PLATES

Abbreviations to plates :
ank – ankerite, ant – stibnite, ad – adularia, asp – arsenopyrite, apt – apatite; Au – native gold, Bi – native bismuth, bt – biotite, bo – boulangerite, bs – bismuthinite, bu – bournonite, cab – carbonates, cc – calcite, chlc – chalcedony, chl – chlorites; cov – covellite, chp – chalcopyrite, dol – dolomite; el – electrum, fal – tetrahedrite group, fe – Fe-hydroxides, gra – graphite, ga – galena, gu – gustavite, he – hematite, hes – hessite, ho – hornblende, il – illite; kao-chlc – kaolinite-chalcedony matrix, ti – titanite, mg – magnetite, mrs – marcasite, msc – muscovite; pl – plagioclase, po – pyrrhotite, py – pyrite, ru – rutile, ruc – rucklidgeite; scor – scorodite, ser – sericite, sid – siderite, sls – Pb-Ag-Bi-sulphosalts, sf – sphalerite, sulph – sulphide; ten – tennantite, ti – titanite, tur – tourmaline; q, q1 – quartz;

PLATE I

Types of ore mineralization and host rocks at the Radzimowice Au–As–Cu deposit

Photo 1. Cataclased massive arsenopyrite-pyrite-chalcopyrite ore in the main quartz vein from the –70 m level of the Wilhelm shaft.The youngest generation veinlets of marcasite and porous texture of ores caused by dissolution of carbonates. Sample no. M-22.

Photo 2. Arsenopyrite-chalcopyrite ore in chlorite schists. Sample no. M-22.

Photo 3.Arsenopyrite quartz-carbonate veinlets cutting strongly altered dacite porphyry from the northern ore field. Red-brown colours of veinlets and spots caused by Fe-hydroxides.

Photo 4. Sulphide mineralization (mainly pyrite) of veinlet-impregnation type within the altered dacite porphyry.

Photo 5. Pyrite impregnation of dacite porphyry. Pyrite formed pseudomorphs after biotite, and K-feldspars. Southern ore field. Sample no. Rdz. 7/5

Photo 6. Arsenopyrite mineralization of rhyodacite porphyry of veinlet-impregnation type. Note the massive arsenopyrite vein over 1 cm thick associated with black quartz. Northern ore field. sample no.

Photo 7. Brecciated and mylonitized quartz-sericite schist adjacent to the Miner consolation vein. The various angular rock fragments and sulphide impregnation (pyrite and chalcopyrite) in matrix. Sample no. Rdz. 2/2

Photo 8. Brecciated milky-white quartz vein cut by the younger generation pyrite veinlets hosted by black quartz-graphite schists. Sample no. Rdz. 4/1

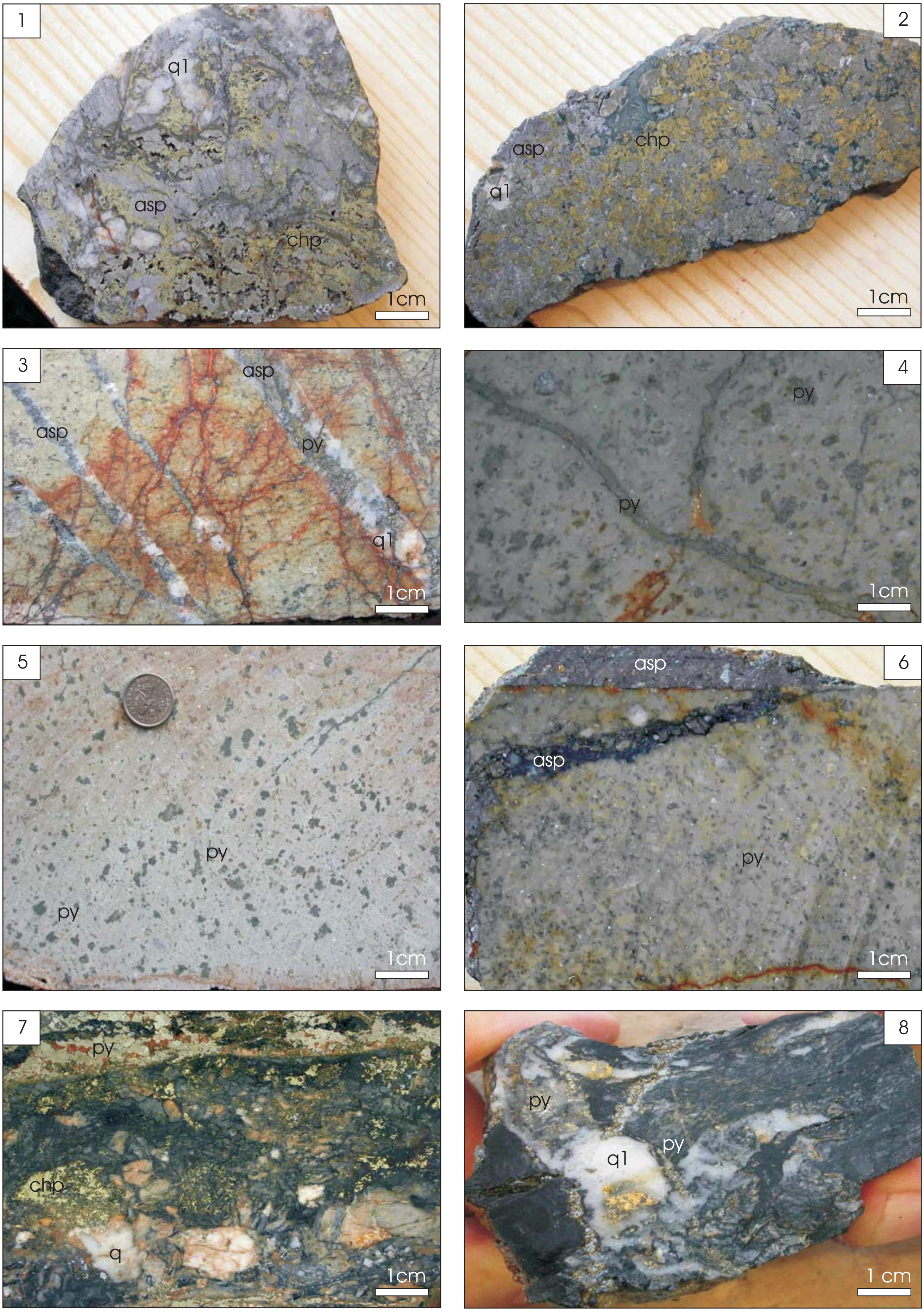
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PLATE II

The association of Au–Ag–Bi–Te–Pb–S minerals from the Radzimowice Au–As–Cu deposit, reflected light

Photos 1–7. The poly- and monomineral inclusions of different minerals of the Au–Ag–Te–Bi–Pb assemblage. Tellurium minerals are represented mainly by hessite, and gold minerals by electrum and native gold and bismuth minerals by native bismuth and bismuthinite. Co-bearing arsenopyrite and minor pyrite are hosts of the inclusions.

Photo 8. Chalcopyrite with electrum cemented fractured crystal of Co-arsenopyrite.

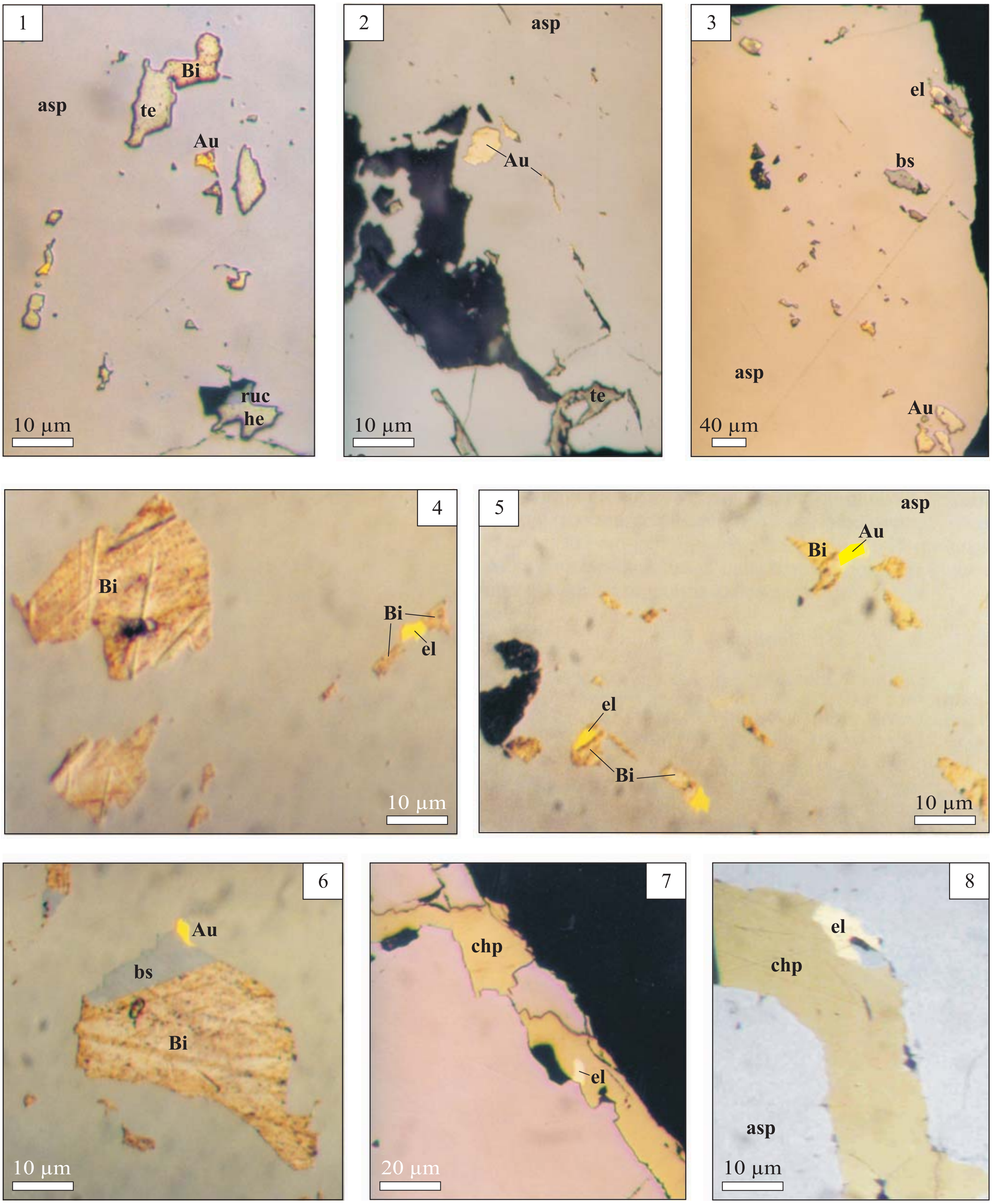
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PLATE III

Photographs of ore and associated minerals in igneous rocks under the reflected (Photos 1, 2 and 8) and transmitted lights (Photos 3–7) from the Radzimowice Au–Cu–As deposit

Photo 1. Pseudomorphs of pyrite after biotite phenocrysts with rutile relics (dark gray). Sample no. R34

Photo 2. Poikilitic texture of arsenopyrite with galena and native bismuth inclusions. Sample no. R36.

Photo 3. Quartz phenocrysts with characteristic rim of fine-grained quartz - sericite composition. Note black anhedral and euhedral fine crystals of sulphide (pyrite and arsenopyrite) replacing rock-forming minerals in matrix, and younger quartz-sulphide veinlet cutting dacite (black). Sample no. R29.

Photo 4. Pseudomorphs of sericite and calcite after plagioclase phenocrysts. Note also euhedral crystals of arsenopyrite and quartz-sulphide veinlet cutting dacite (black). Sample no. R6.

Photo 5. Quartz and biotite phenocrysts and sericite pseudomorphs (black) after plagioclase in dacite. Ore minerals are representing by anhedral pyrite and arsenopyrite. Sample no. R13.

Photo 6. Dacite cut by sulphide veinlet (black; pyrite and sphalerite) with adularia, and siderite in surrounding. Sample no. R37.

Photos. 7, 8. Pseudomorphs of pyrite and titanite after biotite and hornblende crystals in lamprophyre. Reflected (7) and transmitted lights (8).

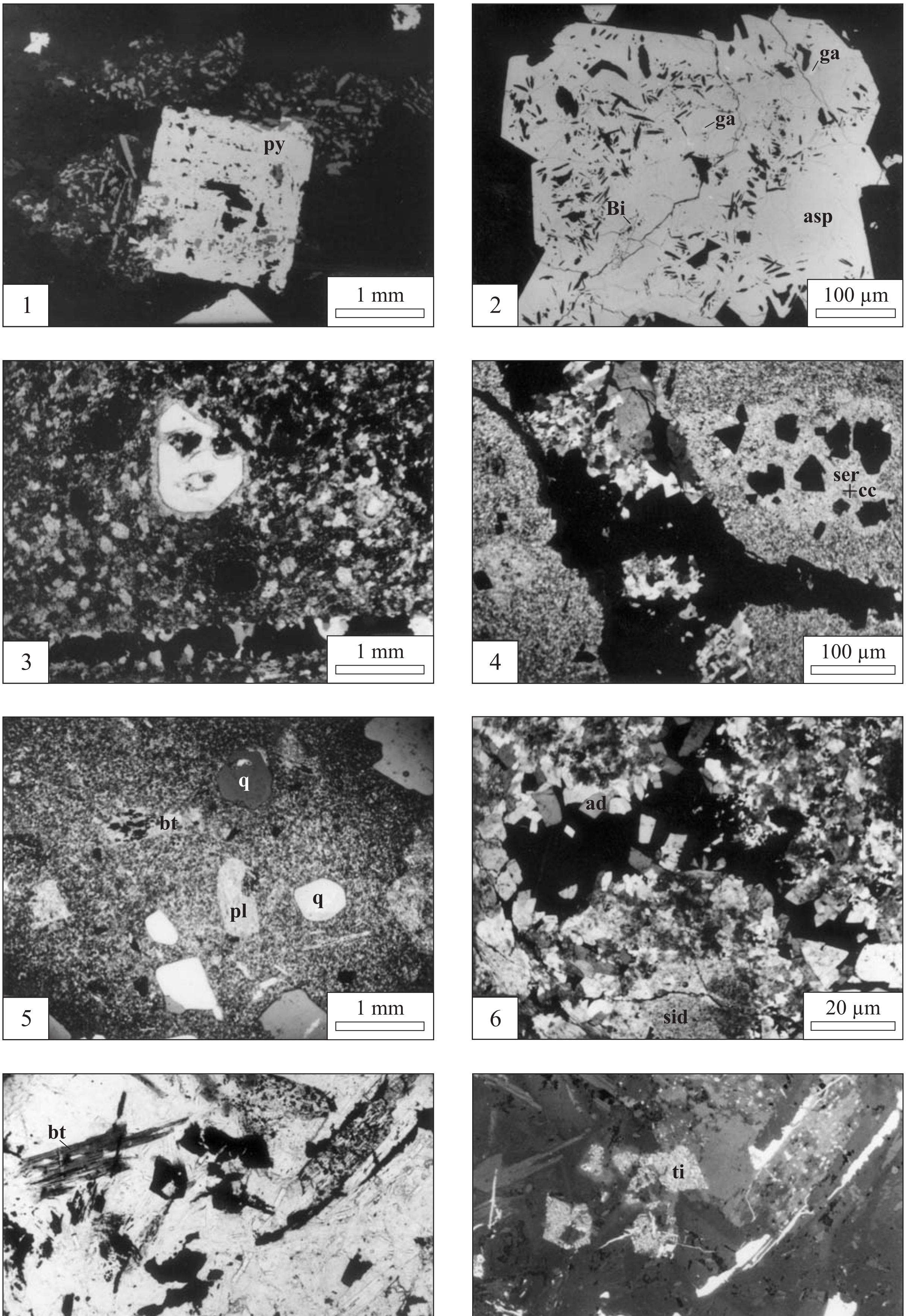
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PLATE IV

Photographs with well visible hydrothermal alteration of igneous rocks around the quartz-sulphide veins at the Radzimowice Au–Cu–As deposit.

Photo 1. Porphyric textures of altered dacite are poorly visible. Phenocrysts of plagioclase (light gray) replaced by sericite or muscovite with calcite, and of biotite (black) by epidote with rutile, and/or muscovite, and by pyrite or Fe-hydroxides. Biotite relics contain commonly primary magmatic acicular rutile.

Photo 2. The older generation veinlets of quartz with arsenopyrite are cut by numerous younger generation tiny veinlets of illite and Fe-hydroxides (light brown color)

Photo 3. Carbonate of various compositions represent younger stage of alteration that followed argilitization, feldspathization and silicification of dacite porphyry. Euhedral crystals of dolomite surrounded here by siderite in quartz-sulphide vein from the northern ore field.

Photo 4. Euhedral pyrite (black) is overgrown by calcite and fluorite (violet-blue). Cathodoluminescence light.

Photo 5. Dacite with open space fractures filling of chalcedony. Note common occurrence of pseudomorphs of illite and chalcedony after primary feldspar, and quartz phenocrysts. Pyrite that earlier replaced biotite or plagioclase is almost completely removed during oxidation.

Photo 6. Zonal quartz phenocrysts surrounded by narrow rim of fine-crystalline chalcedony. Cathodoluminescence light.

Photo 7. Dacite moderately sericitized and illitized (tiny white spots) contain numerous euhedral sulphide (dark). Dacite is crosscut by dolomite and low temperature quartz veinlets (white). Enrichment in Fe-hydroxides adjacent to veinlets is marked by orange color.

Photo 8. Fine-crystalline chalcedony filling partly the open space fractures after primary sulphide veinlets. Presence of chalcedony indicating for oxidation condition. Note weak visible phenocrysts of plagioclase and quartz are almost completely replaced by illite and chalcedony.

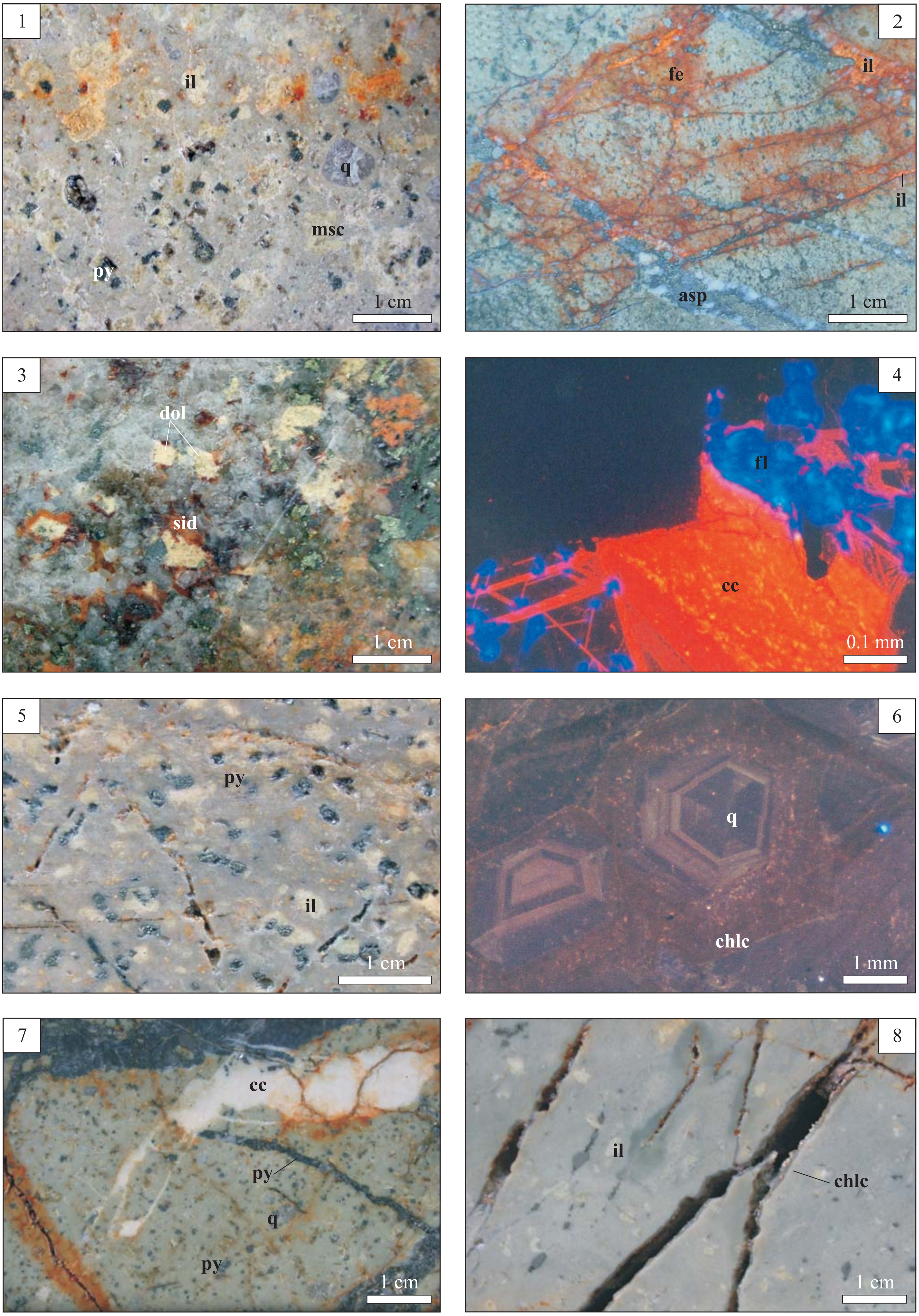
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PLATE V

The representative sulphide from the Radzimowice and Klecza–Radomice abandoned gold mines
in the Kaczawa Mountains selected for the age analyses by the Re–Os methods.

Photo 1. Overgrowths of chalcopyrite on pyrite cubic crystal. Radzimowice deposit. Sample no. Rdz 3/1.

Photo 2. Intergrown of euhedral pyrite crystals from Radzimowice deposit. Sample no. M-22.

Photos 3–5. Separated fragments of pyrite and Co-arsenopyrite anhedral crystals from the Radzimowice deposit. Sample no. M-22.

Photo 6. Separated crystals of Co-arsenopyrite from Radzimowice deposit. Sample no. St 3/1-2.

Photos 7, 9, 10. Rhombohedric single and twin crystals of Co-arsenopyrite from the Klecza deposit. Sample no. S-43.

Photo 8. Fragment of pyrite crystal overgrown by quartz. Golejów deposit. Sample no. G-8.

Photo 11. Twin crystals of Co-arsenopyrite from Klecza deposit. Sample no. S-45.


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PLATE VI

Types of gold-bearing sulphide ore mineralization at the Klecza–Radomice ore district

Photo 1. Massive arsenopyrite ore in the main quartz vein cutting sericite schist from Radomice. Note the cataclased coarse-grained quartz and arsenopyrite big crystals.

Photo 2. Well-visible post-ore brittle deformation. Strongly cataclased quartz vein containing massive arsenopyrite mineralization which was mylonitized and formed so called "arsenic powder". Along the fractures sulphide are replaced by Fe-hydroxides causing red-brownish staining.

Photo 3. Sulphide represented mainly by arsenopyrite cementing brecciated quartz-sericite schist.

Photo 4. Enlarged fragment of Photo 3. Numerous angular fragments of sericite schists are cemented by quartz and sulphide. Note that gray-blue coarse-grained quartz and sulphide was subject of the younger fracturing.

Photo 5. Brecciated massive sulphide (arsenopyrite) with quartz hosted by quartz-sericite schist.

Photo 6. Massive arsenopyrite-pyrite ores. Note numerous angular fragments of quartz-sericite schist in sulphide matrix.

Photo 7. Fractured gray quartz of the 1st generation is filled by micro-veinlets of carbonates (orange – ankerite; white – calcite; red-brown – siderite). Note fine-grained base metal sulphide associated with carbonates.

Photo 8. Strongly fractured white quartz filled by numerous pyrite-marcasite veinlets and fine-crystalline quartz, carbonates, and kaolinite.

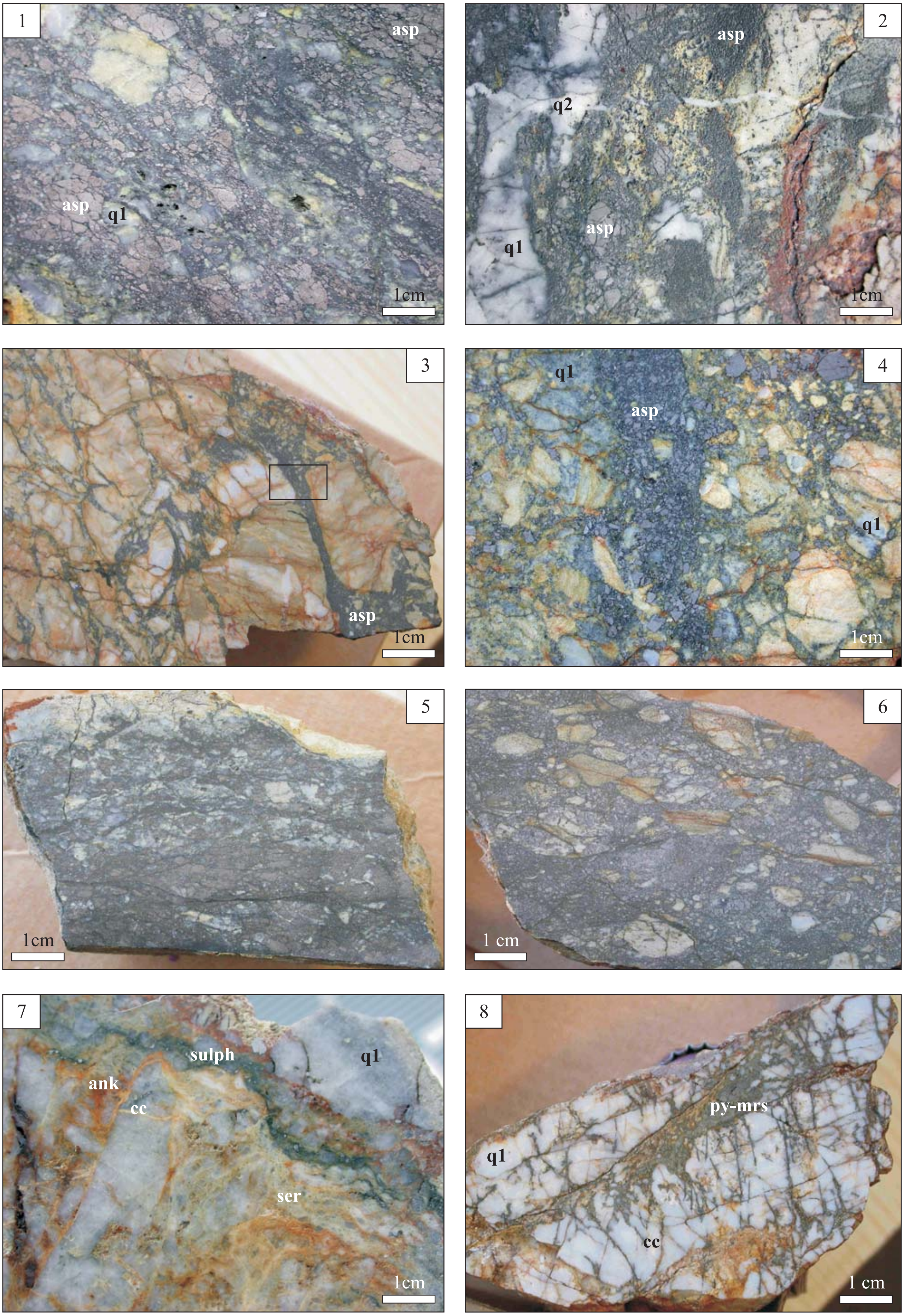
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PLATE VII

Photographs of ore minerals in transmitted (Photo 2) and reflected (other) lights from the Radomice area.

Photo 1. Quartz vein (black) with strongly fractured and cataclased gold-bearing arsenopyrite (white). Sample no. S-46.

Photo 2. Fractured euhedral medium-grained arsenopyrite (black rhomboids). Note well-visible fine fragments of cataclased arsenopyrite (black) in sericite-chalcedony matrix. Sample no. R62.

Photo 3. Arsenopyrite and pyrite replaced by chalcopyrite and galena. Note numerous inclusions of galena and chalcopyrite micro-veinlets. Black fields, spots are carbonates. Sample no. R44.

Photo 4. Association of chalcopyrite, sphalerite and tetrahedrite intergrowths with carbonates (gray) in cataclastic quartz (black). Note numerous very fine chalcopyrite (white) inclusions in sphalerite (light gray). Sample no. R44.

Photo 5. Poly-mineral inclusions of galena, sphalerite, chalcopyrite and electrum within coarse-grained euhedral arsenopyrite. Sample no. R-44.

Photo 6. Fractured arsenopyrite cut by galena-electrum micro-veinlets. Sample no. S-48a.

Photo 7. Two varieties of hydrothermal pyrite. Fine- and medium-grained crystals of anhedral pyrite with poikilitic core are subject of recrystallization by euhedral pyrite. Sample no. R39.

Photo 8. The hair-like form of marcasite and pyrite that are filling fractures within cataclastic quartz (black) and anhedral arsenopyrite. Sample no. S-46.

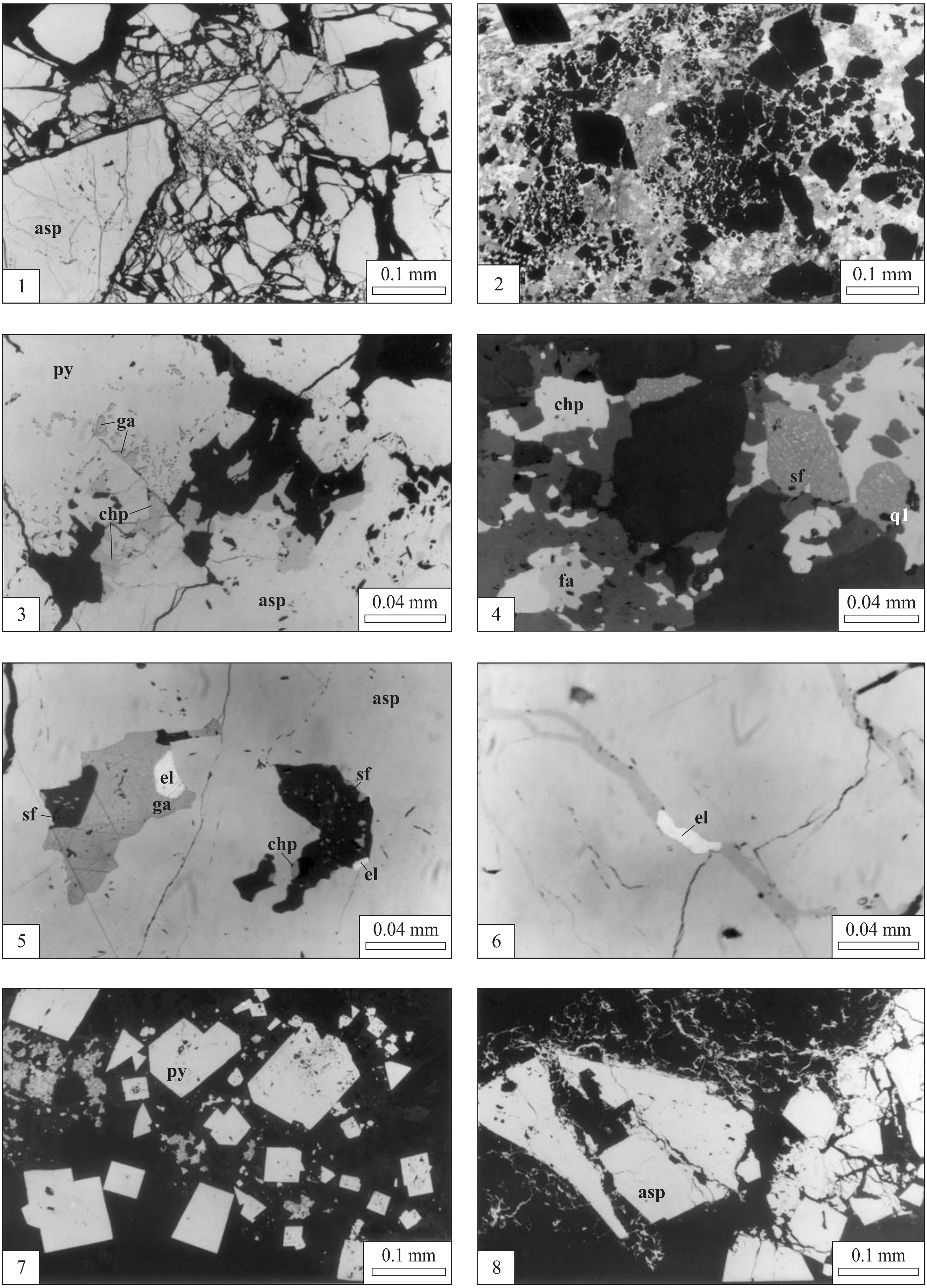
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PLATE VIII

Photographs of characteristic host rocks of gold-bearing ore from Klecza and Nielestno (Photos 4 and 5)

Photo 1. Brecciated and fractured form of white quartz of the 1st generation. Note the angular fragments of quartz in red Fe-hydroxides matrix. Numerous micro-fractures are filled by fine-crystalline glossy quartz. White color mineral is kaolinite. Sample no. R59.

Photo 2. Massive coarse-crystalline gray-white quartz vein with abundant sulphide (major pyrite) of impregnation-veinlet character. Big euhedral pyrite crystals and aggregates are fractured. Sample no. G-4.

Photo 3. Strongly cataclased and fractured massive coarse-crystalline gray-white quartz vein with rare sulphide. Numerous fissures are filled by carbonates of various composition associated with base metal sulphides and Fe-hydroxides and electrum. Note the strong sericitization of the hosting schists marked by yellow-green color. Sample no. G-2.

Photo 4. Cataclased coarse-grained quartz cemented by milky quartz, dolomite, hematite and Fe-hydroxides. Sample no. S-60.

Photo 5. Massive vein of white quartz fractured and filled by the younger generation micro-veinlets of glossy quartz and Fe-hydroxides. Sample no. 82.

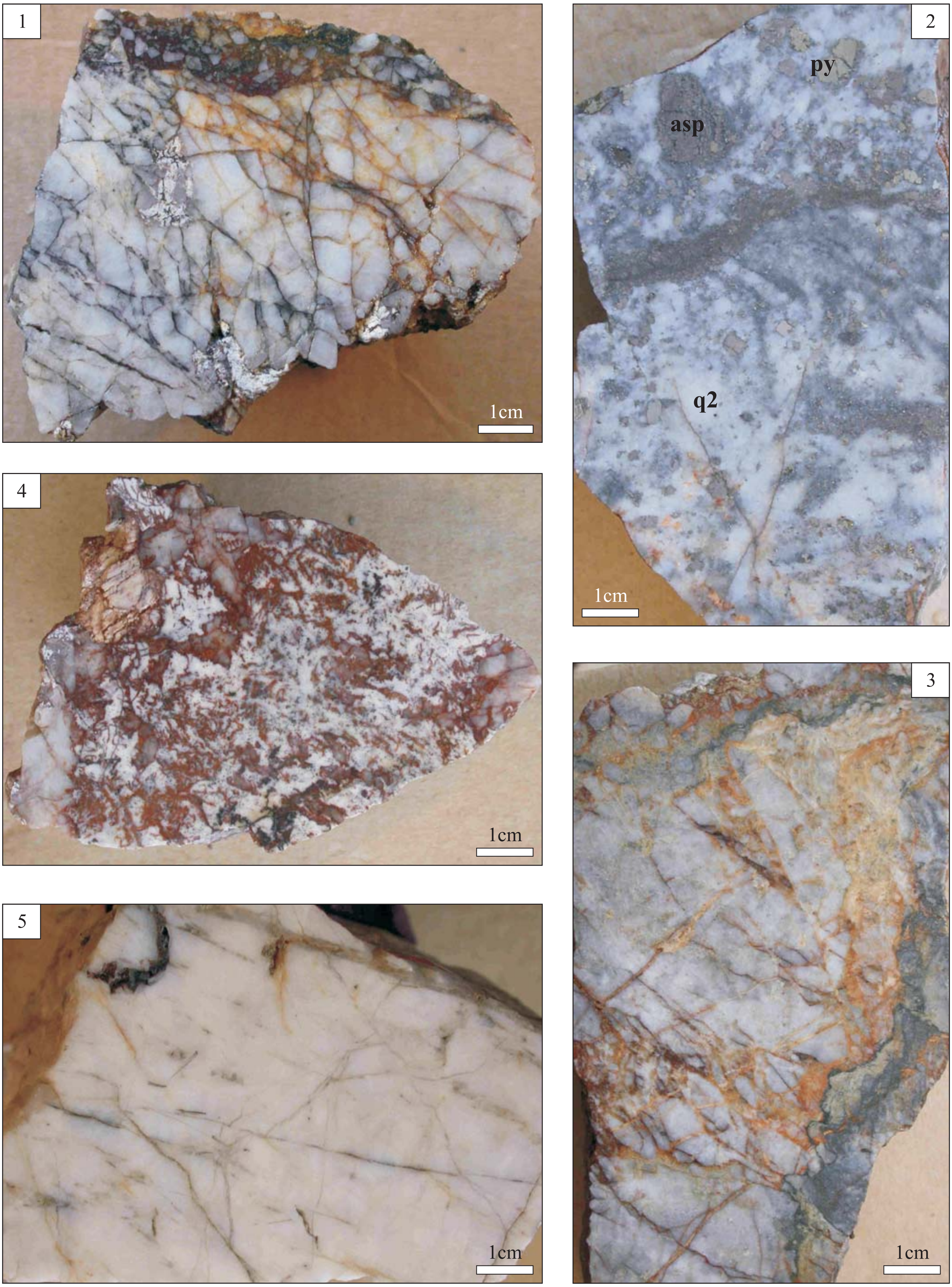
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PLATE IX

Photographs and BSE images of various generations of pyrite and carbonate
from the abandoned Klecza–Radomice gold ore district.

Photo 1. Different folding of the individual layer of schist. Some of layers are enriched in Fe-hydroxides. F_{2A} open asymmetric folds with vergence to the right (north). Section perpendicular to L_1 lineation and S_1 foliation. Sample from the Klecza area.

Photo 2. Quartz-graphite schist from Klecza enriched in organic matter and framboidal pyrite. Sample no. R65.

Photo 3. Framboidal pyrite (py1a) in graphite schist from Klecza. Sample no. R65.

Photo 4. Big fractured crystals of graphite in association with abundant framboidal pyrite in chlorite. Sample no. R65 from Klecza.

Photo 5. Framboidal pyrite (py1a) is subject of recrystallization by anhedral pyrite (py1b, 2). Sample no. R65.

Photo 6. Enlargement of Photo 5. Recrystallization of framboidal pyrite into younger generation anhedral pyrite (py2). Note the gain of As and lose of Ni in the second generation pyrite in comparison to the framboidal pyrite.

Photo7. Skeletal (anhedral) pyrite (py3a) intergrown with carbonate and euhedral pyrite (py3b) as the last phase of recrystallization of skeletal pyrite to fully idiomorphic forms. Breccia of sericite schists from Radomice. Sample no. R39.

Photo 8. Numerous inclusions of arsenopyrite and rare electrum in pyrite of the 3rd generation (py3b). Radomice, sample (R44) – cataclased sericite/muscovite schist. Note that darker and lighter areas in pyrite crystal reflect also different Ni, Co, and As admixtures.

Photos 3–5, 7 and 8 by P. Dzierżanowski

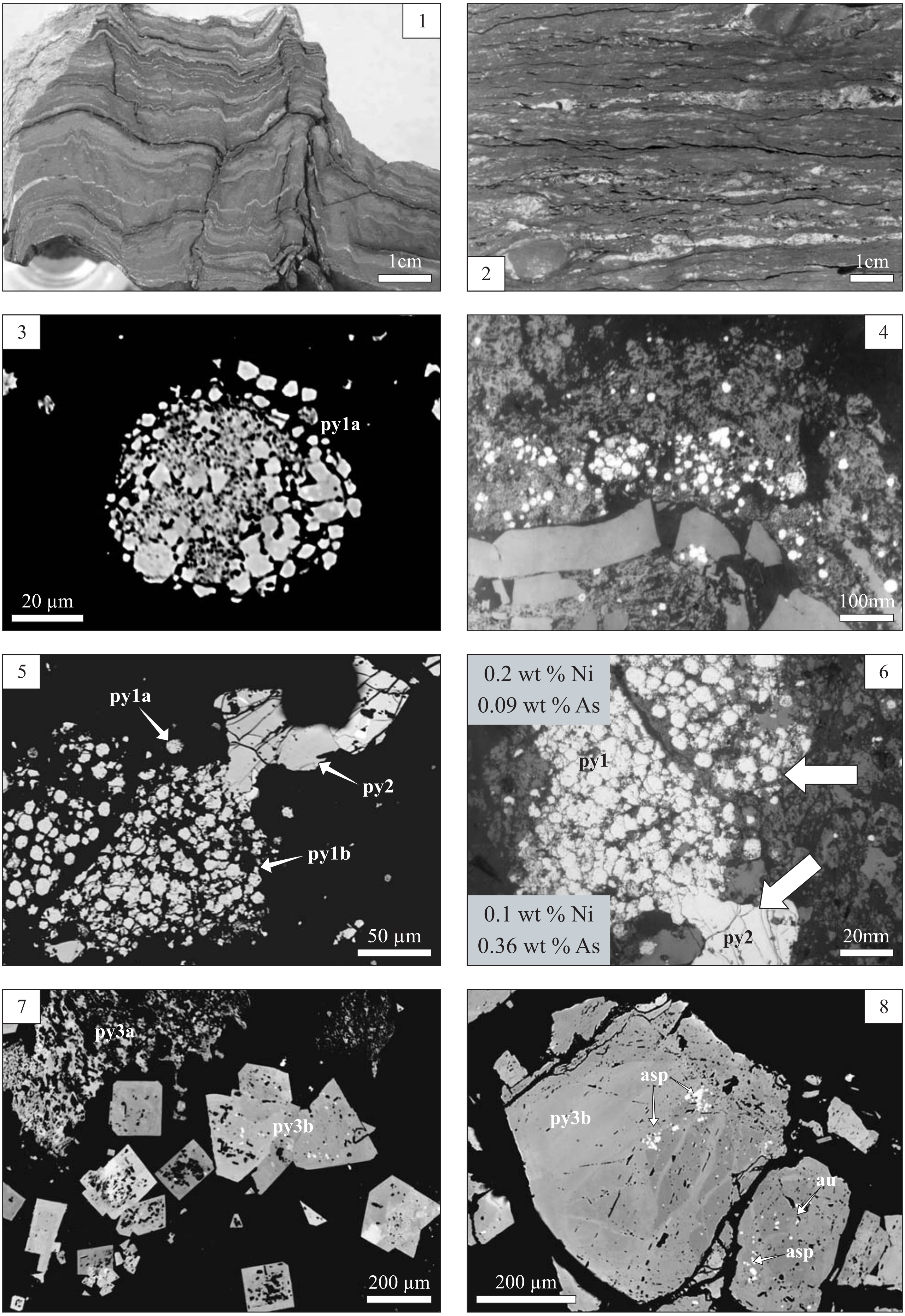
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PLATE X

Photographs of ore minerals in reflected (1–7) and transmitted (8) lights from the Klecza area.

Photo 1. Two generations of pyrite (white) – the framboidal and recrystallized (py2) in quartz-graphite schists. Note a big crystal of graphite (gray). Sample no. R65.

Photo 2. Hematite idioblasts (white) of acicular habit between sericite-rich laminae and in fractures. Sample no. R57.

Photo 3. Quartz vein (black) with strongly fractured and cataclased gold-bearing pyrite (white). Sample no. R63.

Photo 4. Massive quartz vein (black) with cataclased euhedral pyrite cemented by chalcopyrite. Sample no. R62.

Photo 5. Fractured pyrite and euhedral arsenopyrite replaced by galena. Sample no. R63.

Photo 6. Sphalerite (gray) with numerous chalcopyrite (white) inclusions. Note, locally very narrow rims of galena (white) on sphalerite. Sample no. R62.

Photo 7. Marcasite replacements of euhedral pyrite. Sample no. R63.

Photo 8. Ankerite euhedral crystals with narrow rims of Fe-hydroxides (black) in kaolinite/illite-chalcedony matrix. Note anhedral chalcopyrite (black) mineralization between quartz coarse crystals and in association with carbonates. Sample no. R60.

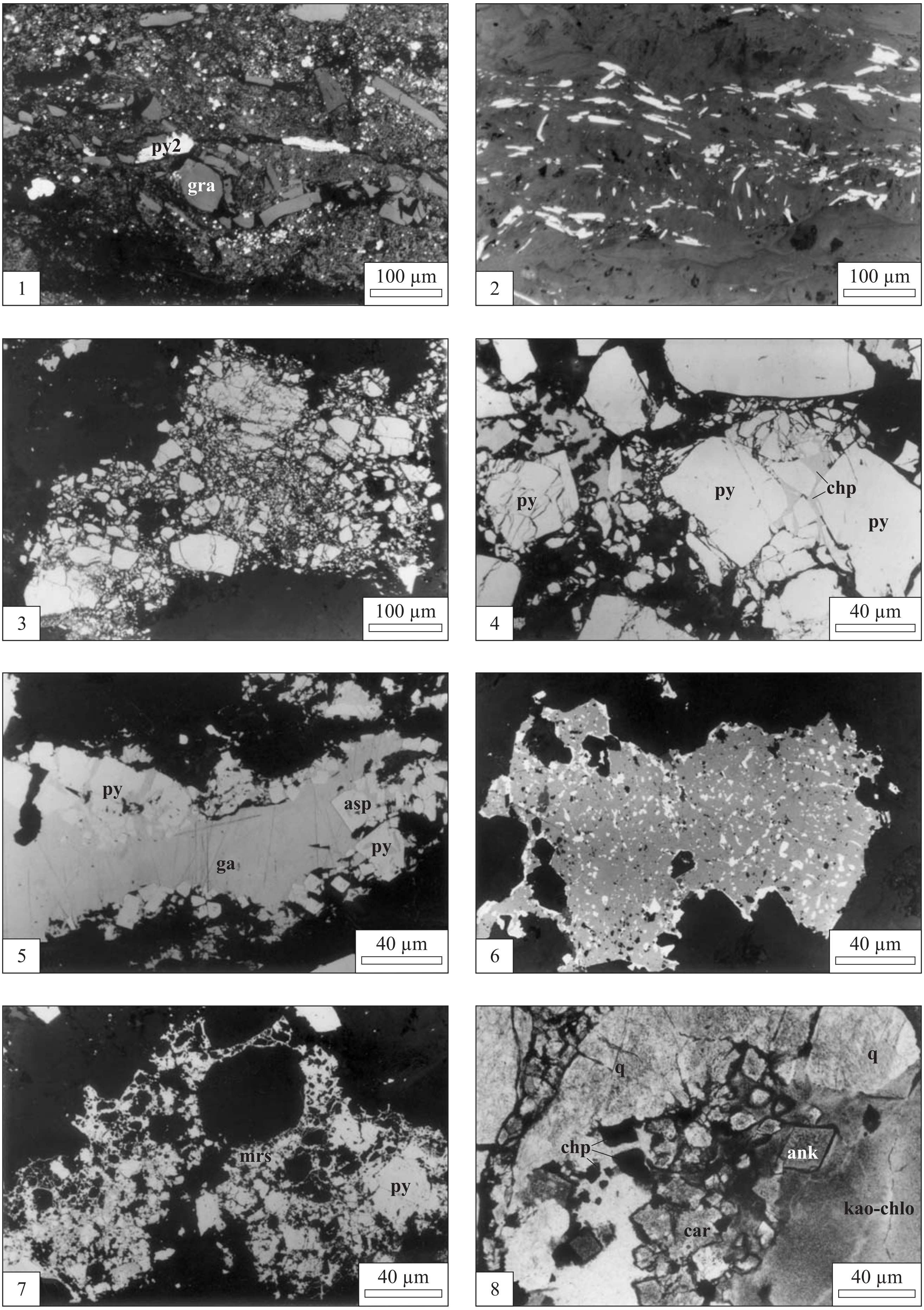
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PLATE XI

Photographs of ore minerals in transmitted (Photos 1, 2, 7 and 8) and reflected (Photos 3–6) lights from Nielestno area

Photo 1. Folded laminae built of fine-crystalline quartz; sericite and organic matter (black) are subject of younger shearing and micro-faulting. Note also the youngest micro-fracture filled by fine-crystalline quartz. Sample no. R74.

Photo 2. Euhedral fine-grained pyrite (black) in fractures between graphite-muscovite laminae (dark gray) and in quartz (white). Sample no. R53.

Photo 3. Gold and relics of primary sulphide (arsenopyrite and pyrite) in chalcedony. Covellite formed after chalcopyrite. Sample no. R80.

Photo 4. Replacement of arsenopyrite by scorodite (dark gray) and Fe-hydroxides (gray) and of chalcopyrite by covellite. Sample no. R80.

Photo 5. Iron redistribution from primary arsenopyrite and chalcopyrite into the low temperature hematite of acicular habit that is associated with chalcedony. Sample no. Ra 34.

Photo 6. Hematite of fibro-radial aggregates with goethite core in kaolinite-chalcedonic matrix in cataclased quartz vein. Sample no. S-60.

Photo 7. Rhombohedric crystals of dolomite with narrow rims of Fe-hydroxides (black). Sample no. R 68.

Photo 8. Fractured sulphide grains (black) in quartz cemented by chalcedony. Sample no. Ra 34.

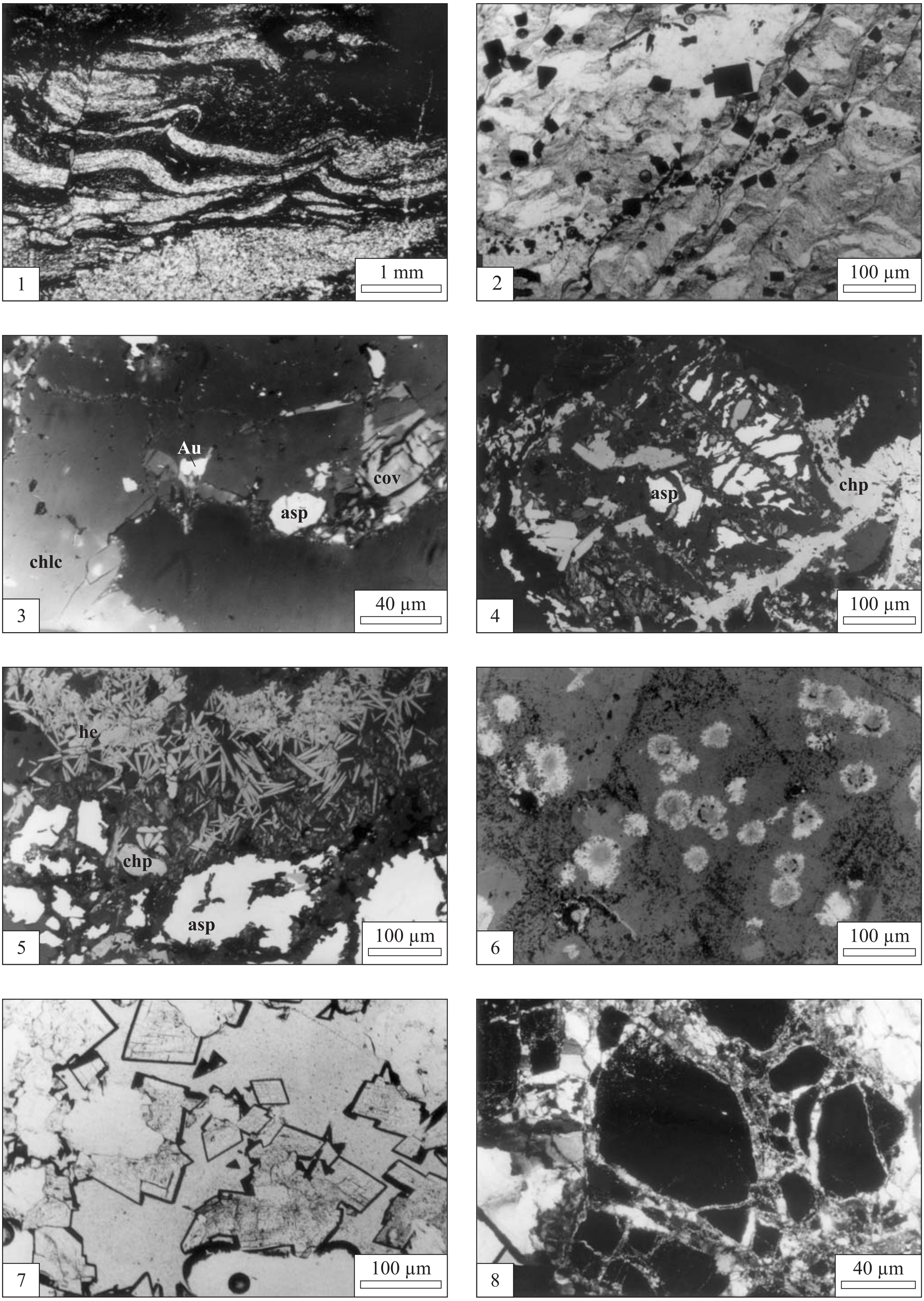
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PLATE XII

Gold in association with sulphide in reflected light (1–8) in the Klecza–Radomice area

Photo 1, 2. Electrum overgrown on arsenopyrite in quartz vein (black). Microphotographs in reflected light, parallel (1) and crossed nicols (2). Sample no. G-7.

Photo 3. Numerous inclusions of electrum hosted by arsenopyrite. Sample no. G-5.

Photo 4. Monomineral inclusions of electrum and galena distributed in micro-fractures of anhedral arsenopyrite. Broken arsenopyrite crystals are cemented by coarse crystalline quartz (black). Sample no. G-7.

Photo 5. Various sulphide inclusions (sphalerite – gray; chalcopyrite – dark yellow; galena – light gray) in association with electrum (light yellow) hosted by arsenopyrite. Note cobaltite euhedral cubic crystal (co) in arsenopyrite. Sample no. G-3.

Photo 6. Association of base metal sulphide with electrum in inclusions hosted by arsenopyrite. Note the elongated inclusions of chalcopyrite and gold in sphalerite. Sample no. R-44.

Photo 7. Micro-veinlets of galena-electrum filling fractures in coarse-grained euhedral arsenopyrite in quartz vein. Sample no. Ra 18.

Photo 8. Electrum filling fracture in coarse-grained arsenopyrite. Sample no. G-7.

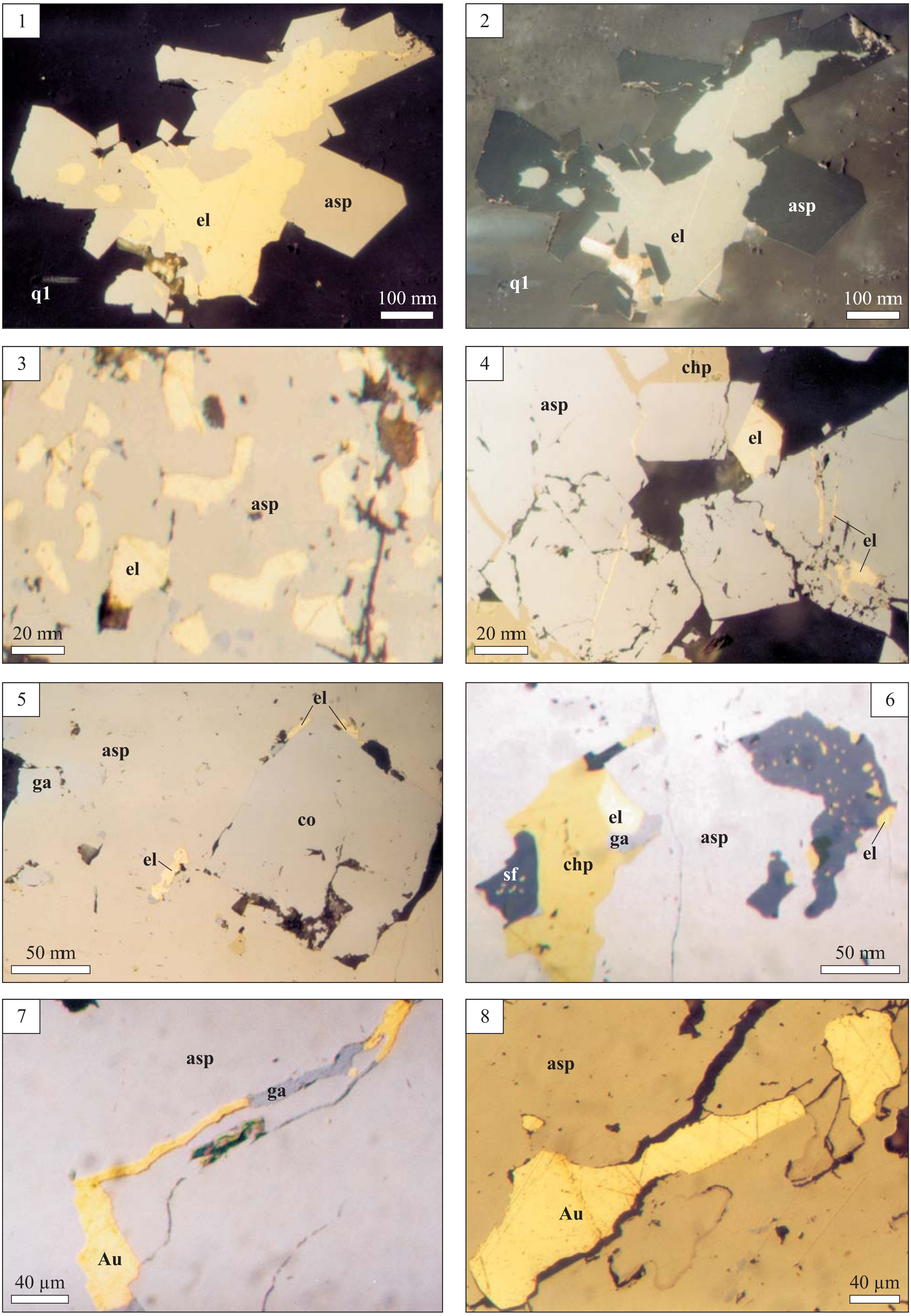
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PLATE XIII

Intergranular gold with chalcedony in the cataclased quartz-graphite-sericite schist from Klecza (Photos1–4) and Radomice (Photos 5–8)

Photo 1. Free gold in ankerite in association with chalcopyrite and graphite. Sample no. G-7.

Photo 2. Free gold in chalcedony which is cemented fractures in coarse-crystalline quartz. Sample no. R61.

Photo 3. Numerous fine-grained euhedral pyrite and arsenopyrite grains (black) surrounded by chalcedony (light gray). Numerous micro-veinlets of galena with electrum occur in fractured sulphide. Sample no. G-7.

Photo 4. Free gold micro-grains (Au – 82.8 wt%; Ag – 16.3 wt %) in paragenesis with chalcedony (white) filling fractures and intergranular spaces. Note fractured scorodite crystal (gray) cut by fine-crystalline quartz. BSEI. Sample no. R79.

Photos. 5, 6. Native free gold in chalcedony quartz (light gray). Strongly cataclased quartz-sericite-muscovite schist is cemented by chalcedony. Sample no. R79.

Photo 7. Characteristic rosettes of chalcedony which cemented cataclased coarse-grained quartz. Note the black holes which formed after acidic dissolution of primary sulphide. Sample no. R-79.

Photo 8. Chalcedony rim around coarse-grained arsenopyrite (black) which contains micro-veinlets and inclusions of galena, sphalerite and electrum. Sample no. R-44.

Photographs in: reflected light (1, 2, 4–6) and transmitted light (3, 7 and 8).

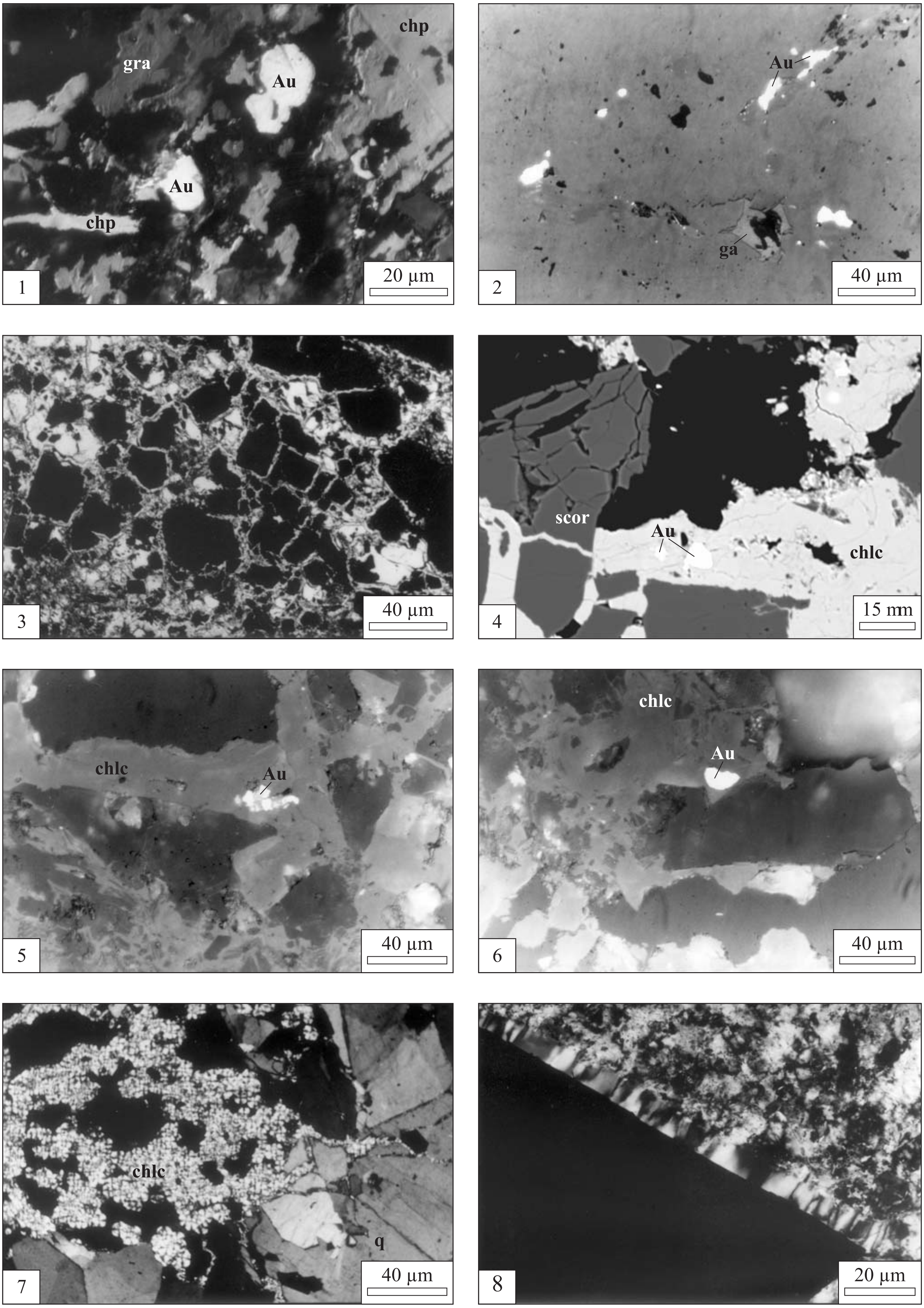
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PLATE XIV

Photographs of the ore minerals association and the host rock alteration at the Klecza–Radomice ore district. Cathodoluminescence and transmitted light (Photos 4 and 8)

Photo 1. Coarse- and fine-crystalline hydrothermal quartz generations with sulphide mineralization (black). Note the various colors of quartz (dark brown – coarse-grained euhedral quartz of the first generation). Sample no. G-1.

Photo 2. Characteristic rim of clay minerals (green – kaolinite) surrounding arsenopyrite euhedral crystal. Note also clay minerals filling micro-fissures in rock. Sample no. R44.

Photo 3. Kaolinite (blue) associated with chalcedony (yellow) are filling fractures and intergranular spaces in sulphide ores represented mainly by pyrite (black). Sericite schist. Sample no. Ra 19.

Photo 4. Euhedral crystals of tourmaline (green) in association with muscovite and chlorite (brown). Sample no. R77.

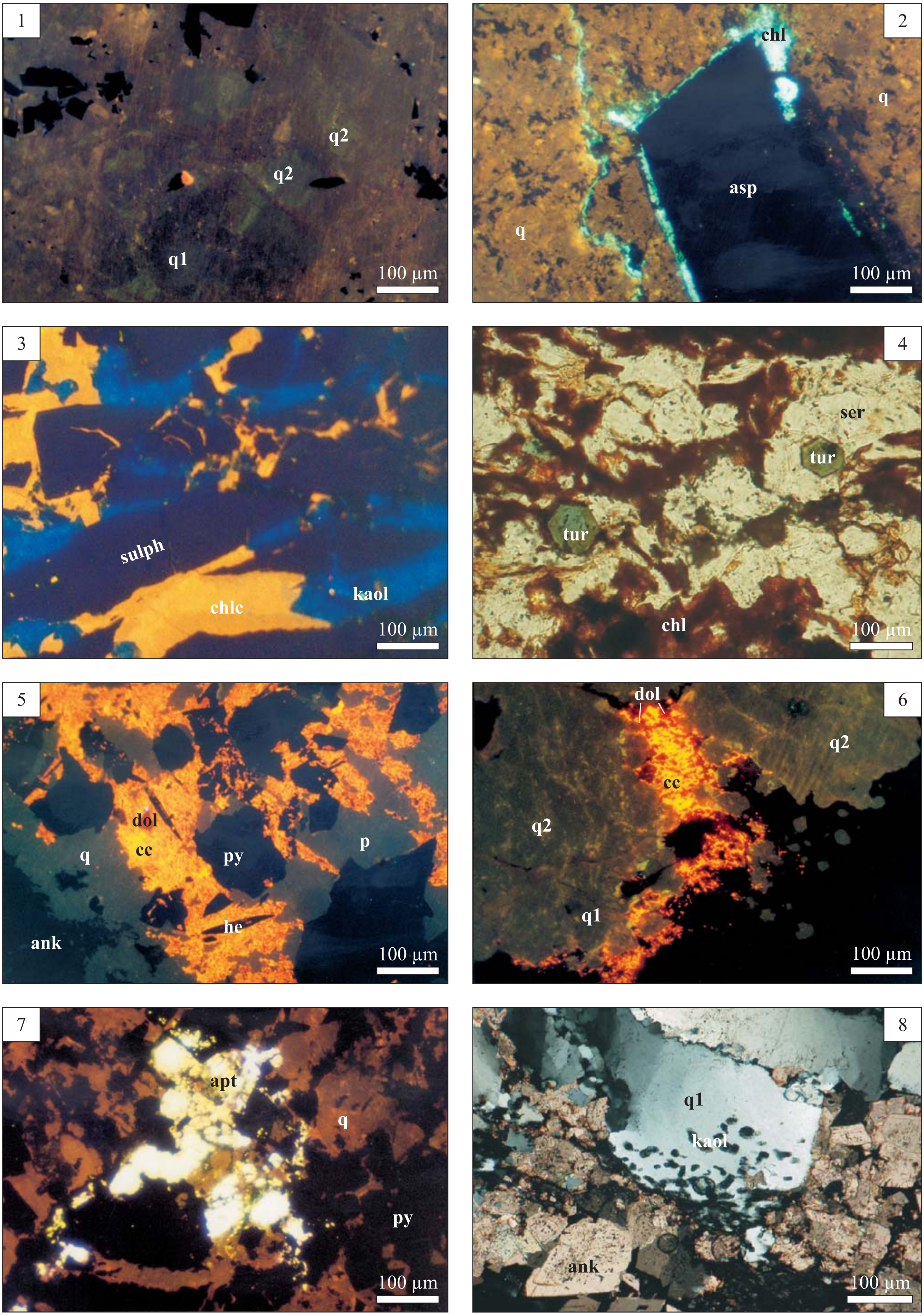
Photo 5. Fractured coarse-crystalline quartz and pyrite cemented by various composition carbonates. Note the euhedral large crystal of ankerite and fine-grained crystals of dolomite (red) and euhedral hematite in the younger generation calcite. Sample no. Ra 15.

Photo 6. Strong carbonatization (calcite – yellow; dolomite – red) of fractured quartz and sulphide ore (black). Sample no. S-60.

Photo 7. Fractured coarse-crystalline quartz and pyrite cemented by hydrothermal apatite. Note the remnants of fine-grained apatite of sedimentary-metamorphic origin. Sample no. Ra 18.

Photo 8. Euhedral ankerite and dolomite crystals cementing fractured coarse-crystalline quartz. Notice the micro-crystalline quartz between coarse-grained quartz. Kaolinite is the main clay mineral represented mostly as numerous inserts in quartz. Sample no. R68.

PLATE XIV


1
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