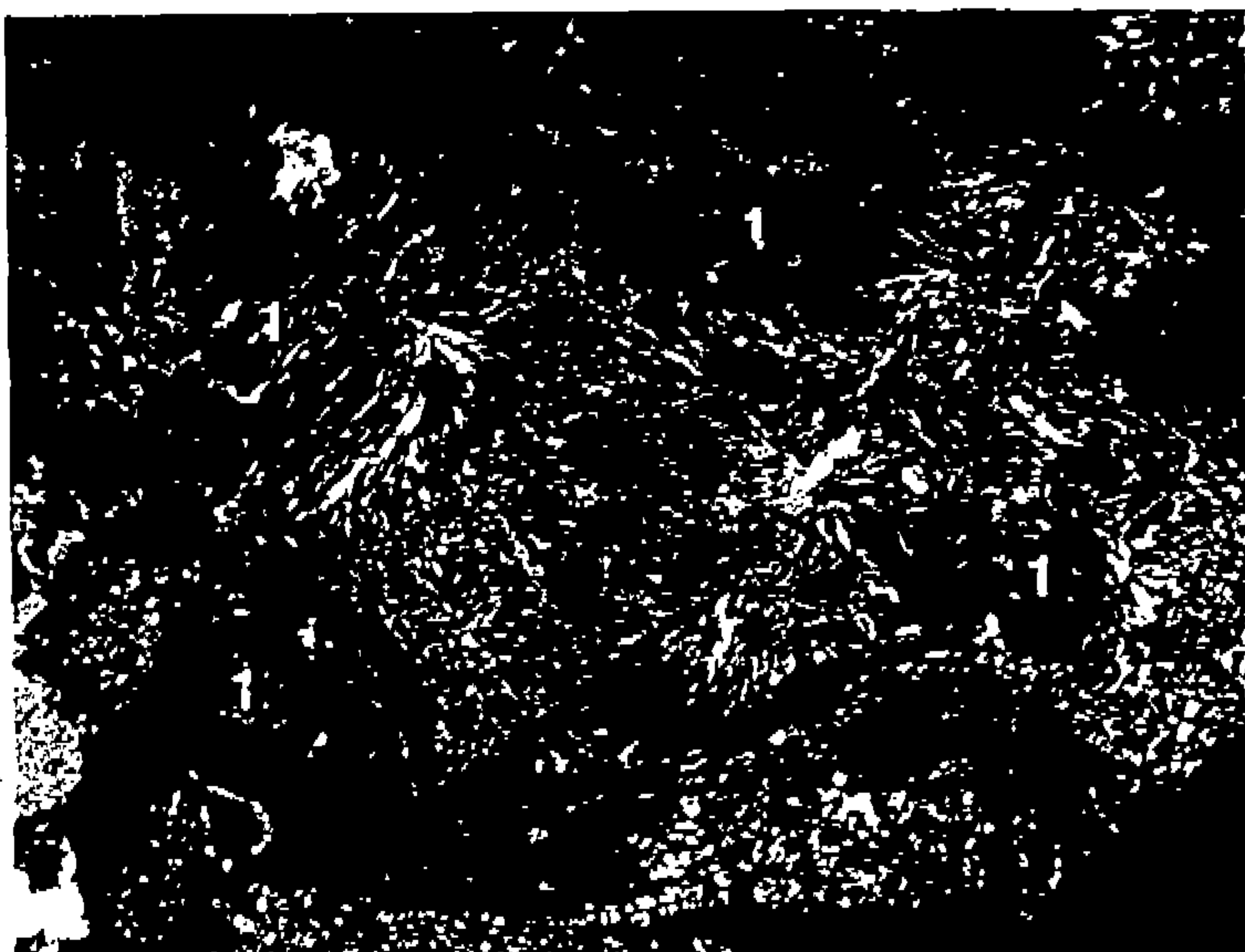
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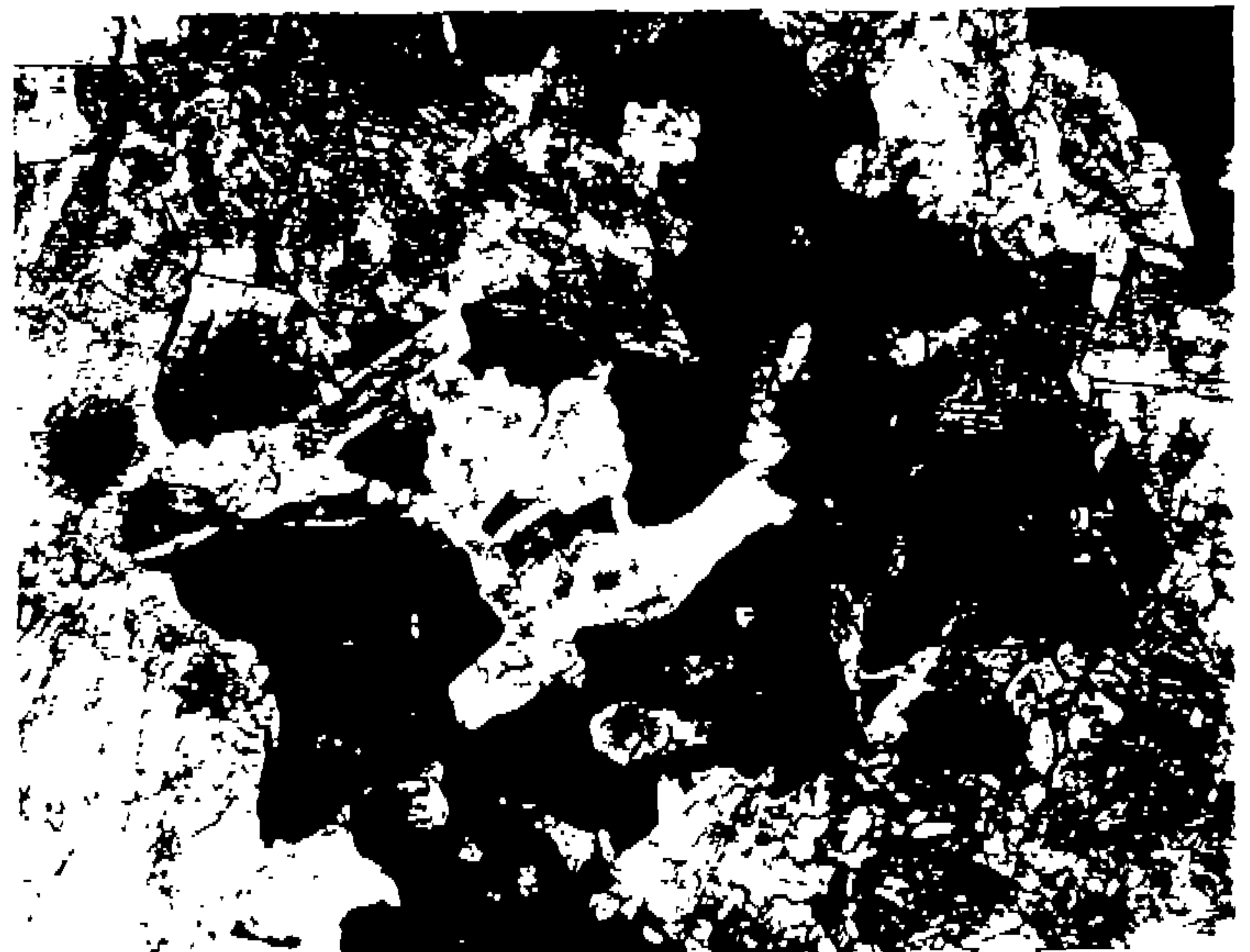
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6

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- Photo 7 :** (R.L., x 130)  
Hollow plate of titanomagnetite.
- Photo 8 :** (R.L., x 130)  
Symplectic texture in a large ilmenite.
- Photo 9 :** (R.L., x 130)  
Small dots of chalcopyrite associated to an altered amphibole (1).
- Photo 10 :** (R.L., x 130)  
Late concretions of pyrite.

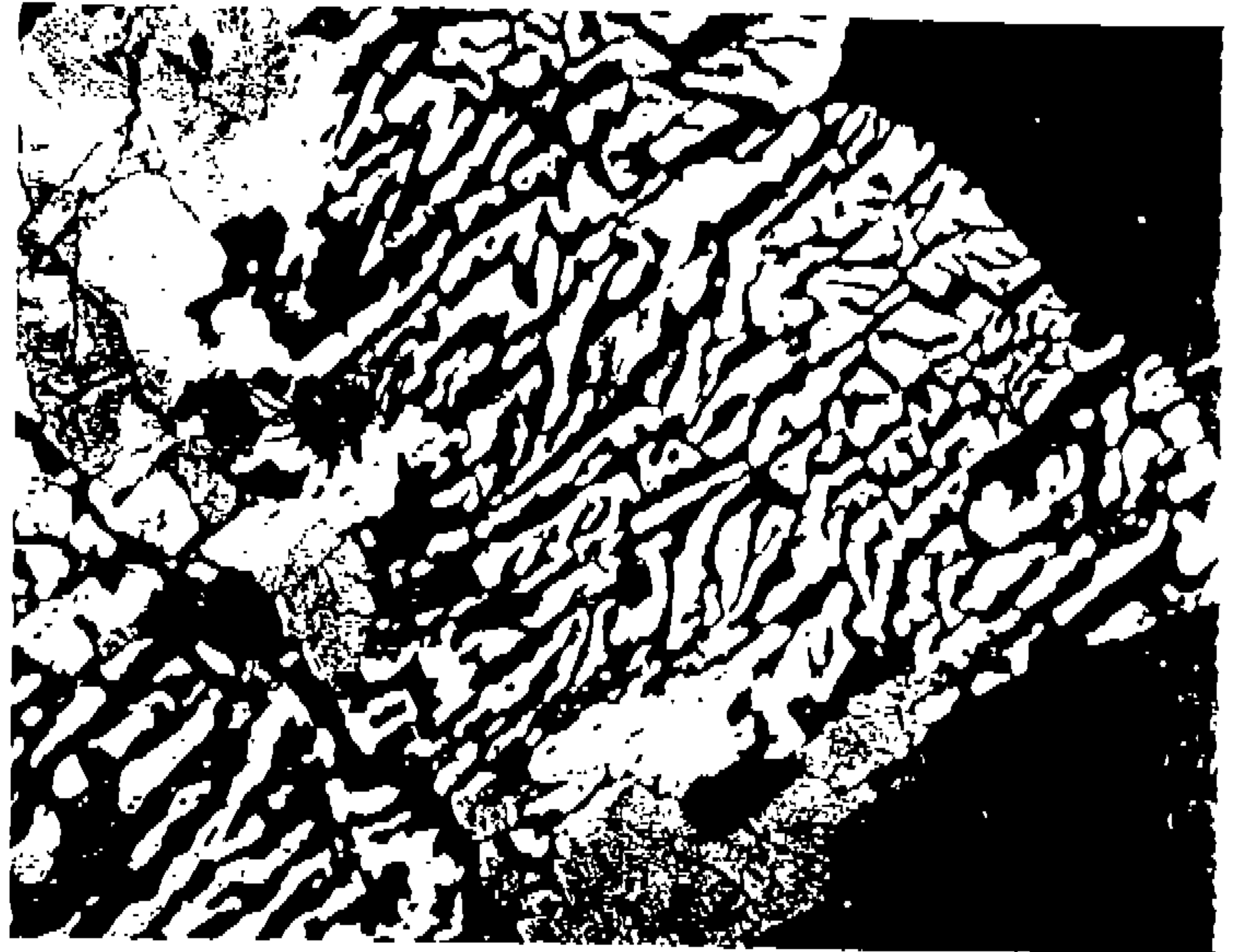
**Sample 1 - SHRD 04 - 60.65 m**

- Photo 11 :** (PPL, x 130)  
Amphibole altered into green chlorite (1) - quartz (2) - Ti-oxyde granules, plagioclase altered into illite (3), quartz (4).
- Photo 12 :** (XPL, x 130)  
Contact between an illitized plagioclase (1) and a chloritized amphibole (2). The plagioclase itself is invaded by late Fe-chlorite (arrows).

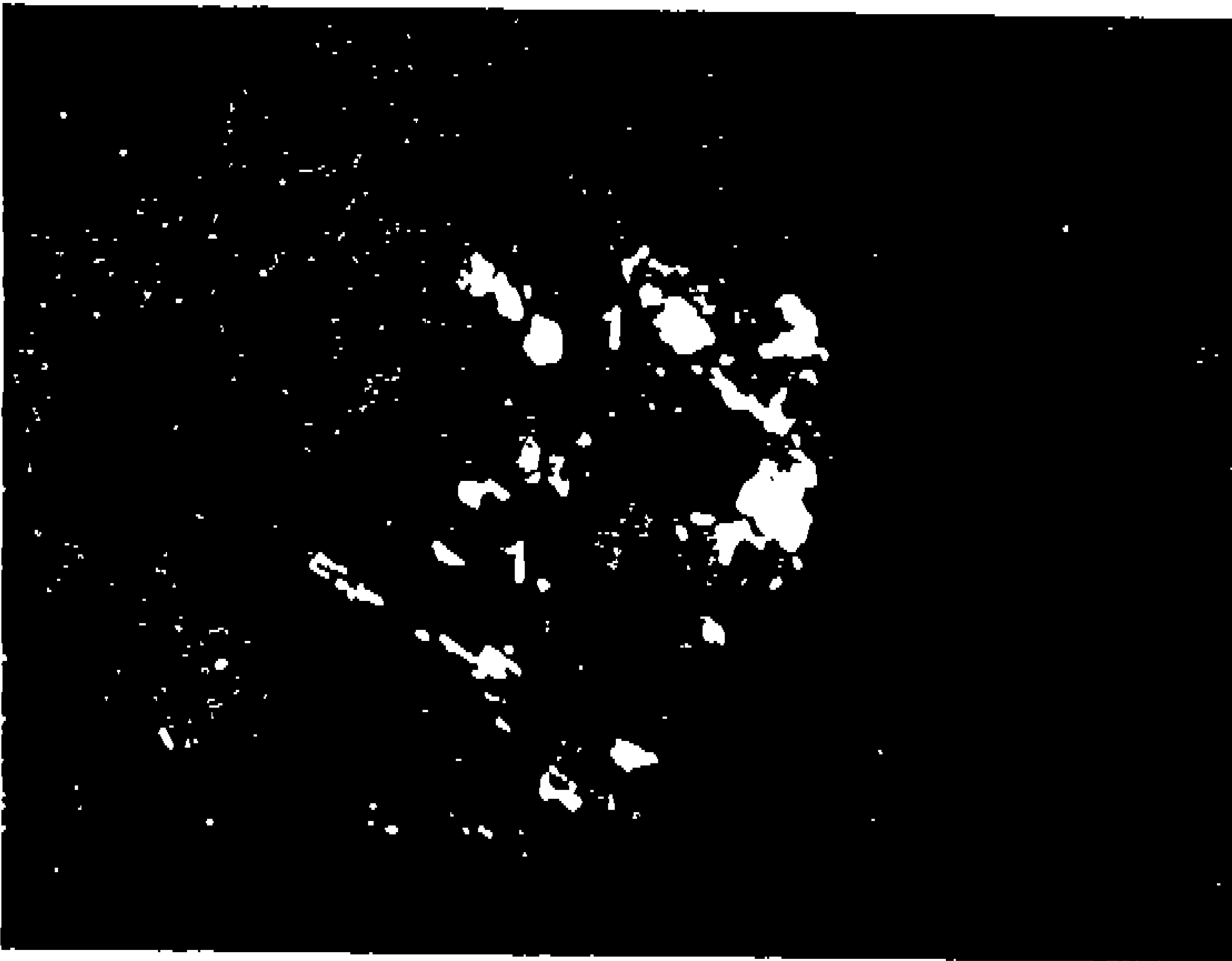
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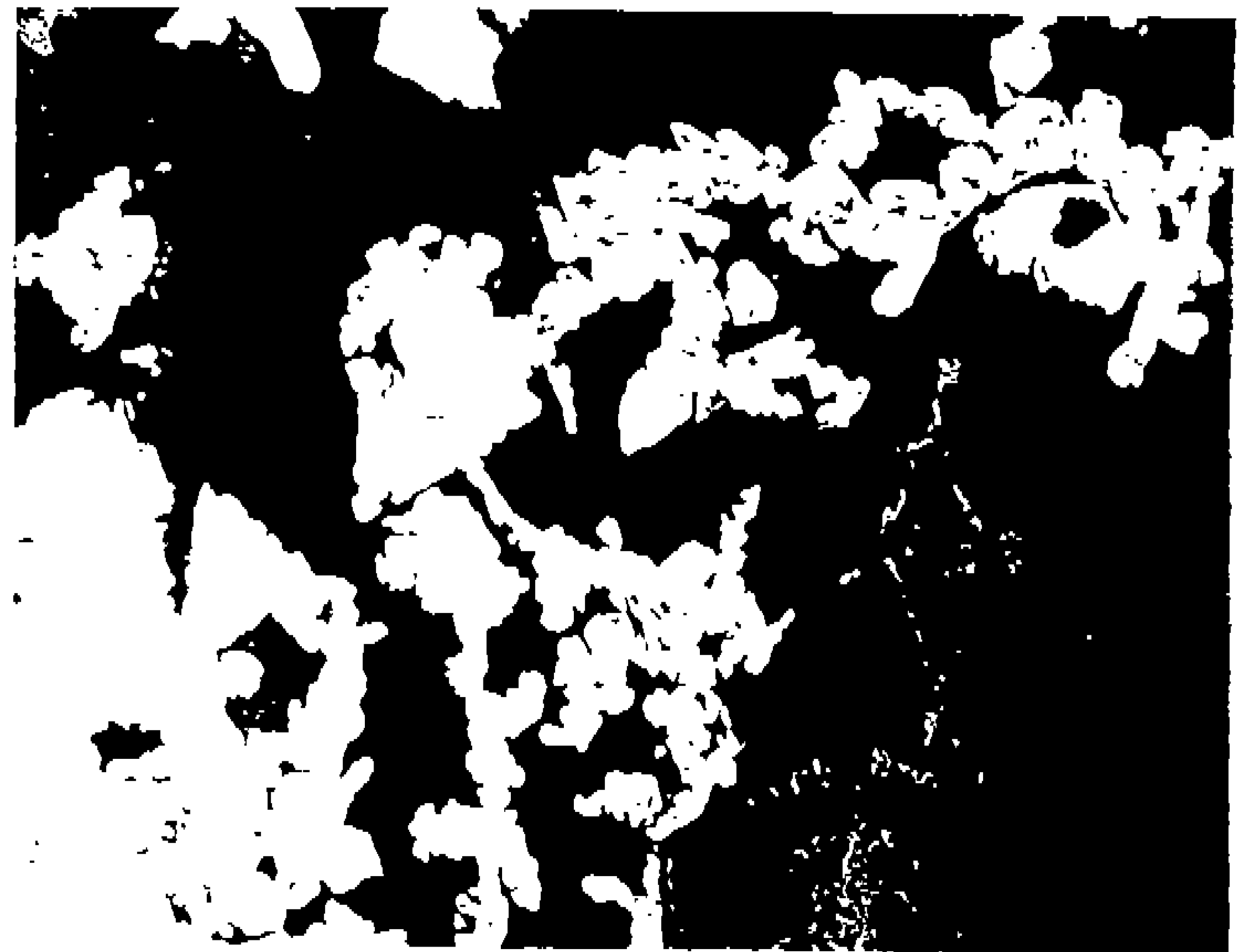
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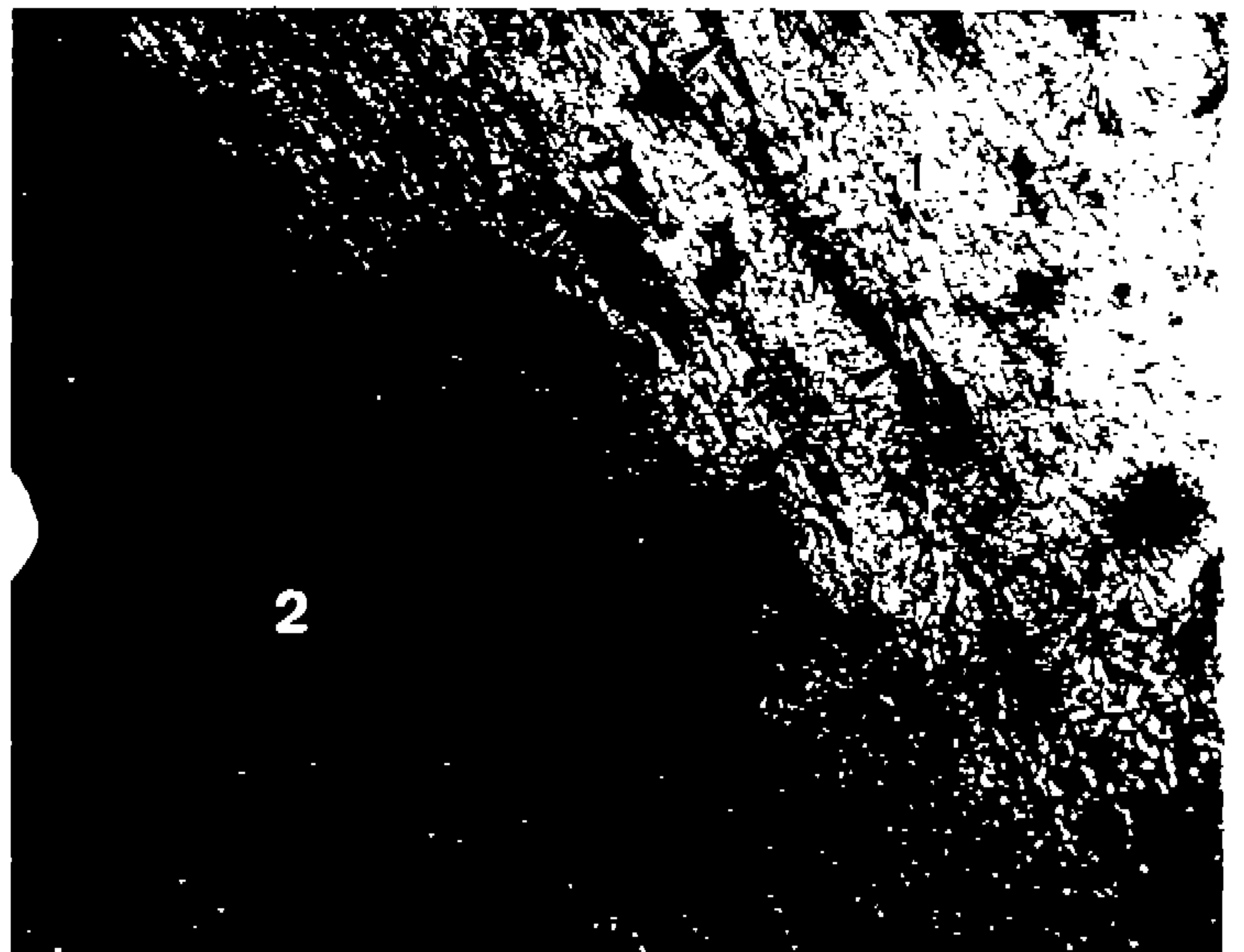
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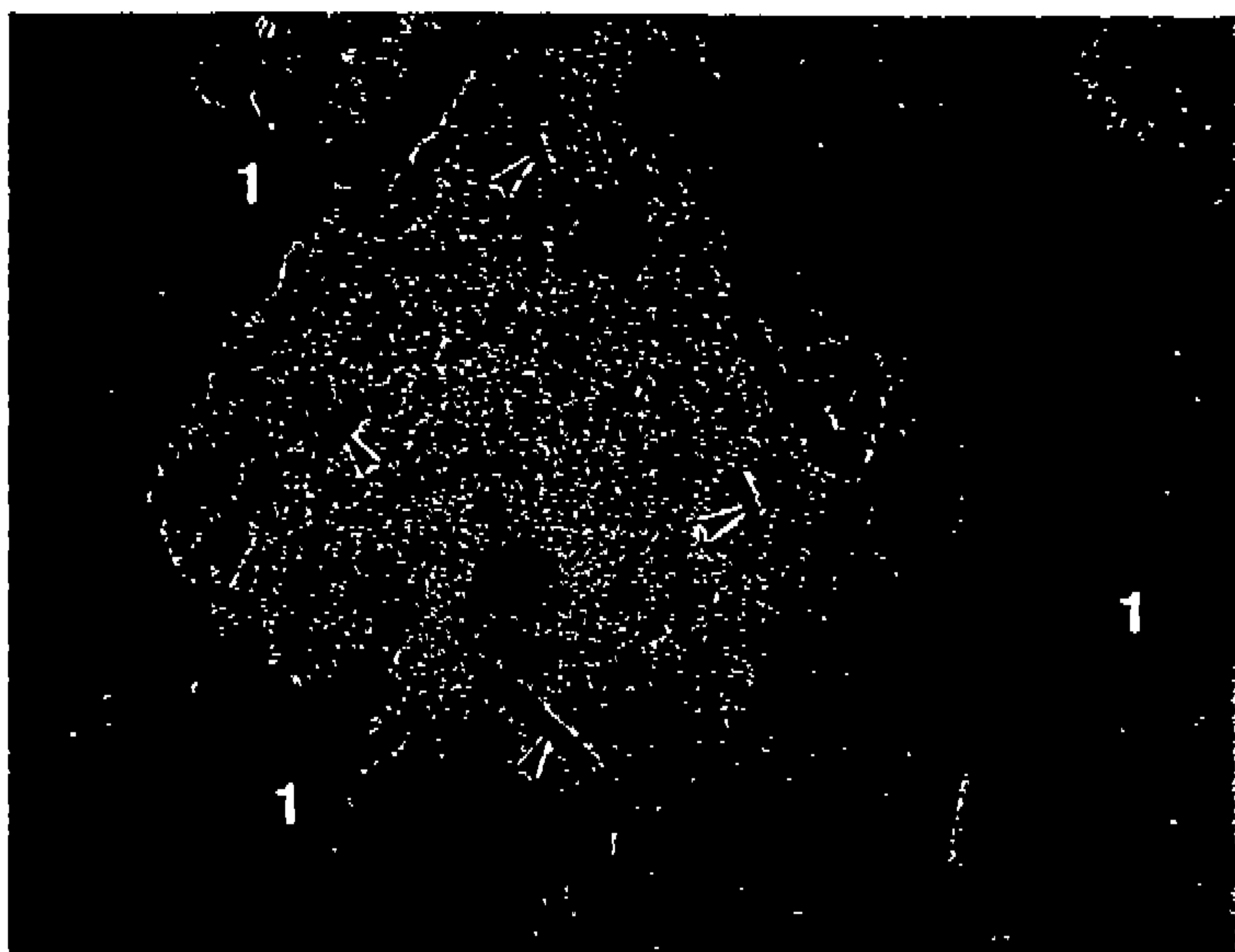
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- Photo 13 :** (PPL, x 50)  
Subhedral quartz plate with curved lines of fluid inclusions and acicular brown apatite (arrows). Surrounded and corroded by dark green chlorite (1).
- Photo 14 :** (PPL, x 50)  
Large skelettic plate of partially altered titanomagnetite.
- Photo 15 :** (PPL, x 130)  
Detail of the complete alteration of a large skelettic plate of titanomagnetite into brown granular rutile.
- Photo 16 :** (R.L., x 130)  
Ilmenite (1) partially transformed into secondary U-Ti oxydes (brannerite) and large ilmenomagnetite (2) with ilmenite lamellae.

**Sample 2 - SHRD 04 - 65.35 m**

- Photo 17 :** (XPL, x 130)  
Hydromuscovite (1) from amphibole alteration replaced by illite (2), then dark green chlorite (3).
- Photo 18 :** (XPL, x 130)  
Bunches of hydromuscovite - illite replaced by dark green chlorite (1) and uraninite (2) (trails of small black crystals).

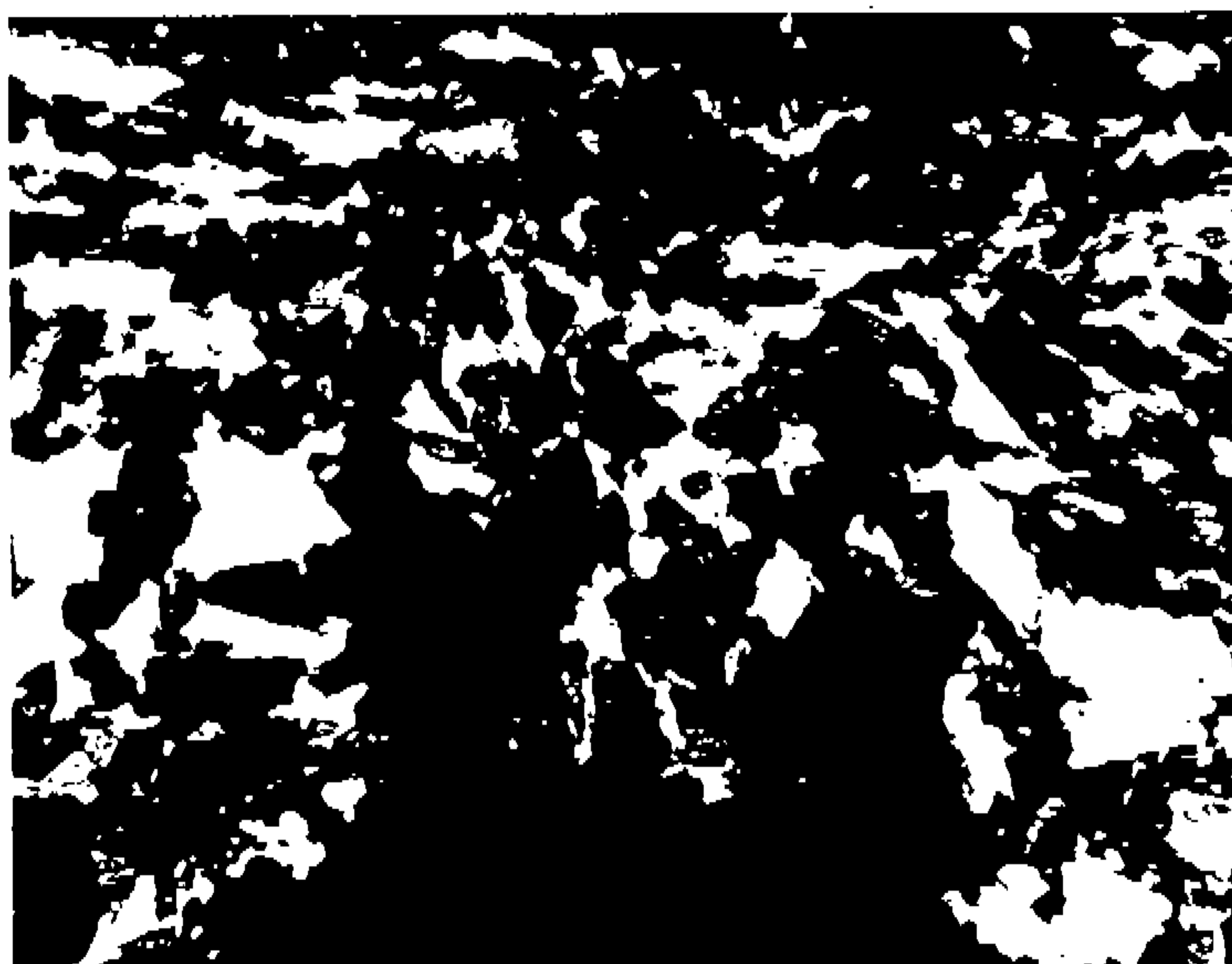
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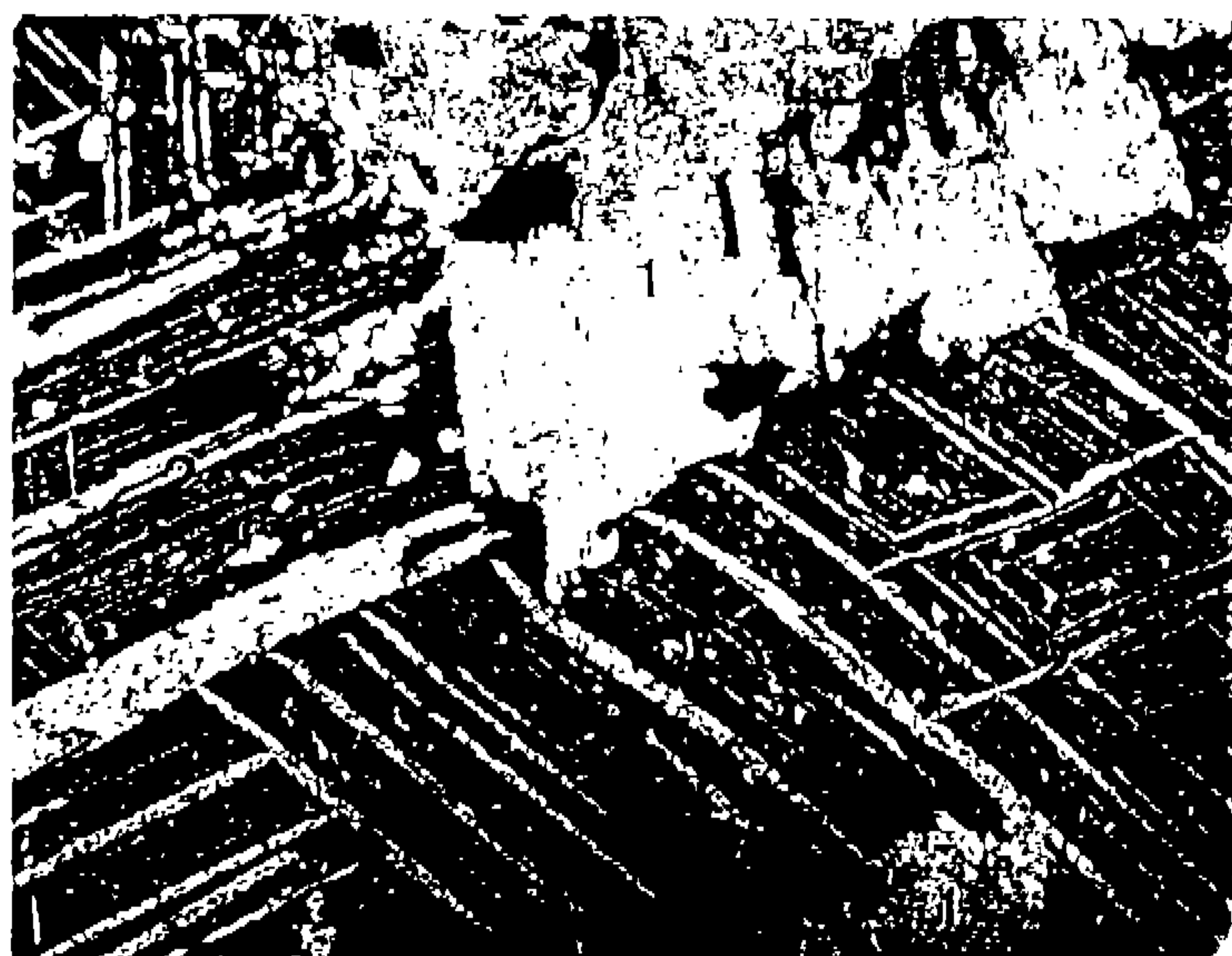
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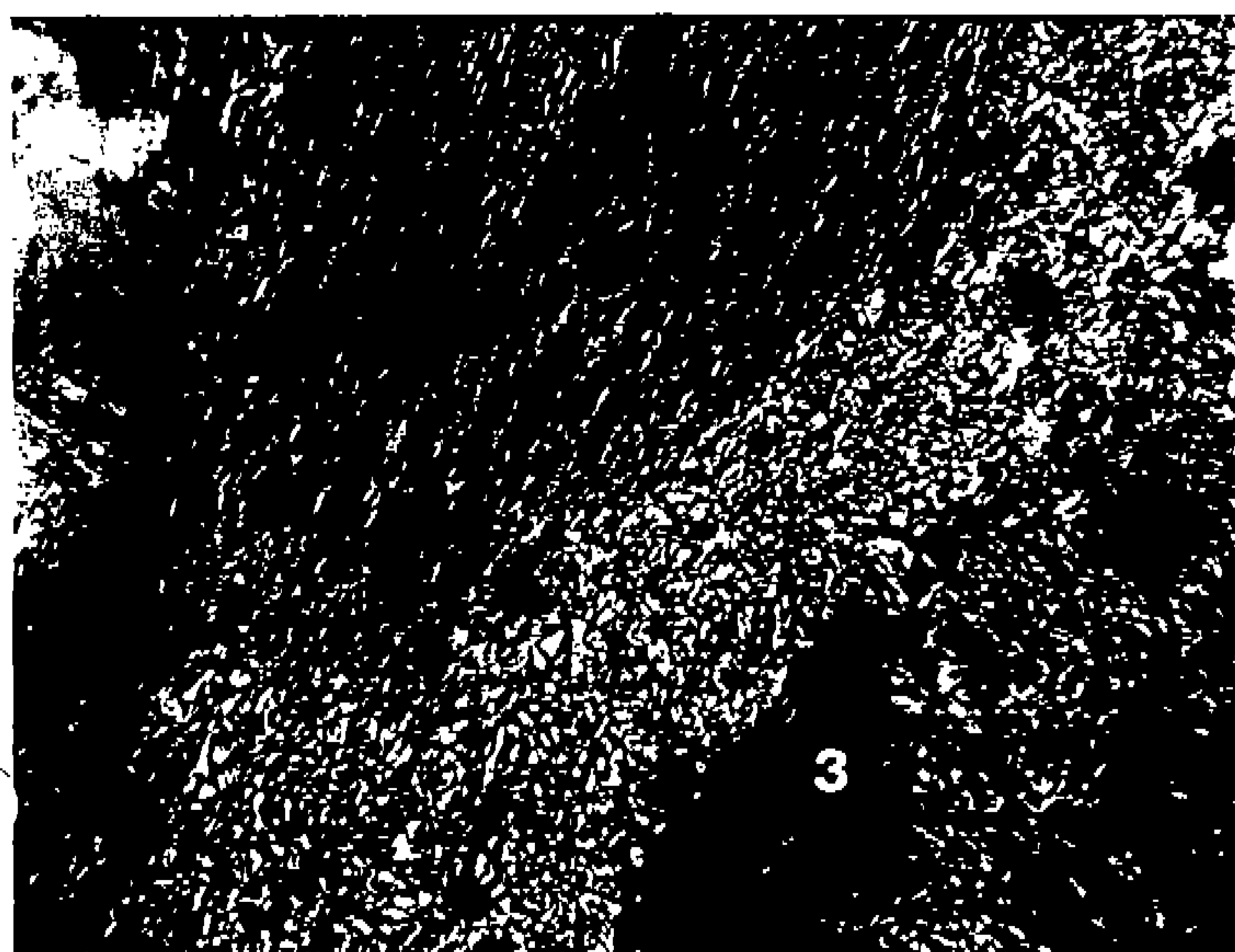
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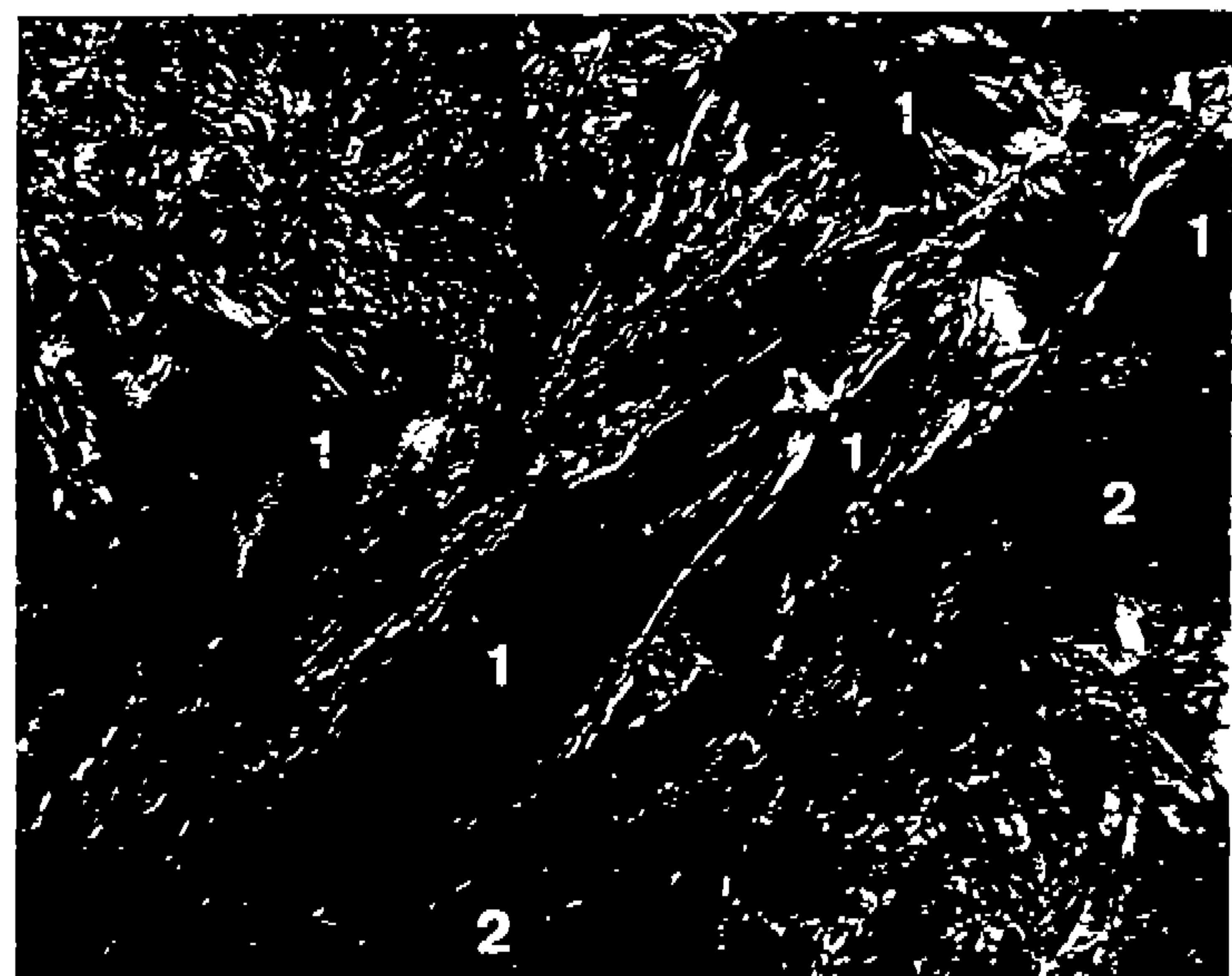
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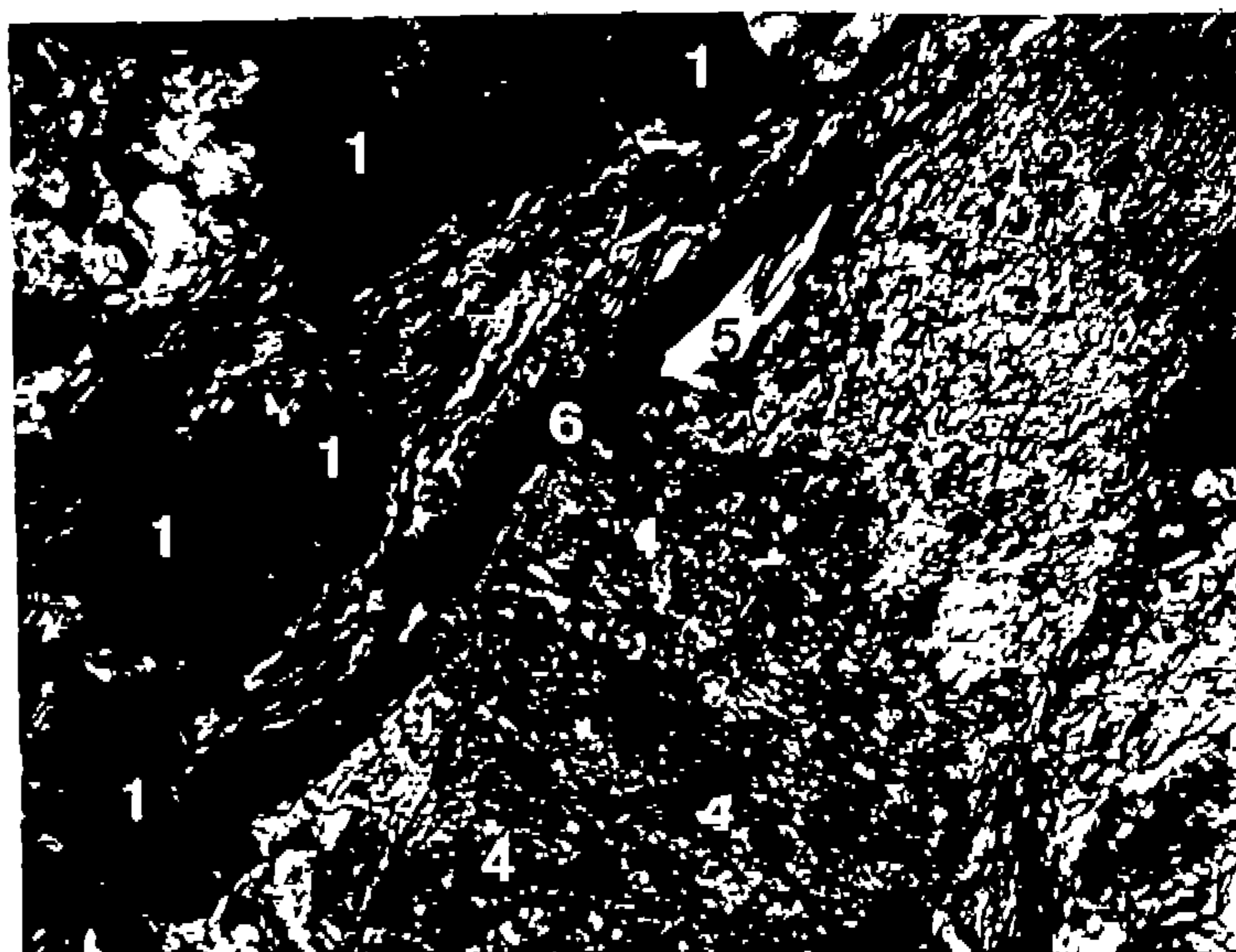
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- Photo 19 :** (PPL, x 130)  
Various alteration phases : apatites (1), hydromuscovites (2), illite (3), Fe-Mg fine-grained chlorite (4), colourless (Mg ?) chlorite (5), dark green Fe-chlorite (6).
- Photo 20 :** (XPL, x 130)  
As above, but in crossed polarized light.
- Photo 21 :** (PPL, x 130)  
Detail of a large aggregate of prismatic apatites within secondary quartz (1).
- Photo 22 :** (XPL, x 50)  
Mosaic recrystallization of secondary quartz.
- Photo 23 :** (XPL, x 200)  
Detail of the alteration of a large plate of ilmenite into acicular brown rutiles.
- Photo 24 :** (XPL, x 130)  
Quartz (1) - dark green Fe-chlorite (2) - dispersed uraninites (black).

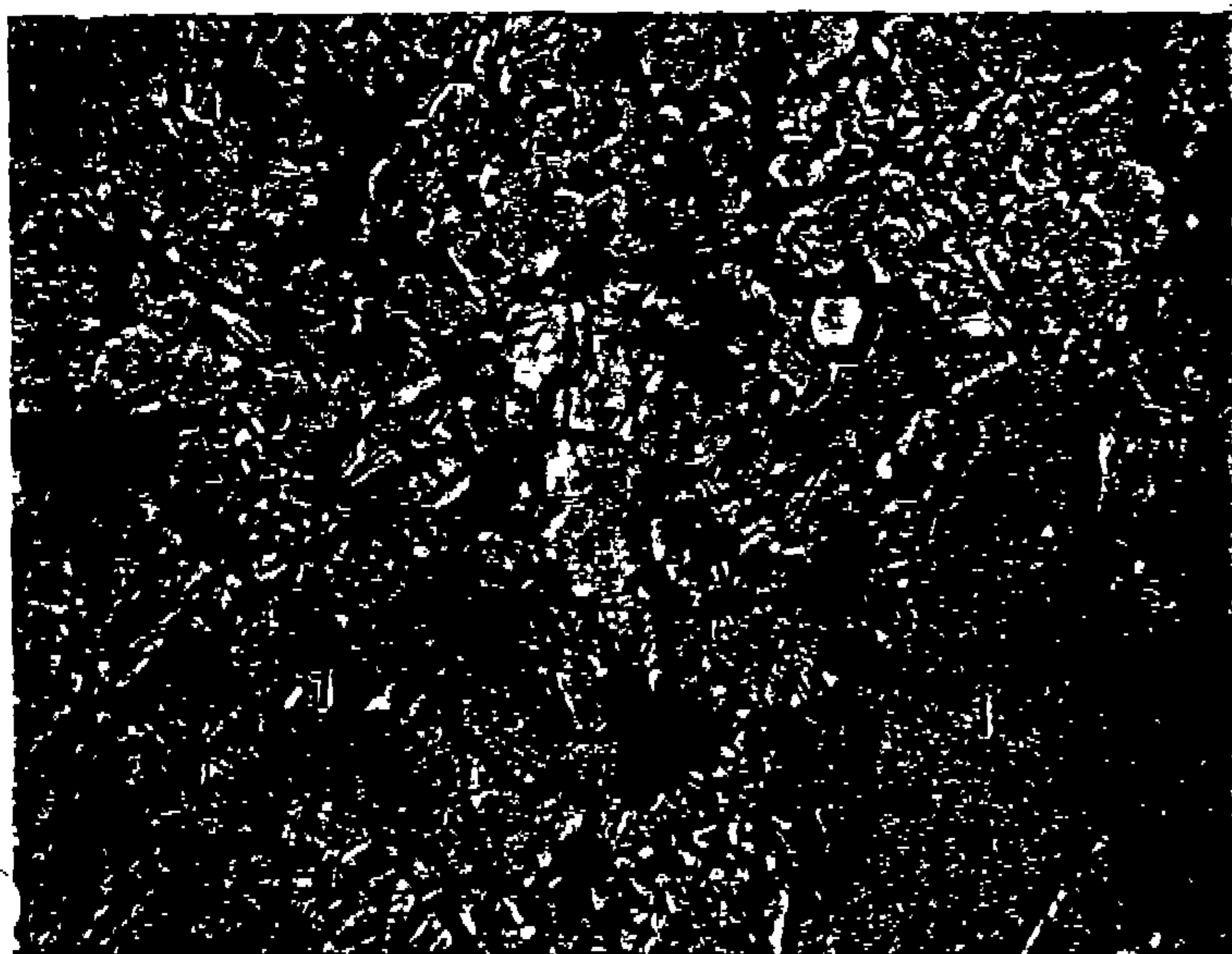
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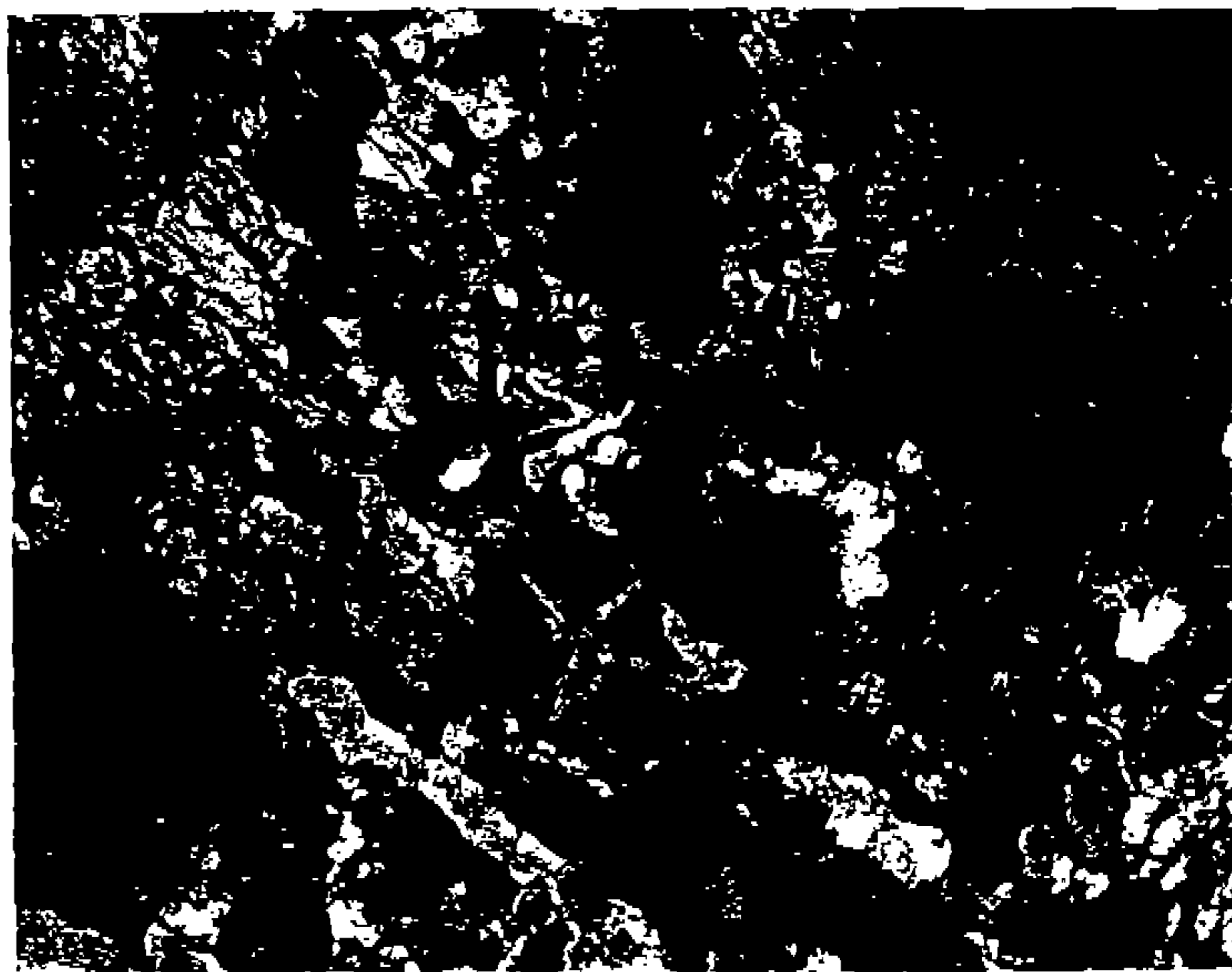
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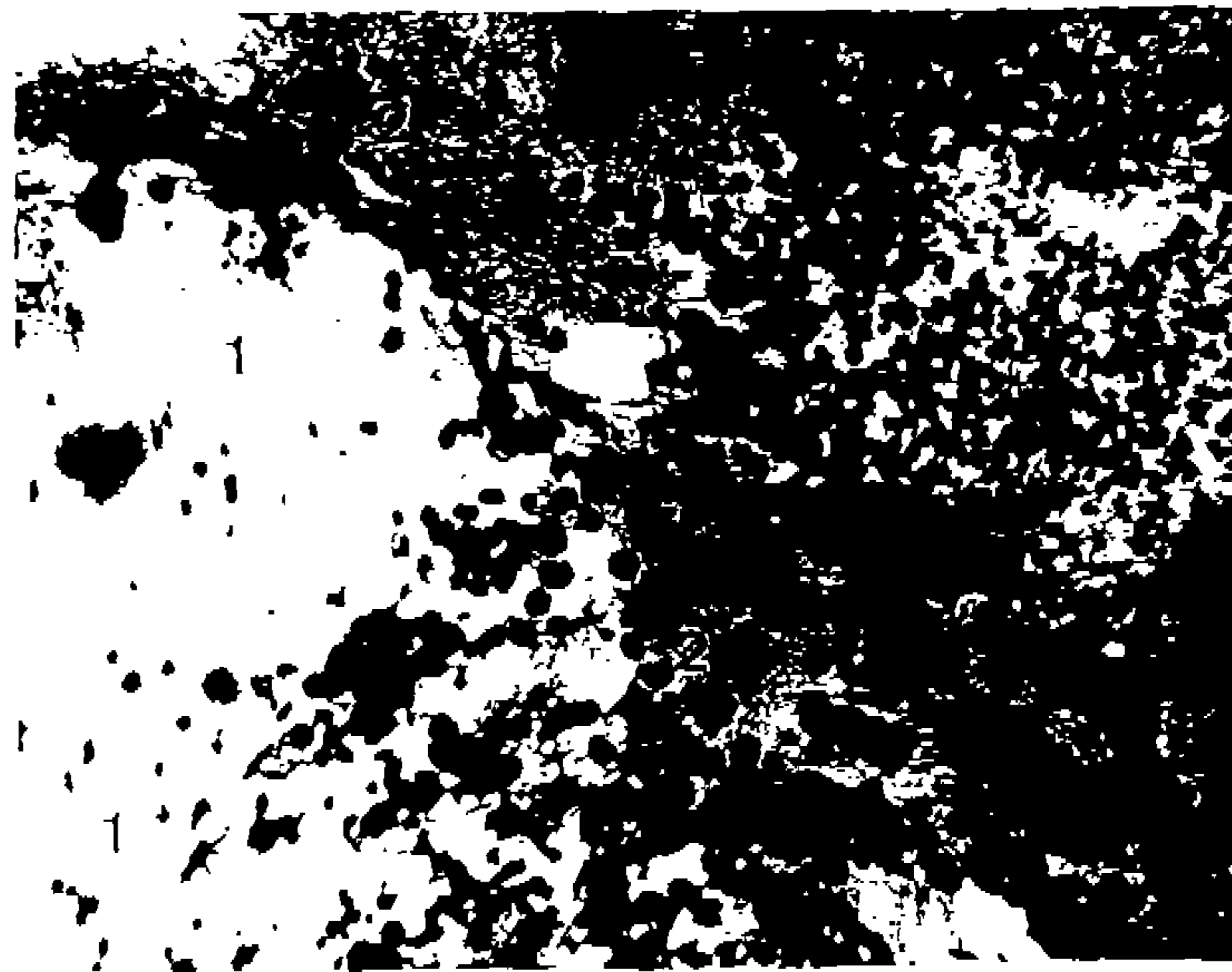
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**Photo 25 :** (XPL, x 130)  
Late quartz (1) and dark green chlorite (2) as irregular veinlets crosscutting the chlorite - illite groundmass.

**Sample 3 - SHRD 04 - 72.95 m**

**Photo 26 :** (PPL, x 50)  
Hydrothermal paragenesis : quartz (1) from veins, corroded by dark green Fe-chlorite (2) containing opaque minerals (Ti-oxydes, uraninite, sulfides, ...).

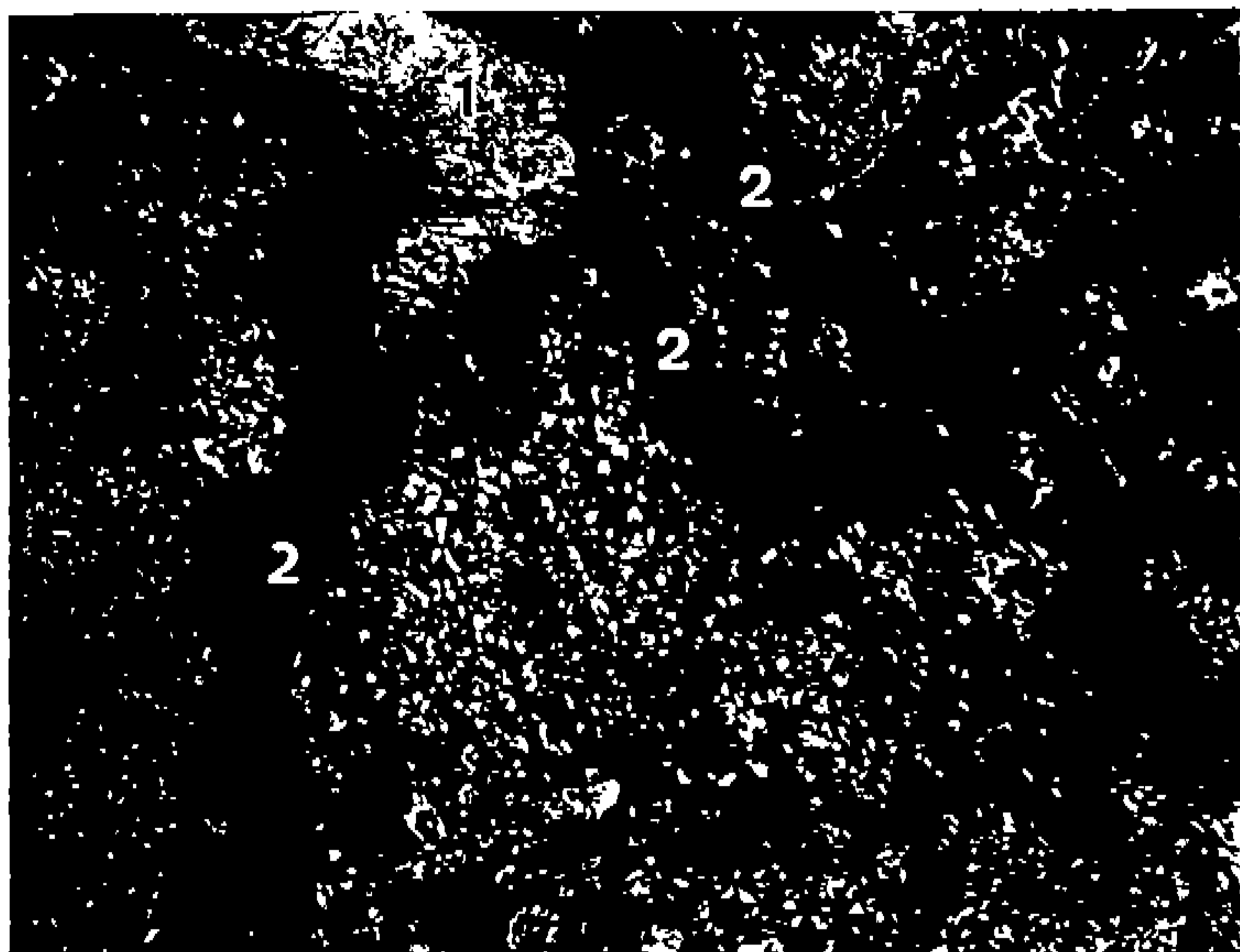
**Photo 27:** (PPL, x 130)  
As above with quartz (1) corroded by the dark green chlorite (2). Scattered uraninites (black).

**Photo 28 :** (PPL, x 130)  
Uraninite (black) with dark green chlorite, brecciated by illite (1).

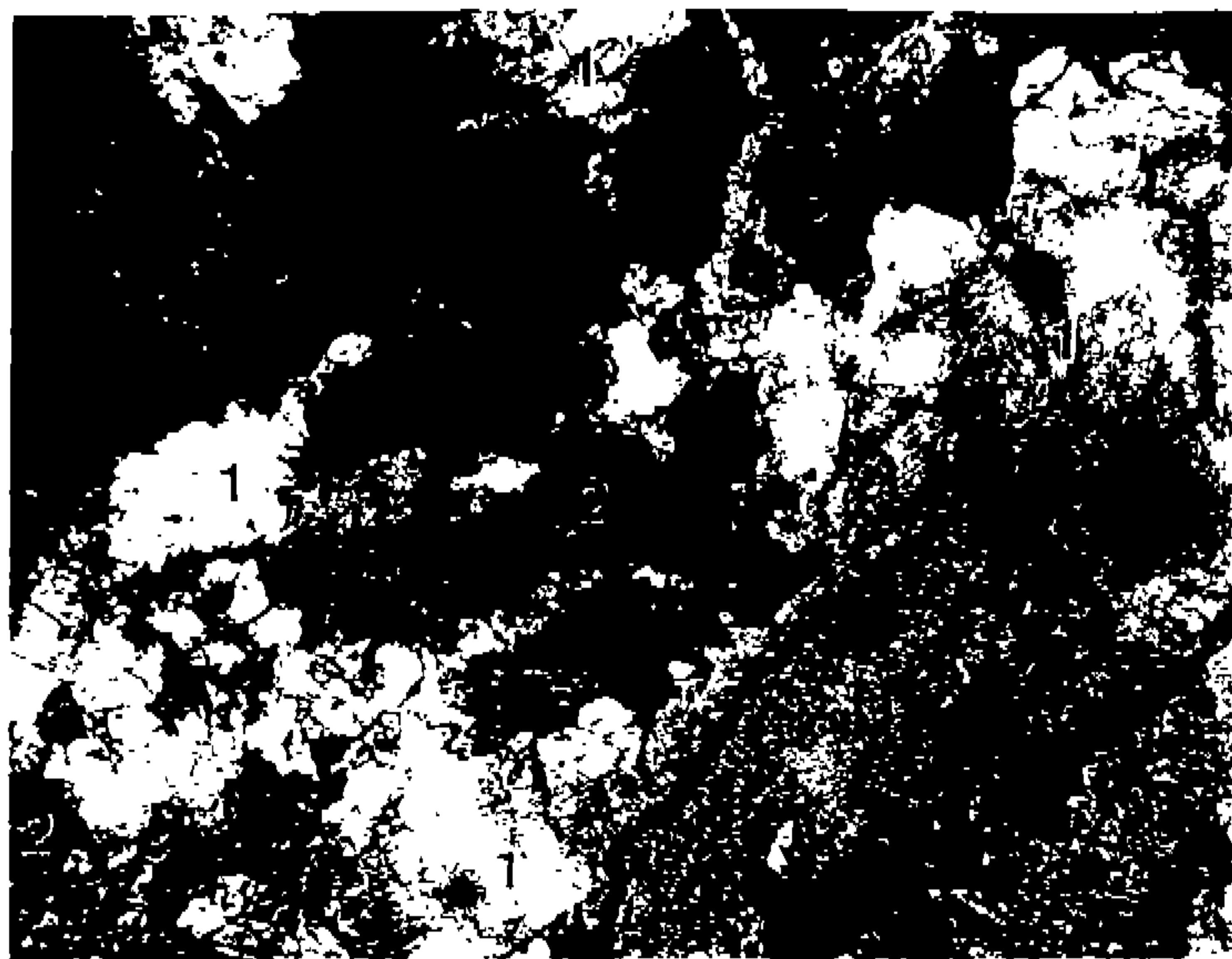
**Photo 29 :** (PPL, x 130)  
Euhedral basal sections of apatites. Note the brown core. Chloritic matrix.

**Photo 30 :** (PPL, x 130)  
Longitudinal sections of prismatic apatites. Crystals are often segmented.

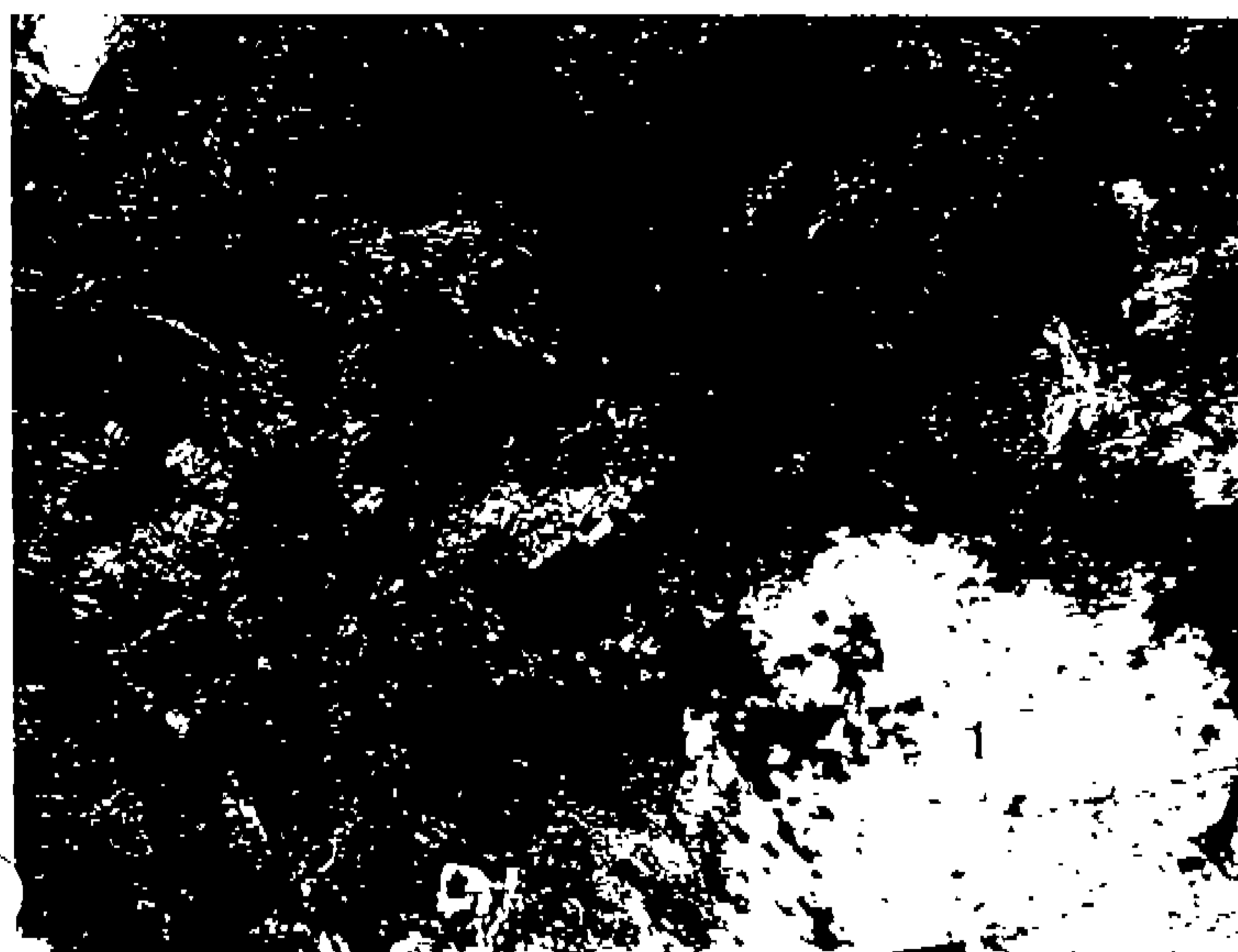
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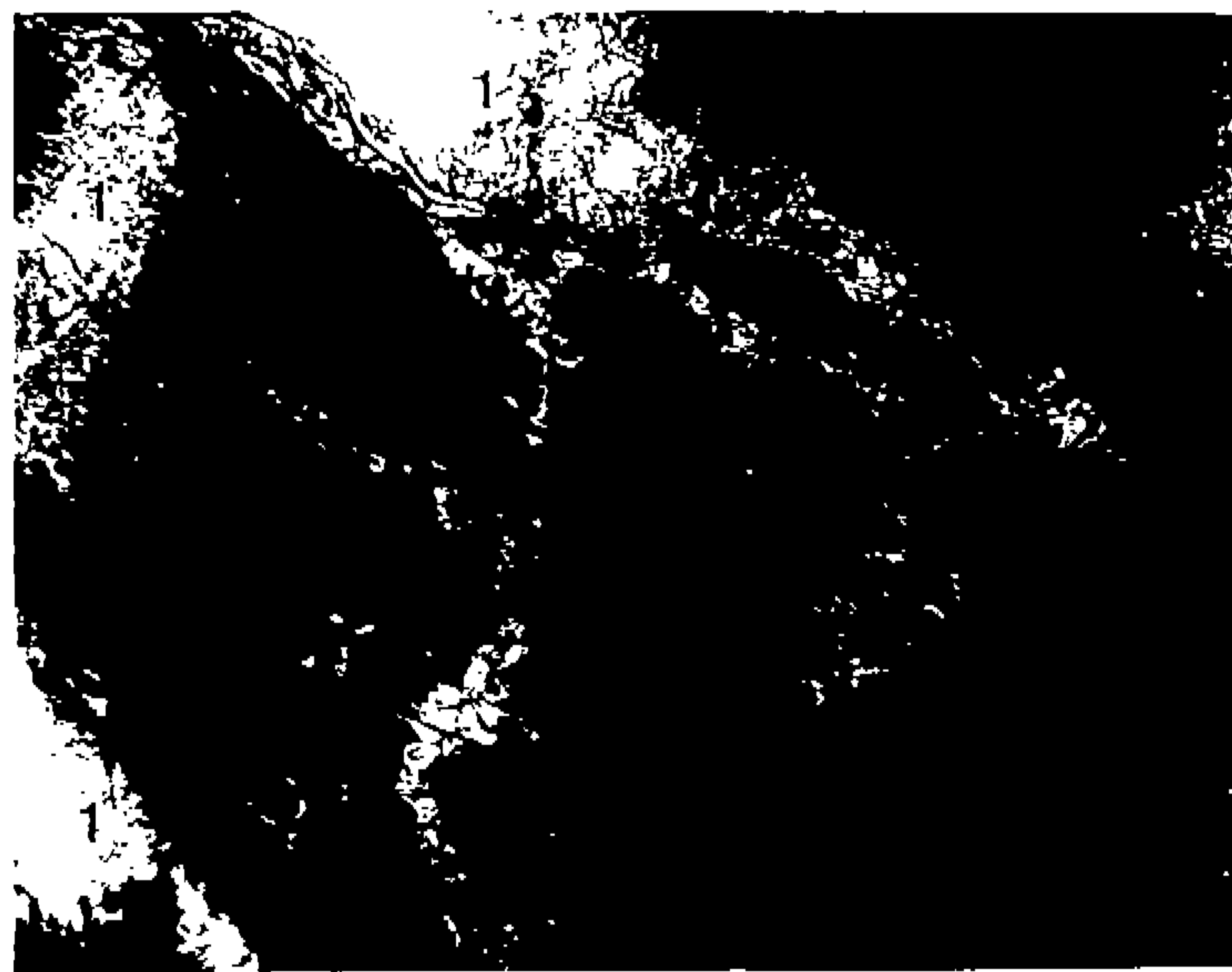
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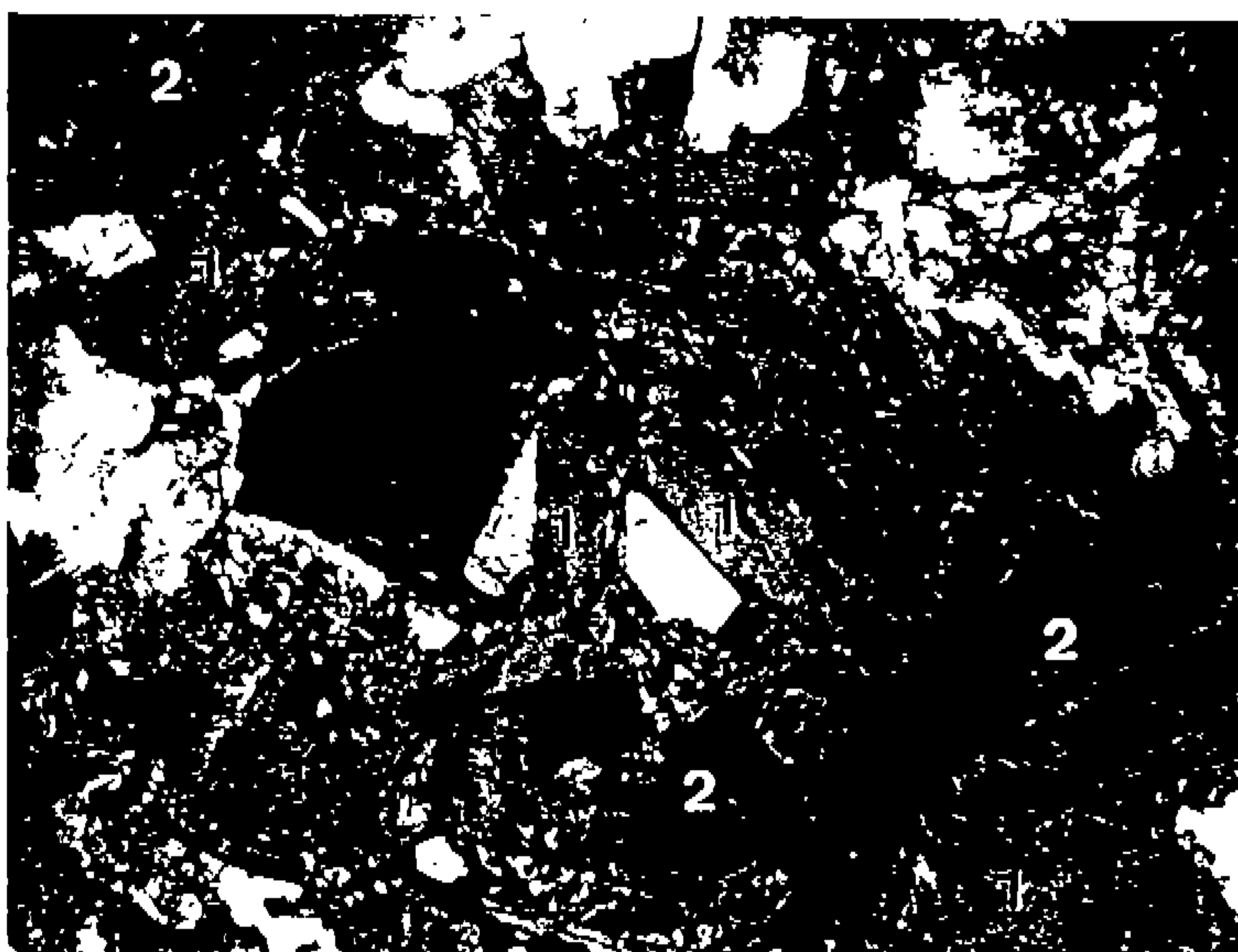
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**Sample 4 - SHRD 04 - 73.65 m**

- Photo 31 :** (PPL, x 20)  
Relictic subophitic texture : lath of plagioclases (1) and amphiboles (2) are totally chloritized (pale green chlorite, dark green chlorite. Large ilmenite (black), interstitial and granophyric quartz (white).
- Photo 32 :** (XPL, x 20)  
Subhedral polygonal dusty quartz plates of various sizes, from a quartz vein.
- Photo 33 :** (XPL, x 50)  
Detail of quartz plates displaying « flamboyant textures » around a polygonal core.
- Photo 34 :** (XPL, x 50)  
Microbrecciated quartz vein. Angular fragments are sealed by silica.
- Photo 35 :** (R.L., x 130)  
Ilmenites (1) transformed into Ti-U oxydes (brannerites) and titanomagnetites (2) with molybdenum sulfides forming a grid texture.
- Photo 36 :** (R.L., x 130)  
Late pyrite veinlet (1) crosscutting a Ti-U oxyde (ilmenite) with symplectic texture (see metallography for more details).

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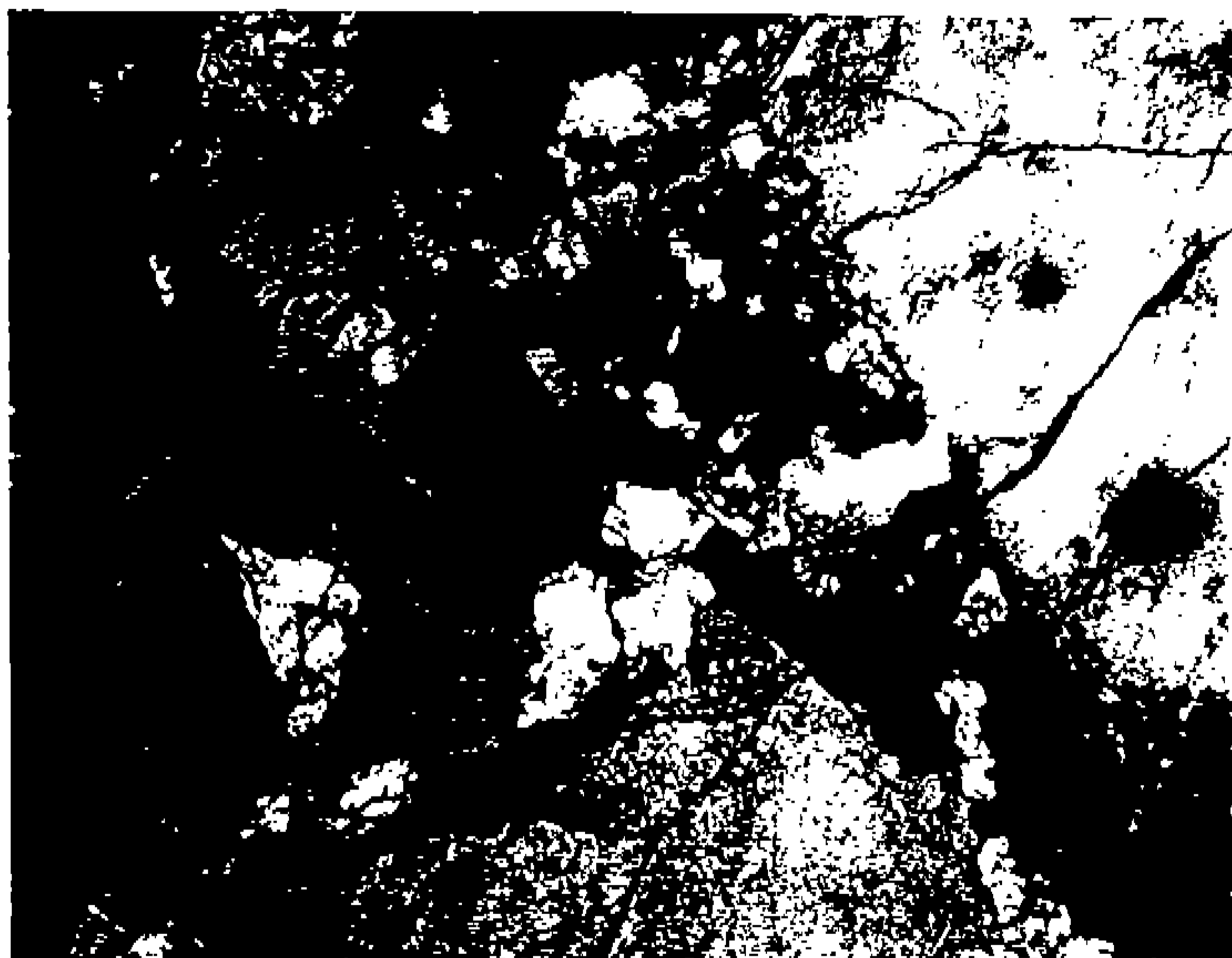
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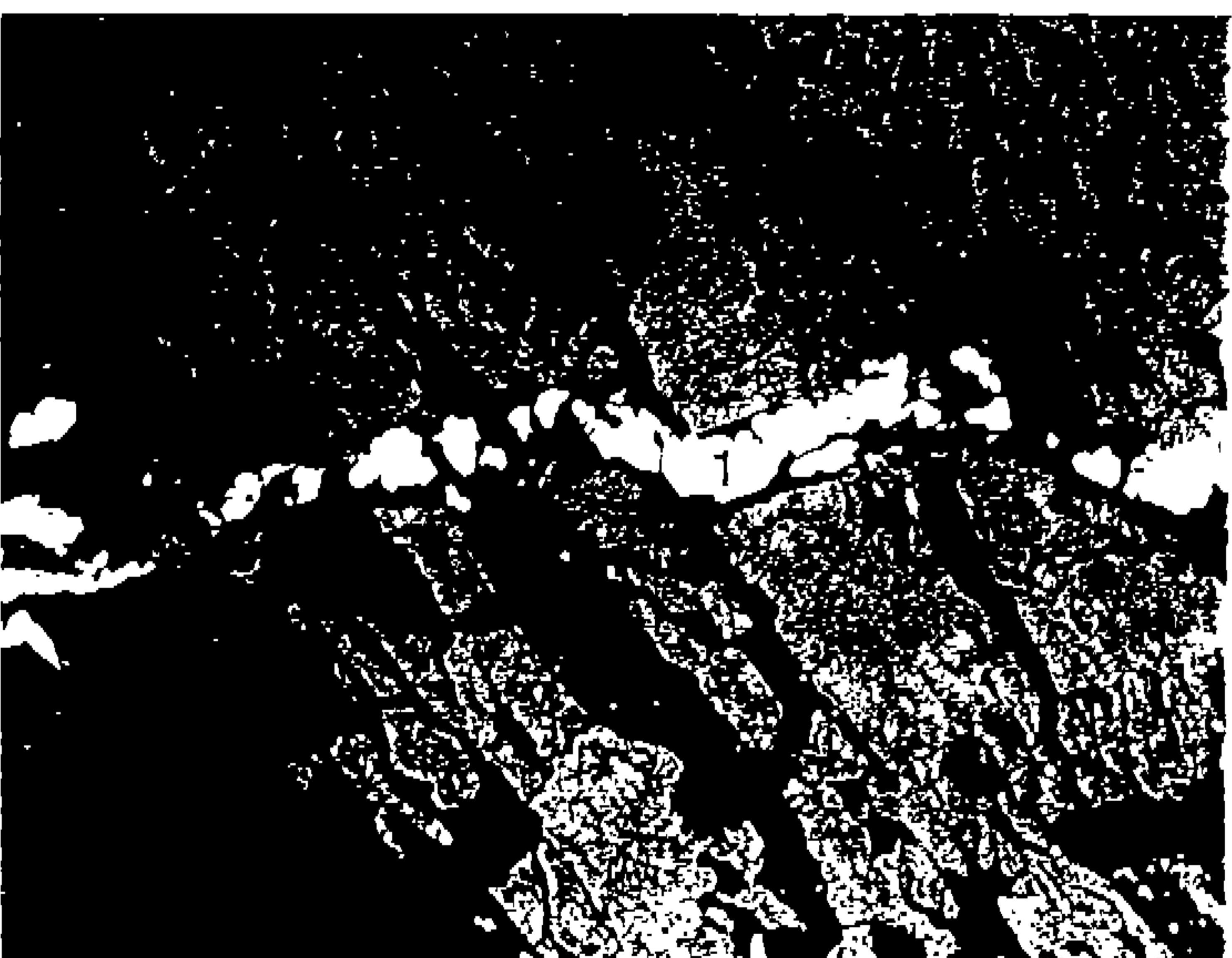
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- Photo 37 :** (PPL, x 50)  
Dusty, zoned, euhedral quartz from quartz veins (pink macroscopic coloration).
- Photo 38 :** (XPL, x 130)  
Ilmenite (black), transformed into Ti-U oxydes. Hydromuscovite is crystallizing within the interstices.
- Photo 39 :** (PPL, x 130)  
Large, euhedral, segmented apatites with brown cores. Quartz (1) and dark green Fe-chlorite (2).
- Photo 40 :** (PPL, x 130)  
Elongated, segmented apatites within an illite - chlorite groundmass. Diffuse hematization.

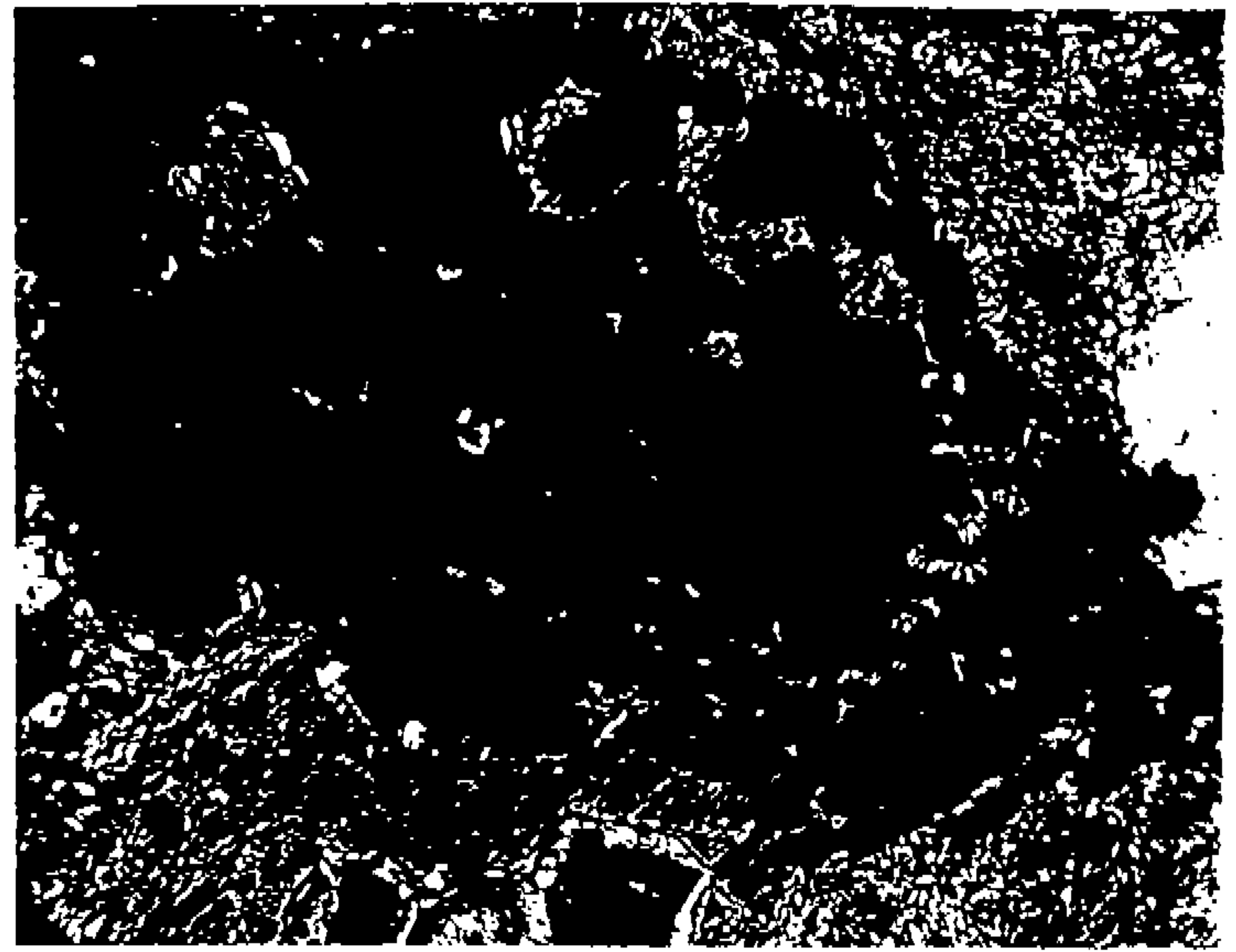
**Sample 5 - SHRD 04 - 77.95 m**

- Photo 41 :** (PPL, x 50)  
Abundant scattered titanomagnetites and ilmenites. Brown altered deformed biotites.
- Photo 42 :** (XPL, x 50)  
Late, discontinuous dark brown carbonate (siderite ? ankerite ?) veinlets (1) crosscutting a fractured quartz vein (2).

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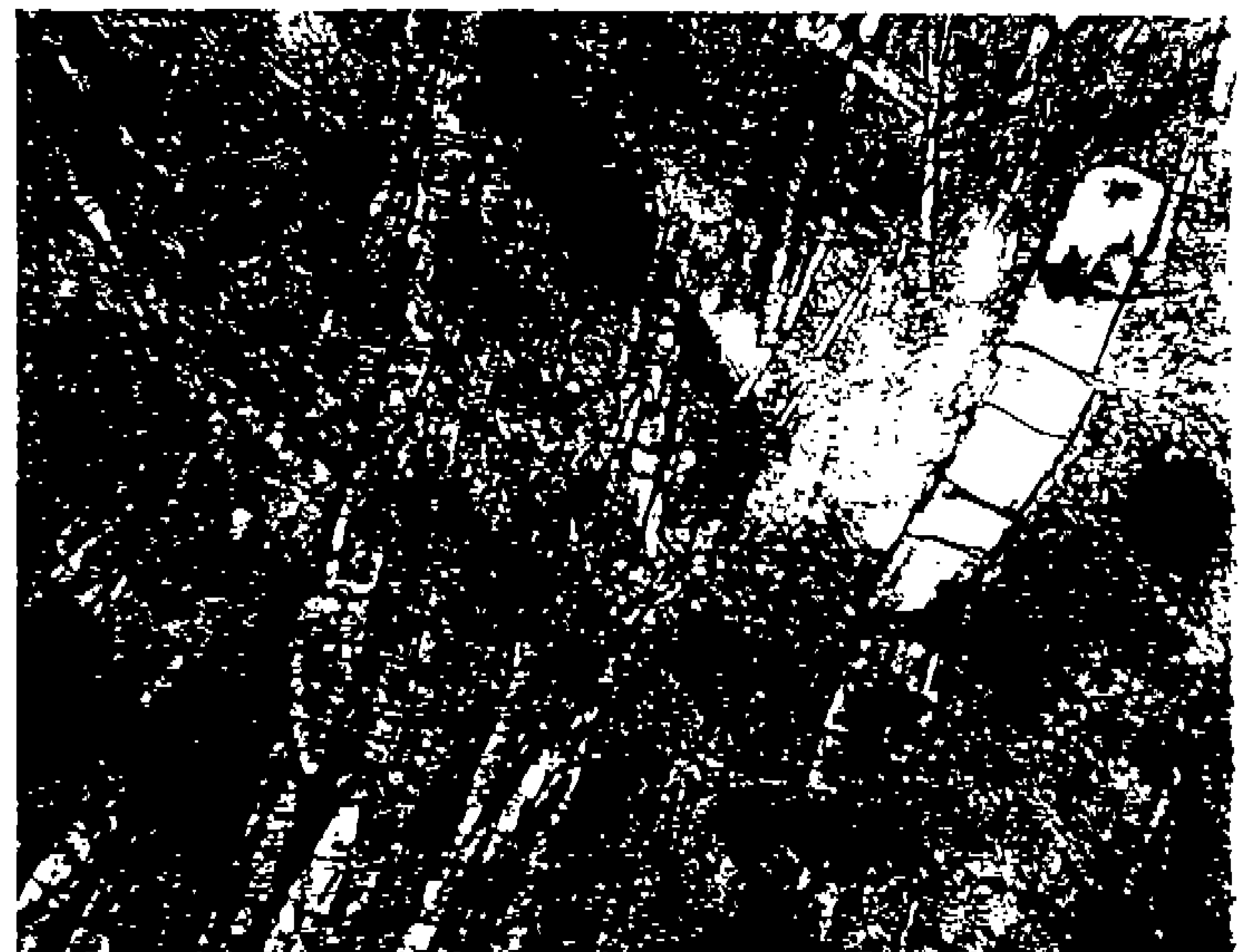
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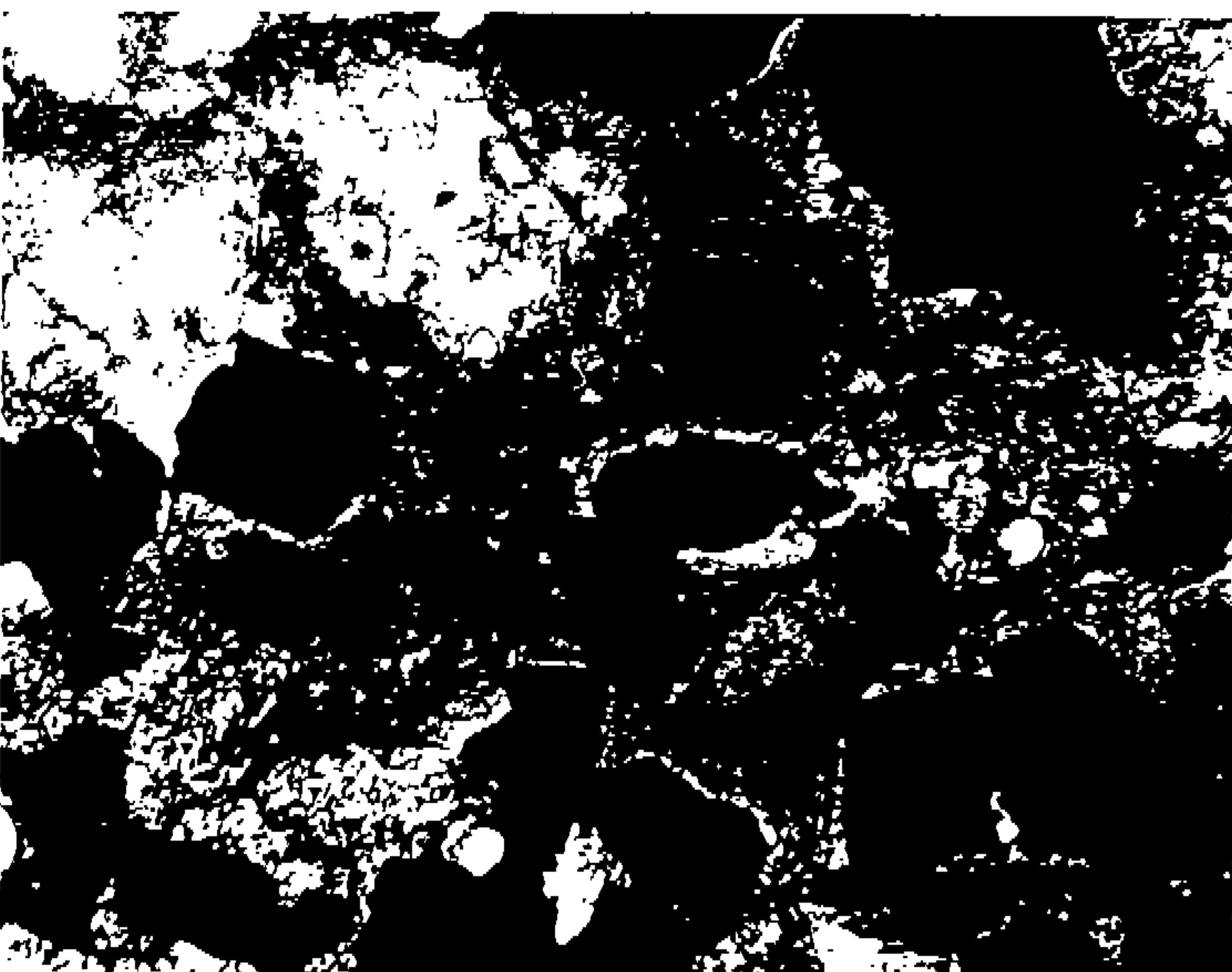
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## Thin sections description

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## 1 - SHRD 004 - 60.65 m

Black, massive, medium - grained dolerite, with disseminated (7 - 8 %) beige minerals (photo 1a).

### Microscopic description

The texture is subophitic, granophyric. Strong alteration is affecting all minerals.

#### **Mineralogical composition :**

Previous plagioclases (euhedral laths), and mafic minerals have been totally transformed into various clay minerals :

- large, irregular plates of pyroxenes are transformed into light green (PPL) - light yellowish - grey (XPL) **chlorites**,
- laths of plagioclases are totally illitized (pale green **illite**) with locally dark green chlorite along cleavages and diffuse quartz,
- other minerals (amphiboles, pyroxenes, biotites, ...) are pseudomorphed into dark green (PPL) - brownish to dark grey **chlorites**. They contain abundant granules of **rutile**, euhedral **apatites** and are often corroded by silica and illite. Amphibole was probably the dominant mineral.

Macroscopic beige minerals correspond to **ilmenite** and **magnetite**. Ilmenite is transformed into leucoxene - anatase - rutile and magnetite with exsolved ilmenite lamellae forms large skeletal plates associated to ilmenite.

Some dispersed small grains of **chalcopyrite** and **pyrite**. Pyrite is also present along discontinuous microfractures.

**Quartz** is quite abundant (~ 15 - 20 %) as :

- large quartz - alkali feldspar graphic intergrowths. The feldspar is totally illitized. Brown apatite inclusions are common.
- isolated dispersed euhedral plates, with also acicular apatite inclusions,
- interstitial anhedral plates,
- diffuse silicification as irregular oriented brownish (iron oxydes micro-inclusions) aggregates of quartz plates with serrated contacts, locally invading amphiboles.

**Apatite** is abundant (~ 2 %) as elongated brown crystals preferentially located in the quartz and in the minerals altered into dark green chlorite.

## 2 - SHRD 004 - 65.35 m

Black to dark grey, massive medium-grained dolerite, cut by an irregular network of small pinkish grey veinlets (photo 3a).

### Microscopic description

As for the previous sample the original texture was subophitic granophyric. Alteration is very strong transforming all minerals.

In particular, muscovitization (large plates or aggregates of well crystallized plates) of the amphiboles and illitization (fine-grained white mica) are well developed, replacing pale green chlorite and replaced by dark green chlorite.

Quartz is also well represented as silicification of previous minerals (brownish dusty polycrystalline quartz) or late crosscutting veinlets.

Large anhedral ilmenites - magnetites are transformed into aggregates of prismatic to fibrous **rutile** and grains of **sphene**.

**Apatite** is abundant (3 - 4 %) as large aggregates of small prismatic crystals developing within the chloritized amphiboles - biotites or along the margins of the late crosscutting quartz veins associated with intense green (PPL) fibroradiated **chlorite** and opaque granules of **uraninite**.

Amphiboles - biotites also contain trails of very small euhedral plates of **phosphates** (goyazite - florencite ?).

Irregular contorted veins are made of subeuhedral, heterogranular indented quartz plates (« macrocomb » textures with some plates surrounded by « microcomb » textures). The macroscopic pink coloration is due to the abundance of dark microinclusions (iron oxydes).

### 3 - SHRD 004 - 72.95 m

Rock similar to the previous one, cut by irregular pinkish grey veinlets of quartz (photo 5a).

Alteration (chlorite - hydromuscovite - illite) is very strong affecting all minerals.

A quartz stockwerk of irregular veinlets is made of polygonal plates with frequent « microcomb » or « flamboyant » textures around.

Veins are very rich in brown trails of microinclusions (dusty habit), microfracturing is common and the margins of the veinlets are corroded by the dark green chlorite containing abundant opaque minerals (uraninite mainly).

Several types of green (PPL) chlorites are present, the latest one, dark green (PPL) to dark purple (XPL) being probably associated to the mineralization (Fe-chlorite) and corroding or crosscutting the other phases.

Quartz, altered opaque minerals and apatites are abundant. Pyrite and chalcopyrite are common. The largest crystals are located along the margins of the quartz veinlets.

Apatite is present as large euhedral crystals often with brown cores (dusty hematite). Prism are also truncated or deformed.

4 - SHRD 004 - 73.65 m

5 - SHRD 004 - 77.95 m

Facies identical to the previous samples (photos 7a, 9a, 11a,). Main differences are :

- diffuse hematization, affecting mainly the quartz, is more pronounced,
- presence of rare zoned zircon,
- most of the abundant apatites contain hematite granules (brown cores),
- trails of small euhedral colourless apatites,
- the quartz veins are microfractured and locally microbrecciated. Angular fragments are sealed by silica. Microfractures contain pyrite and chalcopyrite,
- presence of prehnite,
- in sample 5, late discontinuous veinlets of brown carbonates (siderite ? ankerite ?) crosscutting all phases. It is the only sample with carbonates.

## 6 - SHRD 001 - 76 m

Dark greenish - grey to dark pink, massive medium-grained dolerite (photo 1a).

### Microscopic description

The texture is subophitic to ophitic with some mesostasis : plagioclases laths are disconnected and enclosed in pyroxenes poekilo-crystals.

#### **Mineralogical composition :**

- poekilitic, pale pink, **clinopyroxene** (augite) phenocrysts (30 %) with abundant inclusions of plagioclases laths. They are locally replaced by brownish green hornblende and minor fibrous actinolite,

- **plagioclases** (~ 45 %) as euhedral small to large laths, are totally saussuritized, sericitized and altered to prehnite. The margins of a few plates are albitized,

- greenish-brown **amphiboles** (~ 5 %) are partially altered into green amphibole, or spherulitic chlorite and fibrous actinolite,

- rare flakes of brown **biotite**,

- rounded isolated or in aggregates green crystals (~ 5 %) rimmed by black material, probably correspond to **olivines** completely pseudomorphed into green chlorite, opaques minerals (Ti-oxydes, Fe-oxydes, pyrite), amphibole and epidote.

The mesostasis (~10 %) consists of graphically intergrown quartz and **alkali feldspar** with some euhedral **quartz** containing acicular **apatites** and rare brown **biotite**.

**Titano-magnetite** with exsolved **ilmenite** lamellae (~5 %) forms large (< 2 mm) skeletal grains associated to ilmenite.

Small granules of **chalcopyrite**, **pyrite** as irregular veinlets, are also present. Diffuse hematization affects preferentially the albitized margins of the plagioclases or the granophyric feldspar.

# ETUDE 8873

## AUSTRALIA

Arnhem Land - South Horn

Drill hole SHRD 004

Sample	2	▪	65.35	-	65.55 m
"	3	▪	72.95	-	73.15 m
"	4	▪	73.65	-	73.90 m
"	5	▪	77.95	-	78.07 m

\*

*Ore minerals*

\*

J. REYX

COGEMA - GEO - GST

June 1998

### Abstract

Mineralization corresponds to concentrations, aggregates or dissemination of *uraninite*, and to *uranium - titanium oxides*, kind of *secondary brannerite* replacing primary vanished titanium - iron oxides - (probably *ilmenite* and / or *titanomagnetite* ...) ; minor uranium  $\pm$  silicated concretions are also locally observed. Prints of fine octahedric lattices coming from vanished titanium-iron oxides are also impregnated of *microcrystalline molybdenum sulfides*, *jordisite* type, in association with uranium - titanium oxides. Tiny dots of (*arsenical*) *pyrite*, *chalcopyrite* and *galena* are also disseminated in host rock, quartz veinlets, and uranium or uranium - titanium oxides.

N.B. Lead content in *uraninite* will be analyzed next (microprobe). This could give an approximate idea of the *uraninite* age.

## **Details of observations**

## Sample 2

Numerous octahedric lattices composed of small *rutile* (and/or anatase) crystals and of others *micro-cryptocrystalline titanium oxide* phases. Those oxides contains occasionally small quantity of *iron*.

Primary minerals (probably ilmenite / titanomagnetite) are completely replaced.

### Uranium

Thin veinlets composed by aggregates of tiny idiomorphic - subidiomorphic relatively high reflectance oxides, *uraninite* type, usually associated with / coated or included in / *chloritic* minerals.

*Lead* is detected in these uranium oxides.

### Sulfides

Mainly microcrystalline *molybdenum sulfides*, *jordisite* type, usually associated with / coating, or cementing / *uraninite* crystals.

Traces of *galena* (~ 1 - 10  $\mu$  size) are occasionally included in *uraninite*.

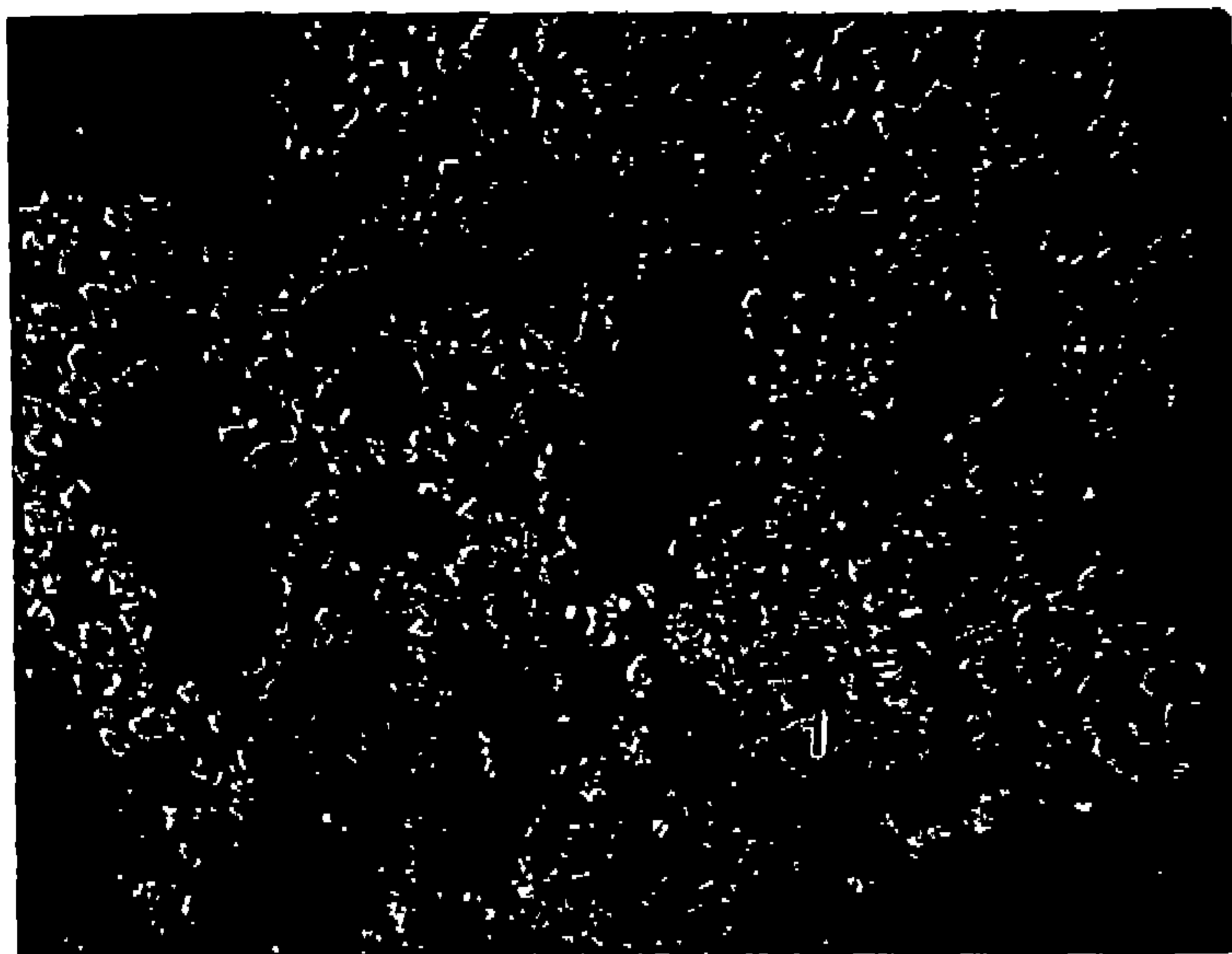
Minor *pyrite*, *marcasite* and *chalcopyrite* dots or short thin microveinlets (10 - 100  $\mu$ ) are scattered in host rock ; *pyrite* contains generally small quantities of *arsenic*, and very occasionally traces of *nickel*.

## Illustrations

### *Reflected light (x 125)*

- 1 and 2**    Uranium oxide (2) associated with  $\pm$  corroded small *rutile* (and/or anatase) crystals (1). Uranium oxide seems to coat, cements or replaces titanium oxide crystals.
- 3 and 4**    Microcrystalline molybdenum sulfides, *jordisite* type (2, white) impregnating aggregates of (sub) idiomorphic uranium oxide crystals (1).
- 5**            Microcrystalline molybdenum sulfides (2) associated with uranium oxide concretions (1).

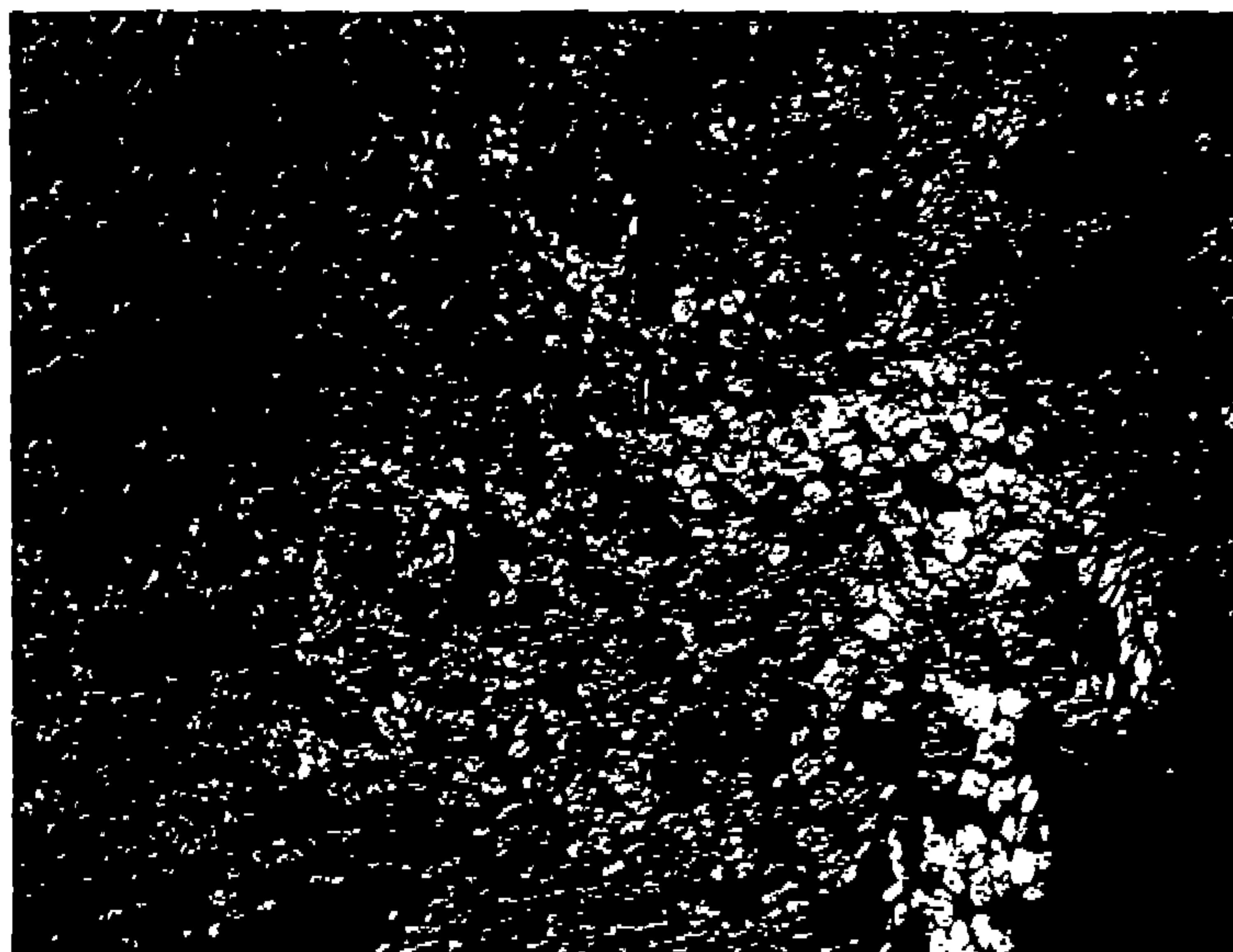
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ARNHEM LAND - SOUTH HORN (sample 2)



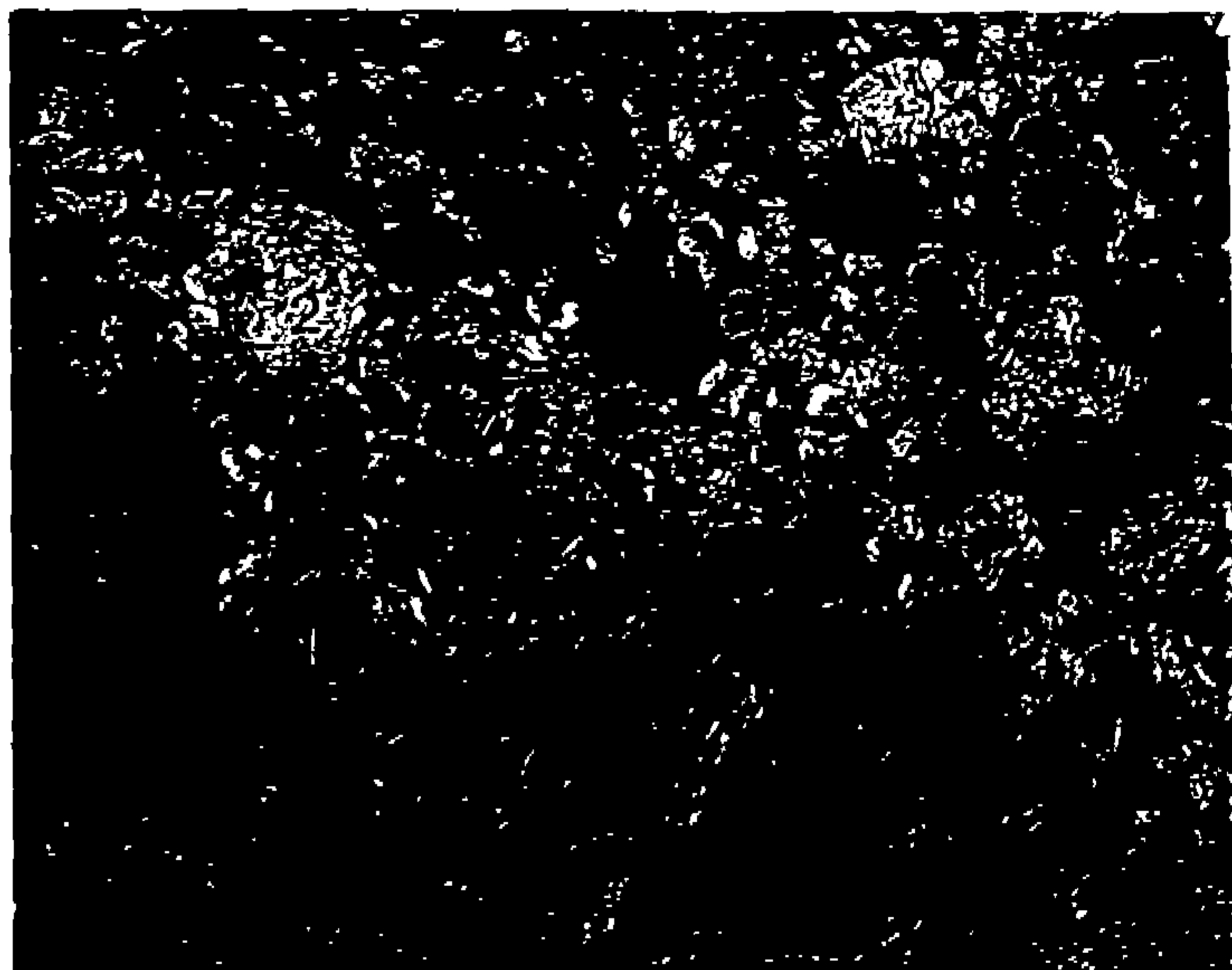
1



2



3



4



5

### Sample 3

As in previous sample, numerous octaedric lattices of secondary *titanium oxides* ; no remnants of primary minerals.

#### Uranium

- Aggregates of relatively high reflectance (sub) idiomorphic tiny oxide crystals, *uraninite* type. *Lead* is detected in these crystals.
- *Uranium-titanium oxides*, kind of heterogeneous « *secondary brannerite* » impregnate and replace primary titanium oxides.

#### Sulfides

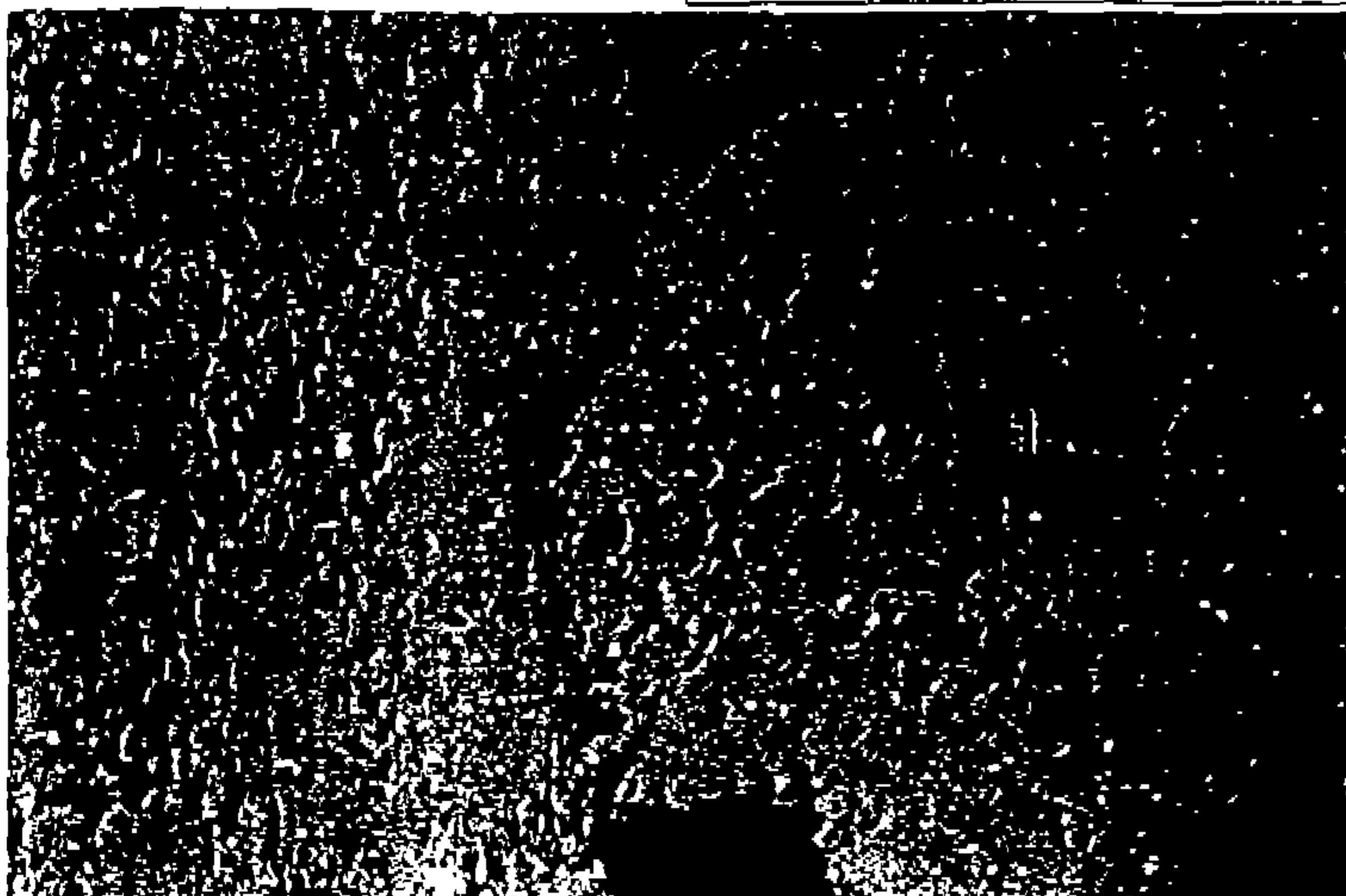
Mainly *microcrystalline molybdenum sulfides*, *jordisite* type, associated (coating, cementing) *uraninite* or impregnating and replacing primary titanium oxides, oriented according to their fine octaedric lattices ; a little of *iron* is detected in these molybdenum sulfides. Minor *pyrite* and *chalcopyrite*, scattered in gangue ; minutes dots (1 - 10  $\mu$ ) of *pyrite*, *chalcopyrite* and *galena* are also included in *uraninite* concentrations.

### Illustrations

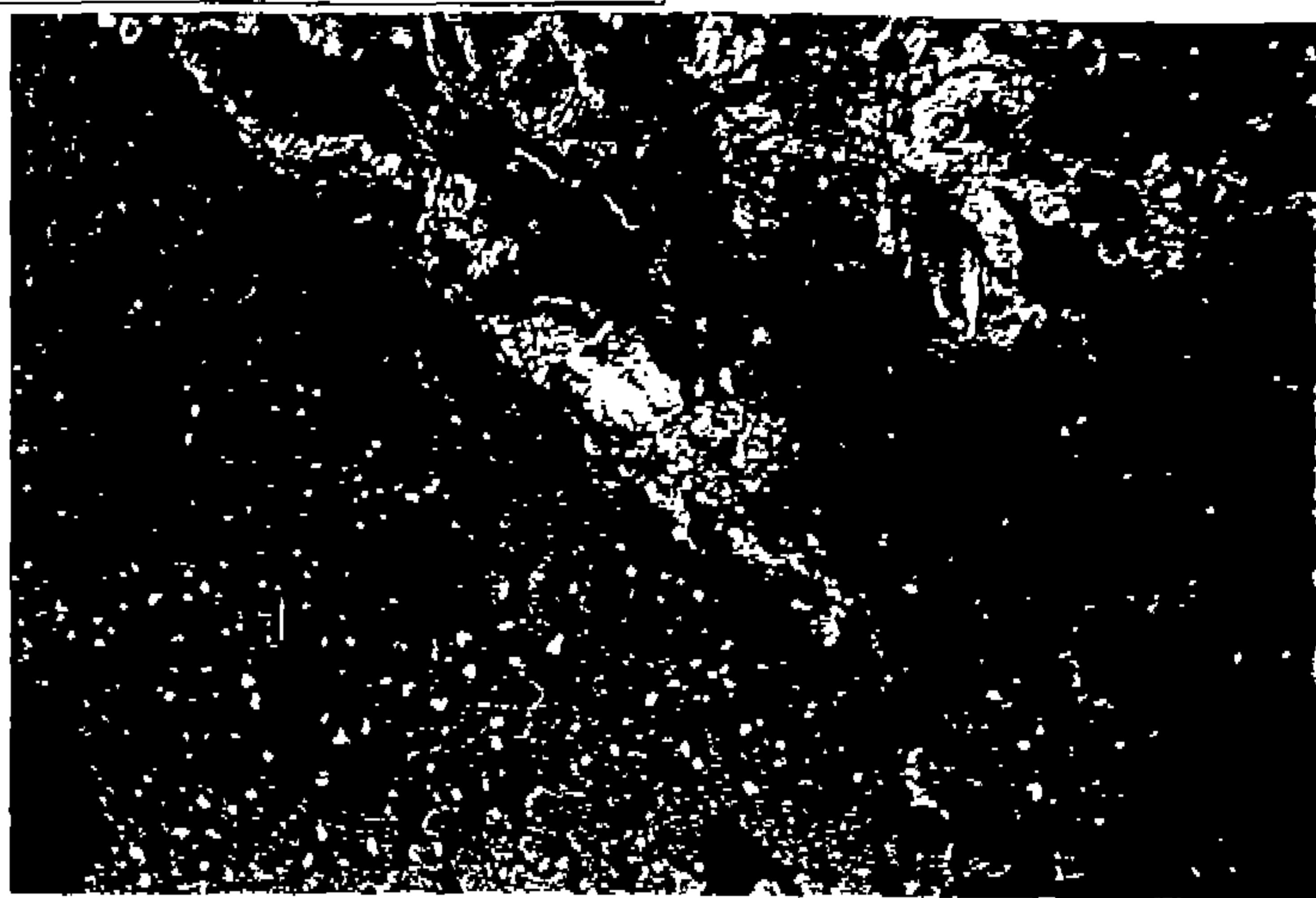
#### *Reflected light (x 125)*

- 1 and 2** Disseminations and massive aggregates of tiny (sub) idiomorphic uranium oxide crystals, *uraninite* type (1), containing scattered very minute sulfides (white  $\sim \mu$  - 10  $\mu$ ) dots (*pyrite*, *galena* ...) ; on photo 2, uranium oxide concentrations are partly invaded by cryptocrystalline molybdenum sulfides (2).
- 3 to 8** Print of fine octaedric lattices of iron-titanium oxides ; completely replaced by uranium-titanium oxides (kinds of  $\pm$  heterogeneous « *secondary brannerite* ») (1) and microcrystalline molybdenum sulfides (oriented according to the octaedric lattices) (2).

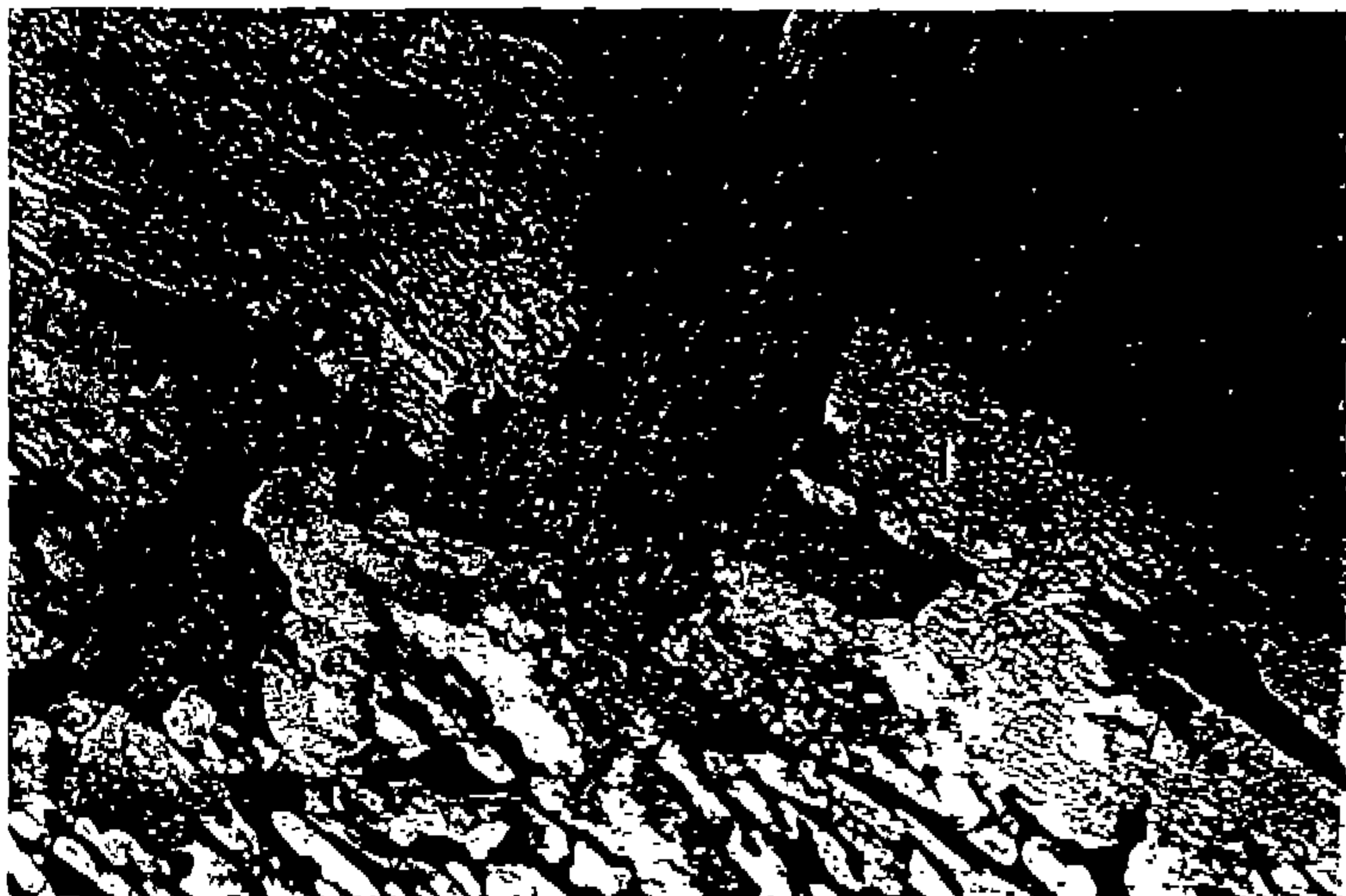
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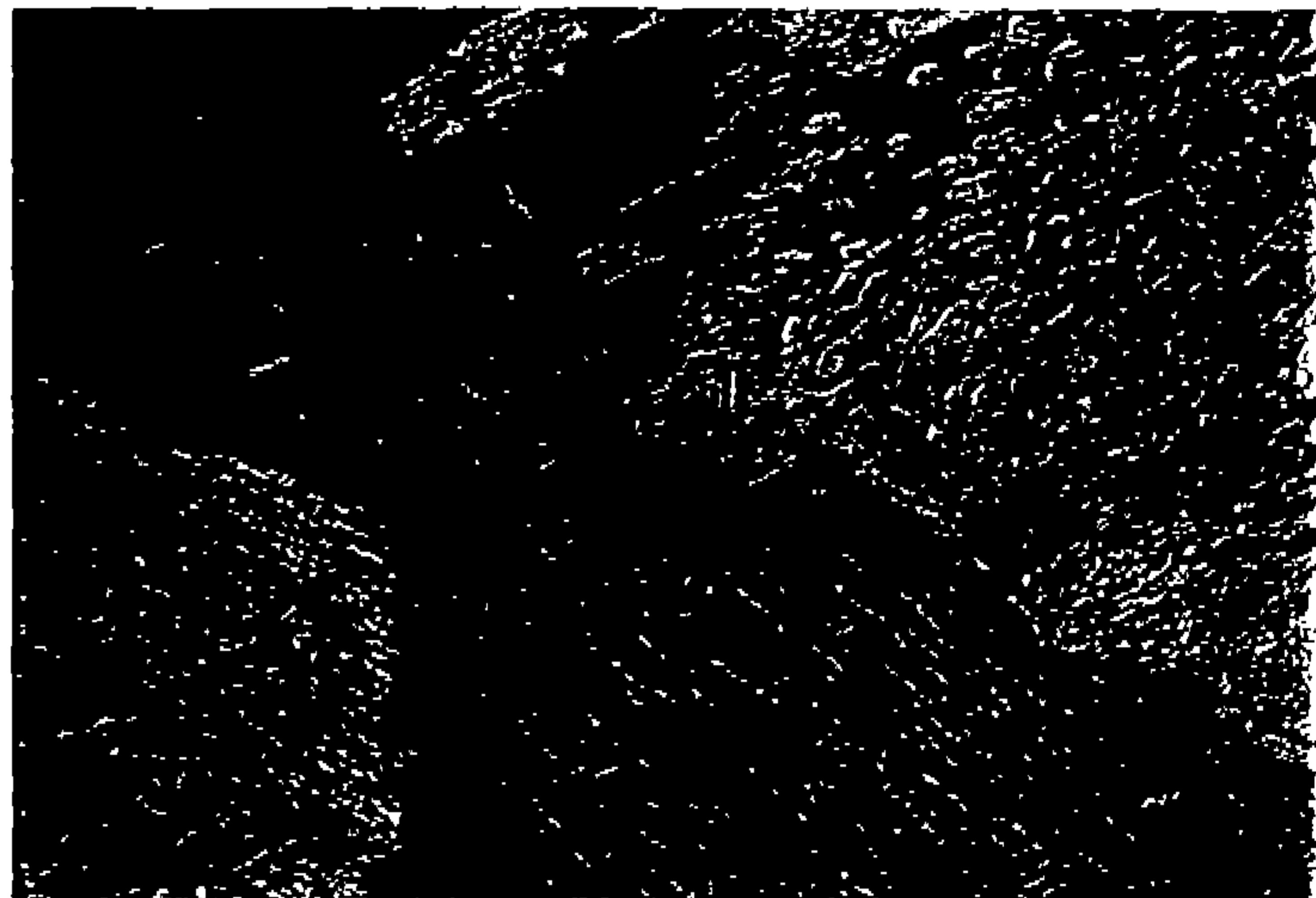
1



2



3



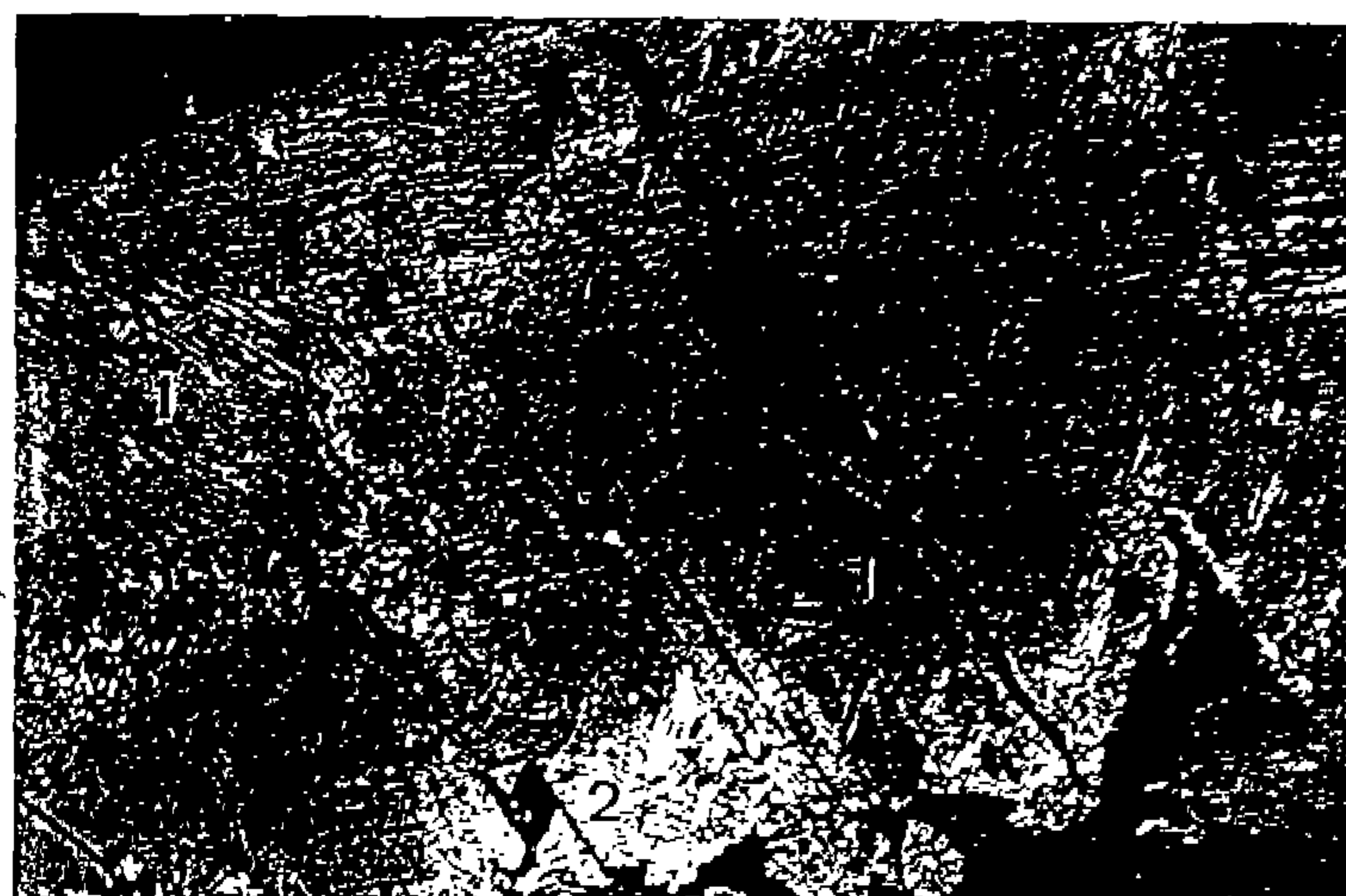
4



5



6



## Sample 4

*Same ore minerals paragenesis than in sample 3*

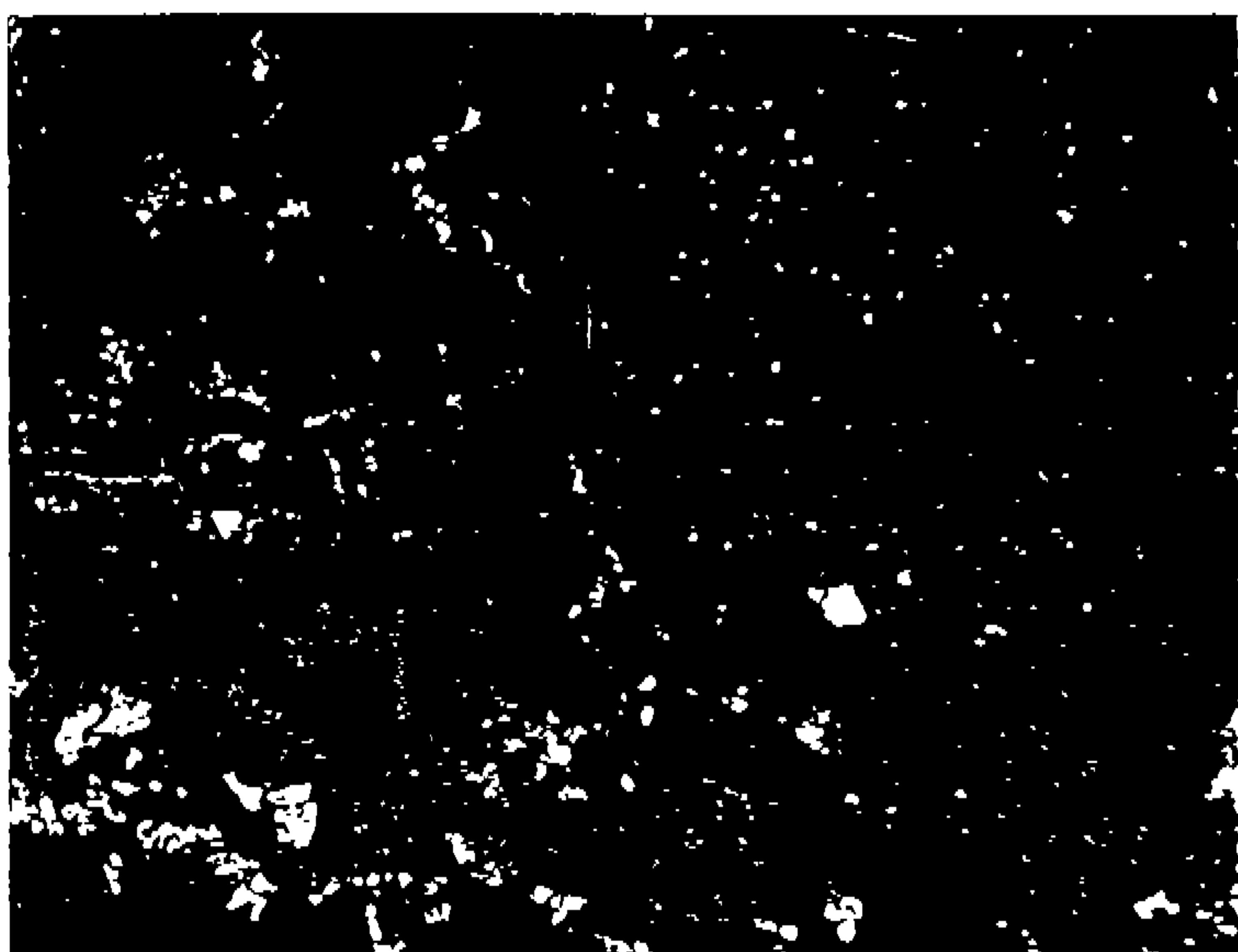
*Pyrite and chalcopyrite*, disseminated in host rock, in quartz microveinlets, or in uranium oxide are just more abundant than in sample 3 ; *molybdenum sulfides* are a little less abundant.

## Illustrations

*Reflected light (x 125)*

- 1** Dissemination and massive aggregates of (sub) idiomorphic tiny uraninite oxide crystals, uraninite type (1) with scattered (white, 2) dots of sulfides, mainly pyrite and chalcopyrite.
- 2** Subidiomorphic uraninite crystals (1).
- 3** Uranium-titanium oxides (kind of heterogeneous « secondary brannerite ») (1) ; minute white dots are galena.
- 4 and 5** Id. print of octahedric lattice composed of uranium-titanium oxides (kind of heterogeneous « secondary brannerite ») (1) and microcrystalline molybdenum sulfides impregnations (2).

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1



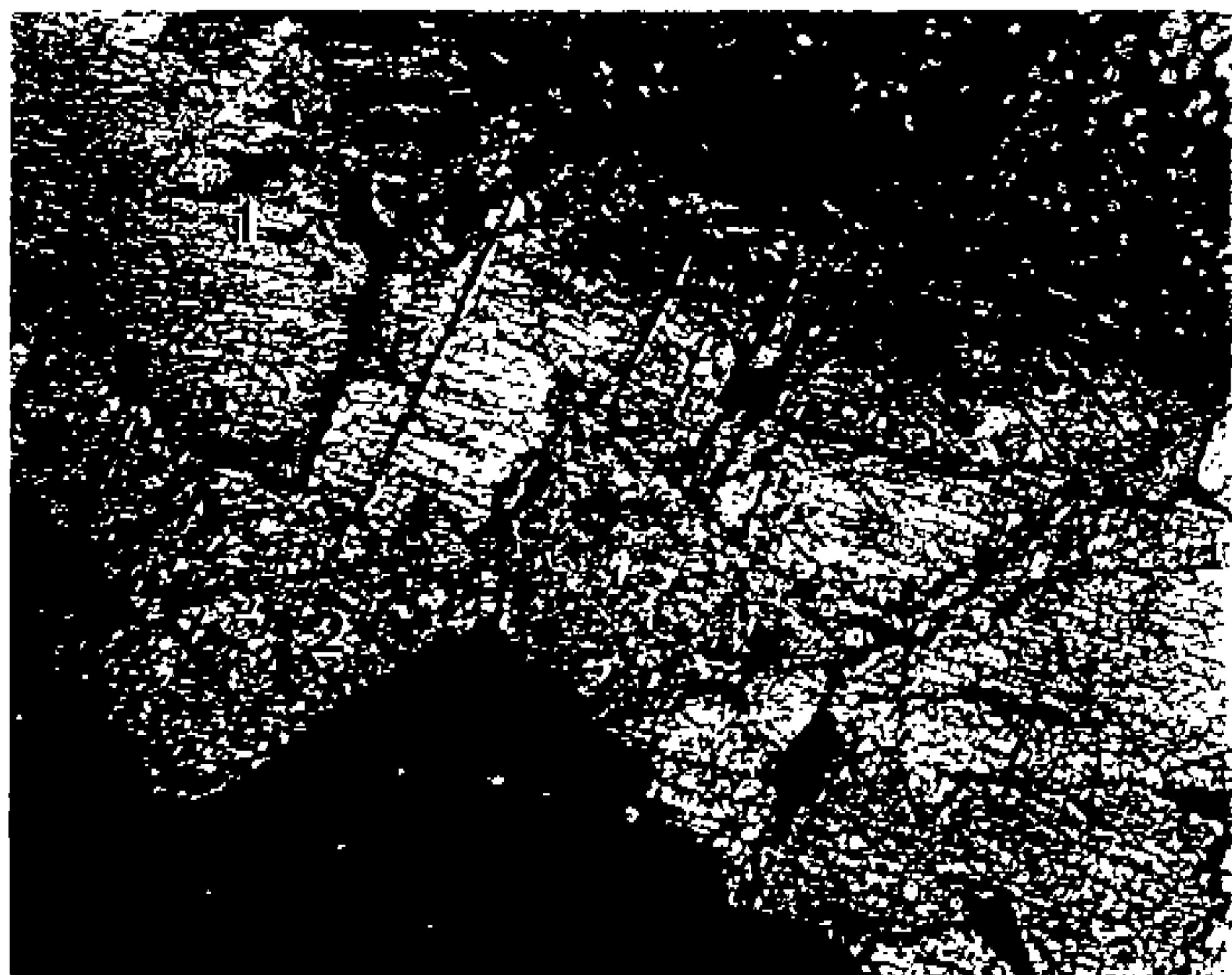
2



3



4



5

## Sample 5

As, in previous samples, dissemination of same kind of *titanium oxides* octaetric lattices ...

### Uranium

Veinlets composed of :

- Aggregates or microdissemination of tiny (sub) idiomorphic *oxide* crystals, *uraninite* type,
- *Uranium titanium oxides*, kind of heterogeneous « secondary brannerite » ... (Id. previous samples),
- Minor low reflectance *uranium silicated concretions*, *coffinite* type.

### Sulfides

Disseminations and microveinlets of *pyrite* and *chalcopyrite* ; in host rock, in quartz veinlets, in uranium / or uranium-titanium oxides.

Minute *galena* dots ( $\mu$  - 20  $\mu$ ) are also frequently scattered in uranium titanium oxides or uranium silicated concretions.

## Illustrations

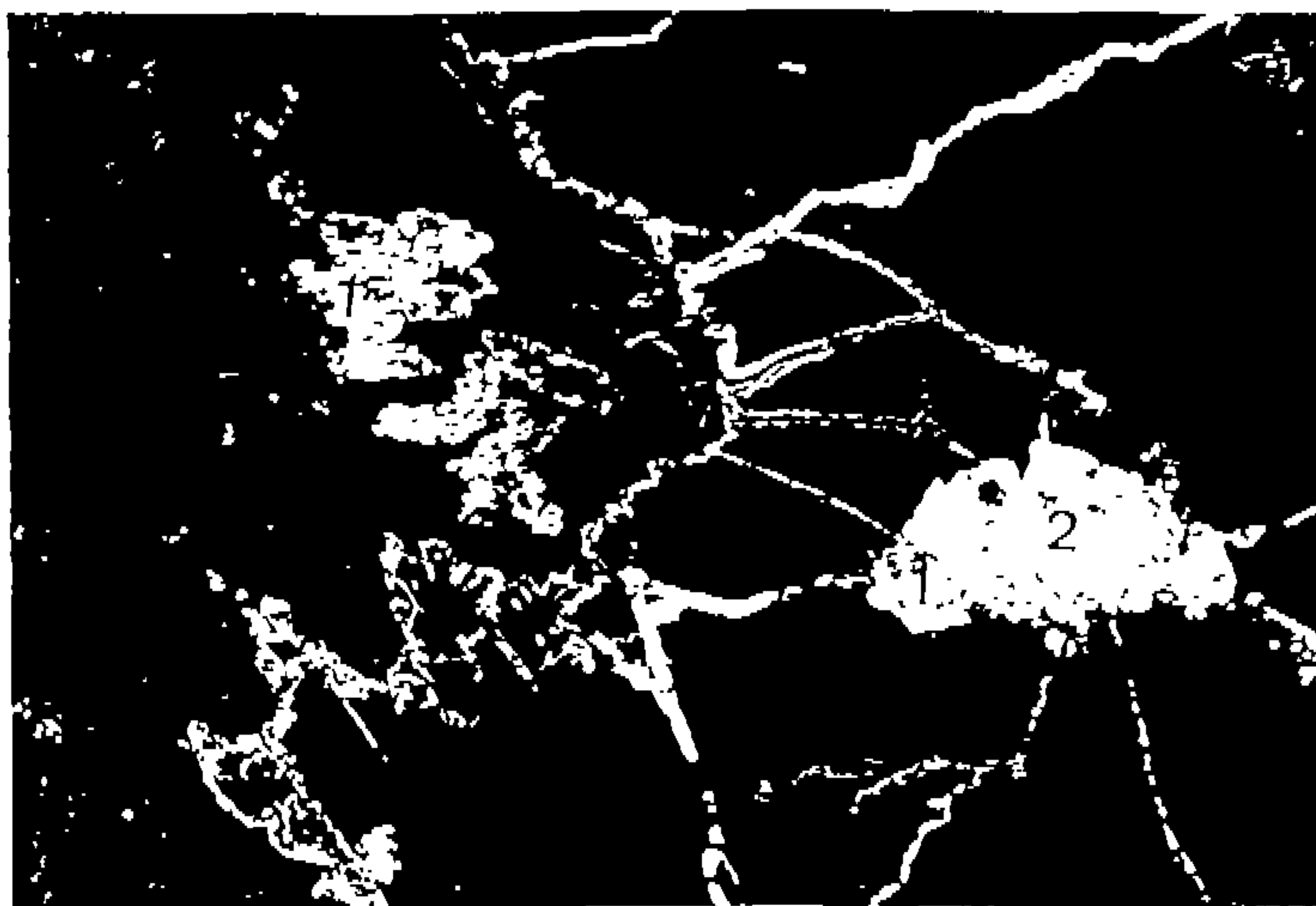
### *Reflected light (x 125)*

- |        |   |
|--------|---|
| 1      | Disseminations and aggregates of (sub) idiomorphic uranium oxide crystals (1), with scattered (white, 2) dots of sulfides (pyrite, chalcopyrite, galena).   |
| 2      | Microconcentrations and microveinlets of pyrite (1) and chalcopyrite (2) in a quartz veinlet.   |
| 3 to 7 | Various more or less uranium-titanium oxide (more or less « secondary brannerite ») (1) and locally molybdenum sulfides (very fine octaetric lattices) (2) with scattered minute (white) dots of pyrite, chalcopyrite and galena.<br>Zones with low reflectance contain more uranium than zones with high reflectance (specially on photos 3, 4 and 7). |
| 8      | Late low reflectance uranium silicated concretions, probably coffinite (1). Minute white dots are galena.   |

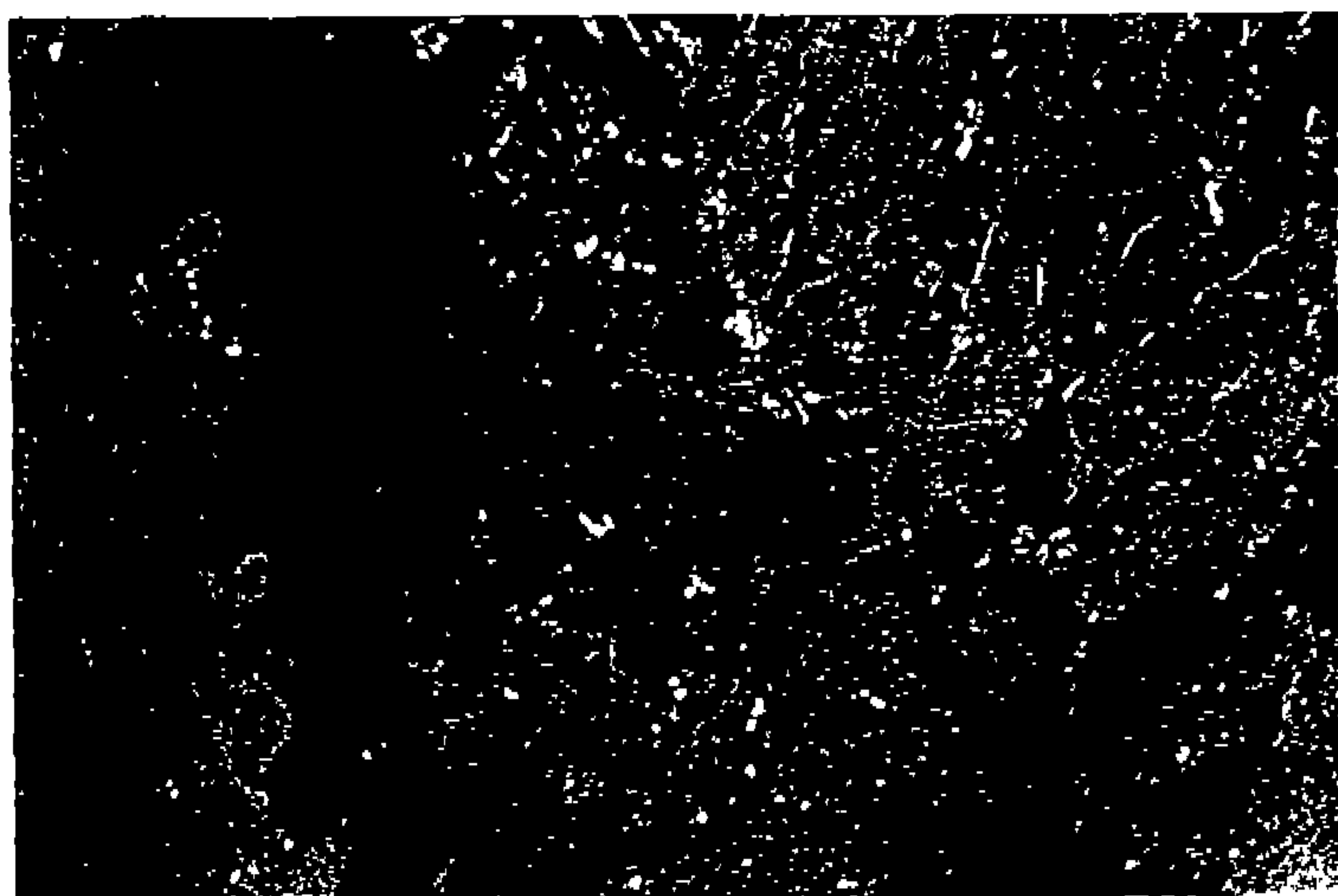
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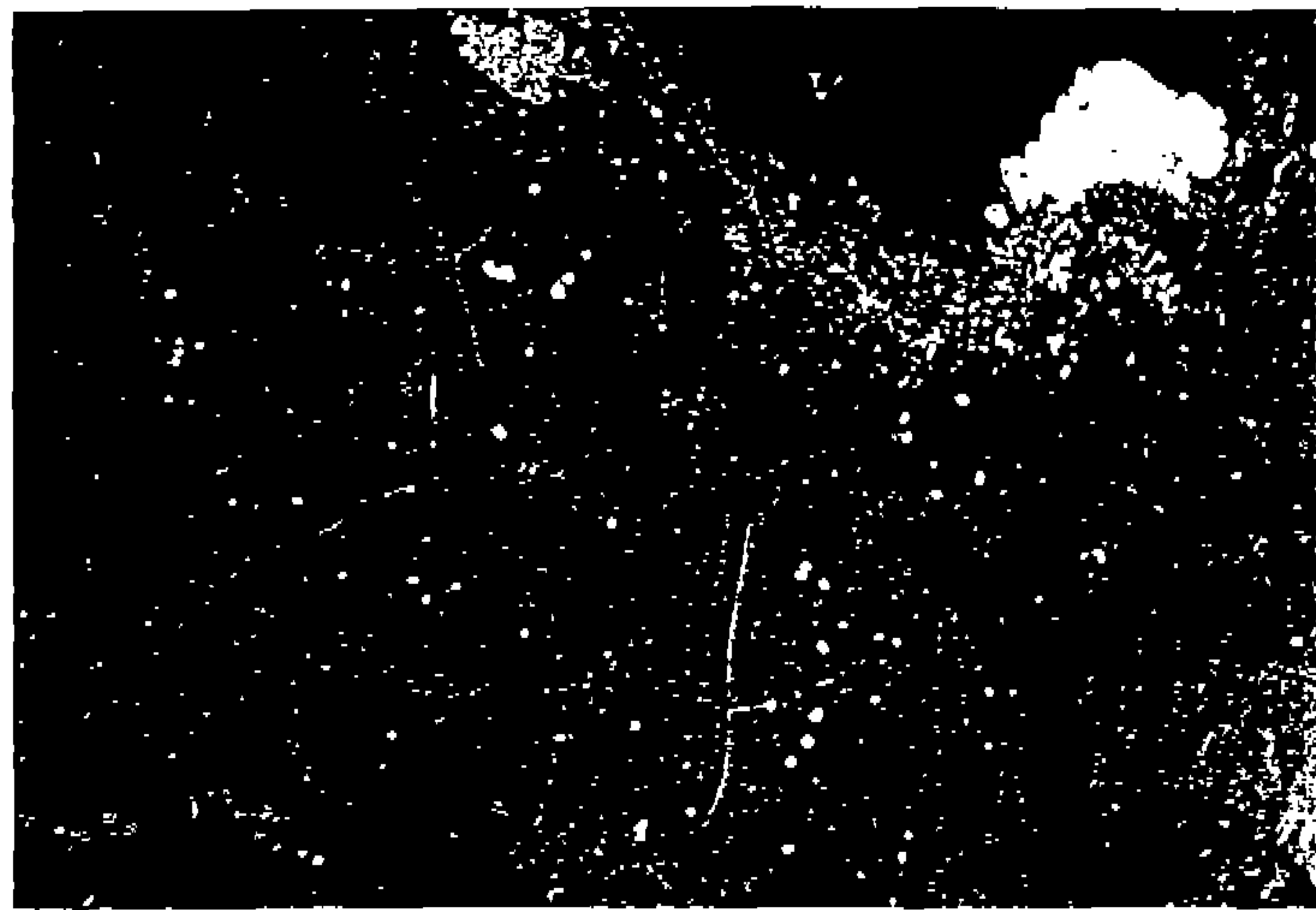
1



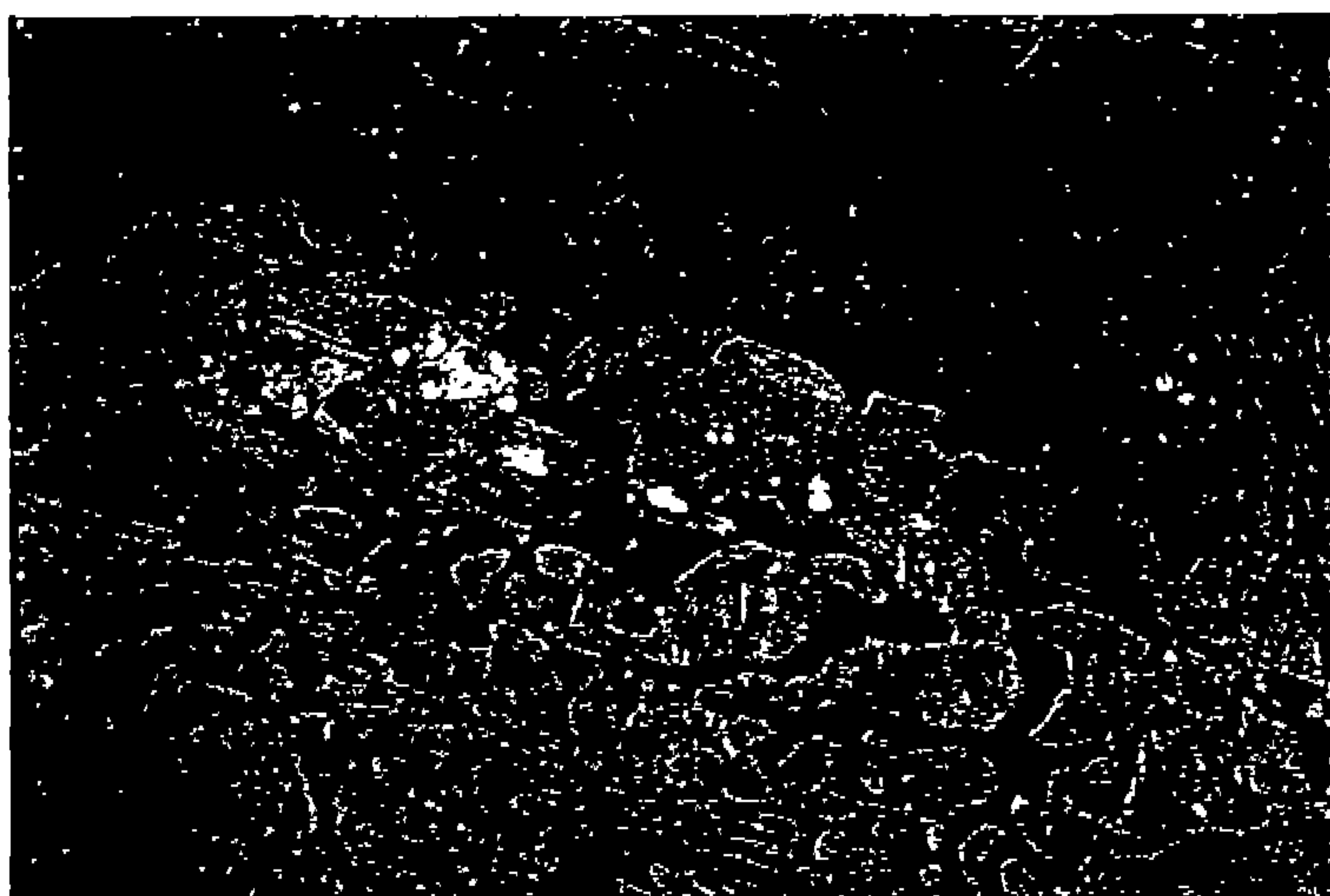
2



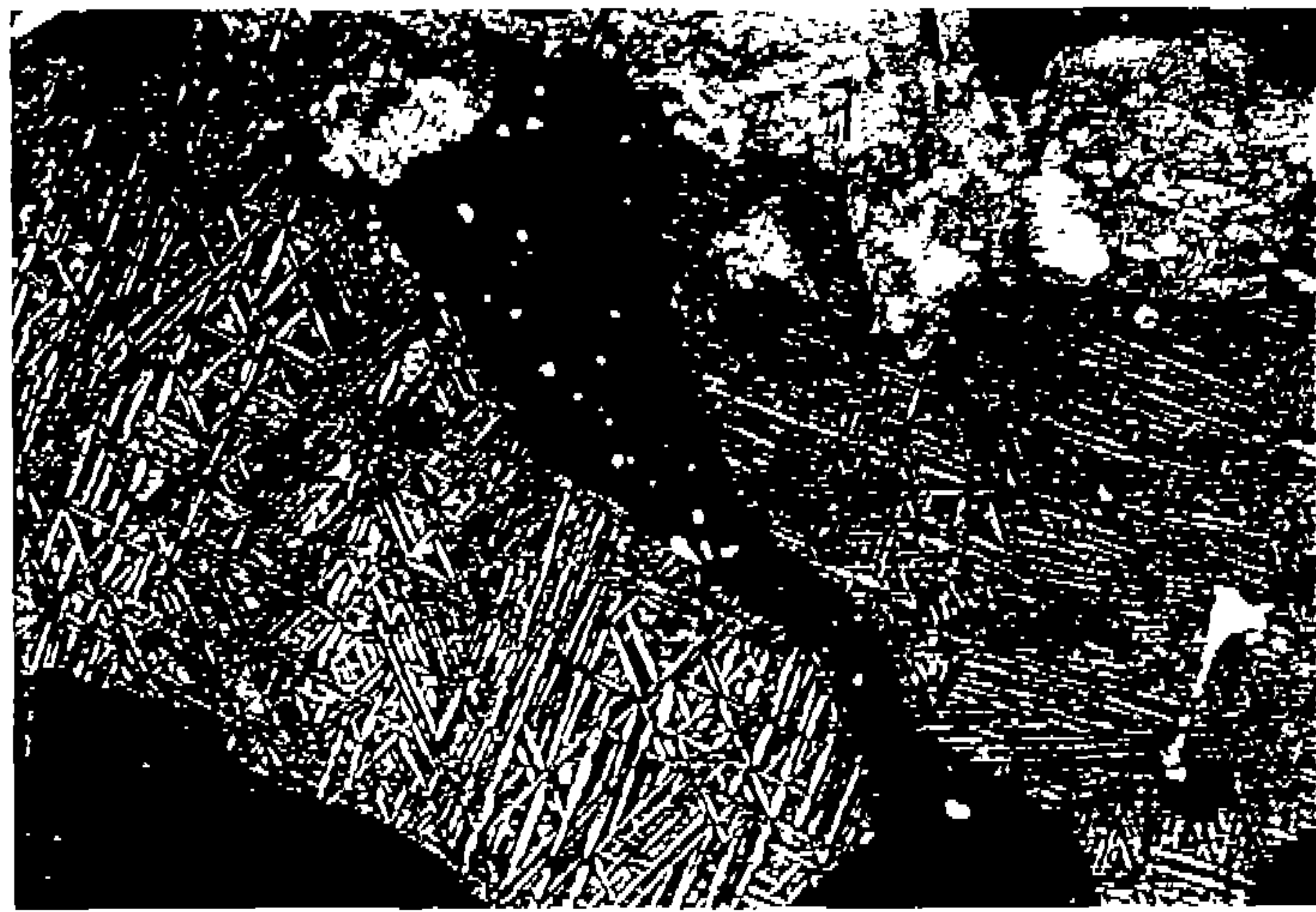
3



4



5



6

