

**COMPOZIȚIA CHIMICĂ
ȘI
MINERALOGICĂ
A
SCOARȚEI TERESTRE**



Clasificarea mineralelelor

- Numărul total de specii minerale cunoscute până în prezent (peste 4100) se repartizează claselor minerale în următoarele proporții: silicați – 25,8%, fosfați – 17,5%, sulfuri – 13,3%, oxizi și hidroxizi – 12,4%, sulfati – 8,4%, halogenuri – 5,8%, carbonați – 4,5%, elemente native – 3,3%, borați – 2,9% *etc.*
- După gradul de participare la compoziția scoarței terestre, mediile sunt aproximativ următoarele: silicați și silice – 81%, oxizi și hidroxizi – 14%, carbonați – 0,7%, fosfați – 0,7%, halogenuri – 0,5%, sulfuri – 0,15%, elemente native – 0,1% *etc.*

CLASIFICĂRILE MODERNE CU RELEVANȚĂ ȘI ÎN GEOLOGIA ECONOMICĂ AU LA BAZĂ CRITERIILE COMPOZIȚIEI CHIMICE ȘI STRUCTURAL.

PRINCIPALELE CLASE DE MINERALE SUNT URMĂTOARELE:

1. ELEMENTELE NATIVE

2. SULFURI, SULFOSĂRURI ȘI COMUȘII SIMILARI

3. OXIZI ȘI HIDROXIZI

4. HALOGENURI

5. CARBONAȚI, NITRAȚI ȘI BORAȚI

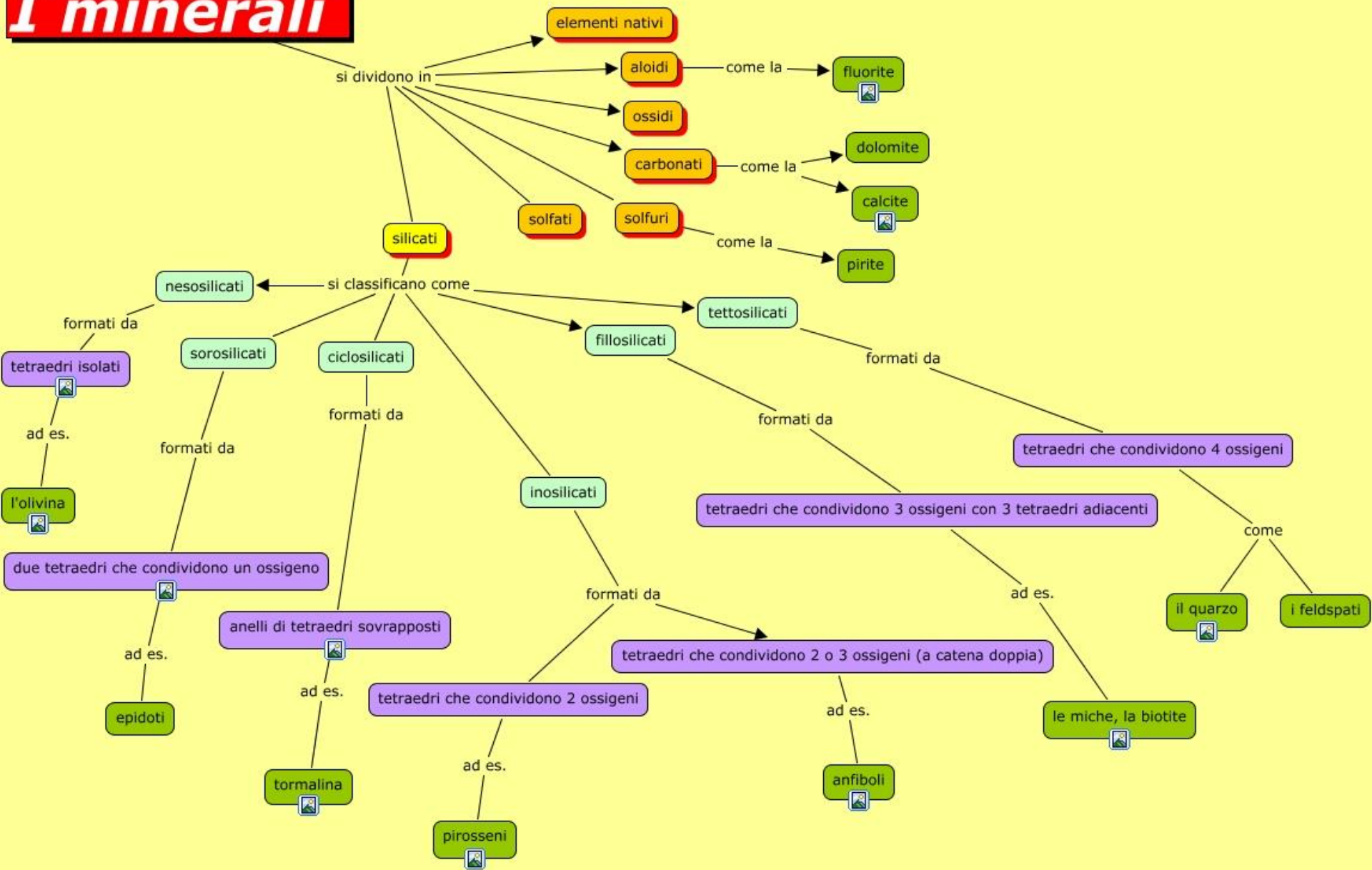
6. SULFAȚI, CROMAȚI ȘI SELENIAȚI

7. FOSFAȚI, ARSENIATAȚI, VANADAȚI

8. SILICAȚI



I minerali



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18						
1 H Hydrogen 1.00794	Atomic # Symbol Name Atomic Weight																2 He Helium 4.002602						
3 Li Lithium 6.941	4 Be Beryllium 9.012182	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">C Solid</div> <div style="border: 1px solid black; padding: 2px;">Hg Liquid</div> <div style="border: 1px solid black; padding: 2px;">H Gas</div> <div style="border: 1px solid black; padding: 2px;">Rf Unknown</div> </div>																5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
11 Na Sodium 22.98976...	12 Mg Magnesium 24.3050	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">Metalloids</div> <div style="border: 1px solid black; padding: 2px;">Other nonmetals</div> <div style="border: 1px solid black; padding: 2px;">Halogens</div> <div style="border: 1px solid black; padding: 2px;">Noble gases</div> </div>																13 Al Aluminium 26.9815388	14 Si Silicon 28.0855	15 P Phosphorus 30.973762	16 S Sulfur 32.065	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955912	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938045	26 Fe Iron 55.845	27 Co Cobalt 58.933195	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.798						
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.96	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.293						
55 Cs Caesium 132.9054...	56 Ba Barium 137.327	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.94788	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.084	79 Au Gold 196.966569	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98040	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)						
87 Fr Francium (223)	88 Ra Radium (226)	89-103	104 Rf Rutherfordium (267)	105 Db Dubnium (268)	106 Sg Seaborgium (271)	107 Bh Bohrium (272)	108 Hs Hassium (270)	109 Mt Meitnerium (276)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (280)	112 Cn Copernicium (285)	113 Uut Ununtrium (284)	114 Uuq Ununquadium (289)	115 Uup Ununpentium (288)	116 Uuh Ununhexium (293)	117 Uus Ununseptium (293)	118 Uuo Ununoctium (294)						

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La Lanthanum 138.90547	58 Ce Cerium 140.116	59 Pr Praseodymi... 140.90765	60 Nd Neodymi... 144.242	61 Pm Promethi... (145)	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92535	66 Dy Dysprosi... 162.500	67 Ho Holmium 164.93032	68 Er Erbium 167.259	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.9688
89 Ac Actinium (227)	90 Th Thorium 232.03806	91 Pa Protactini... 231.03688	92 U Uranium 238.02891	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)

- ***Elementele native*** - numărul total al speciilor minerale și varietăților minerale din clasa elementelor native este de cca. 80, depășind numărul elementelor chimice care intră în componența lor (cca. 35). aceasta se explică prin aceea că unele elemente în natură se găsesc în două sau mai multe stări alotropice: carbonul (diamant și grafit), sulfurul (alfa și beta) *etc.* De asemenea, elementele native se pot găsi sub forma unor soluții solide: electrum (Au și Ag), nichel–fier, platiniridium (Pt și Ir) *etc.*;



- **Sulfuri, sulfosăruri și compuși similari** - în această clasă de minerale intră sulfurile, seleniurile, telururile, arseniurile, stibiurile și sulfurile multiple (sulfosărurile)



- ***Oxizii și hidroxizii*** - sunt compușii cei mai simpli ai peste 40 de elemente chimice (metale și metaloizi) cu oxigenul și hidroxilul. Foarte răspândiți sunt oxizii și hidroxizii fierului, apoi ai aluminiului, manganului, titanului, cromului *etc.*;



- ***Halogenuri*** - mineralele din această clasă sunt reprezentate prin fluoruri, cloruri, bromuri și ioduri, adică prin săruri simple, hidratate sau complexe ale HF, HCl, HBr, HI. Elementele mai importante care formează săruri haloide sunt K, Na, Li, Mg, Ca, Al, Fe, Mn, Cu, Pb, Ag, Hg și Si;



- ***Carbonații*** sunt combinații ale radicalului $(\text{CO}_3)^{-2}$ cu diferiți cationi, în special bivalenți: Mg, Fe, Mn, Ca, Ba, Sr, Pb, Zn etc.



- ***Sulfati*** - sunt săruri ale H_2SO_4 [$\text{Me}^+(\text{SO}_4)^{-2}$]



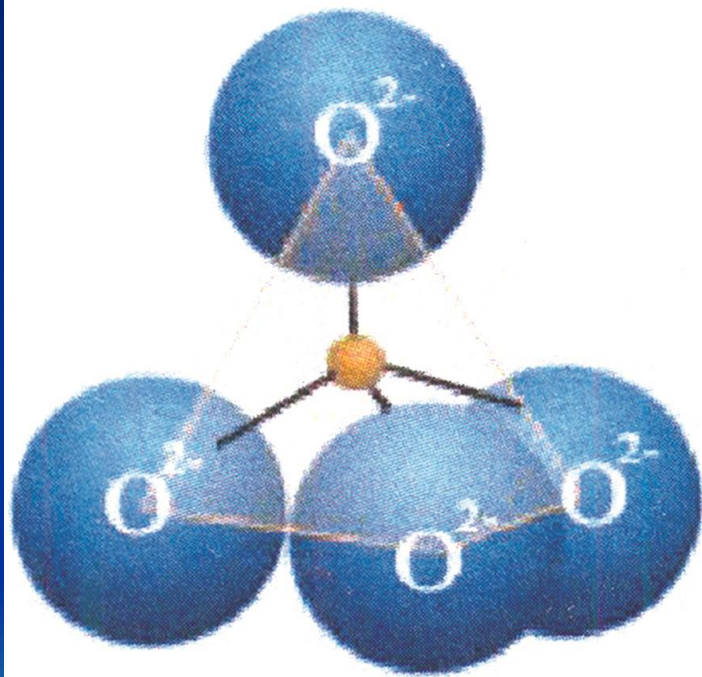
- **Fosfați, arseniați, vanadați** - radicalii $(\text{PO}_4)^{-3}$, $(\text{AsO}_4)^{-3}$, $(\text{VO}_4)^{-3}$, formează săruri stabile cu cationii trivalenți, mai ales cei din grupa pământurilor rare și cu bismutul; elementele bivalente se întâlnesc în această clasă numai sau forma unor ioni suplimentari ca $(\text{OH})^-$, F^- , Cl^- , O^{-2} ;



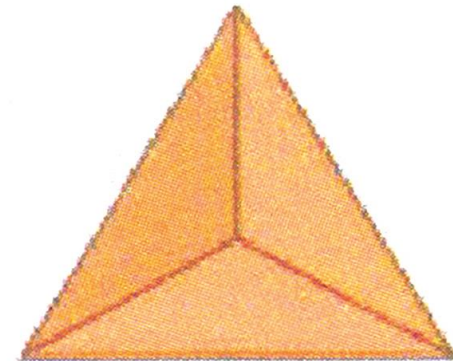
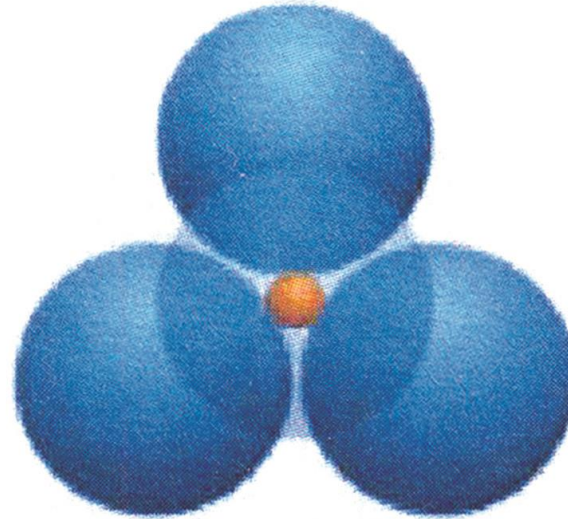
• **Silicații**

- mineralele din această grupă au o mare răspândire în natură, constituind peste un sfert din numărul de minerale cunoscute și aproximativ trei sferturi din masa scoarței terestre. Unitatea structurală specifică silicațiilor este tetraedrul de silice, $[\text{SiO}_4]^{4-}$.
- Clasificarea silicațiilor are la bază criteriul structural, fiind împărțiți în **nezosilicați** (silicați alcătuiți din tetraedri solitari de silice, legați prin cationi de Ca, Mg, Na, etc., dar nu prin atomi de oxigen ai tetraedrului), **sorosilicați** (doi tetraedri de silice legați printr-un atom de oxigen aparținând tetraedrului), **ciclosilicați** (o structură ciclică din minim trei tetraedri de silice, legați prin atomi de oxigen), **inosilicați** (lanțuri infinite simple – *piroxeni* și duble – *amfibolili*, de tetraedri de silice legați prin atomi de oxigen), **filosilicații** (tetraedri sunt dispuși în ochiurile unei rețele plane, hexagoane) și **tectosilicați** (tetraedri de silice legați prin atomi de oxigen sunt dispuși într-o rețea tridimensională). La valențele libere ale oxigenului adăunează ceilalți cationi și ioni complexi, formând speciile minerale.

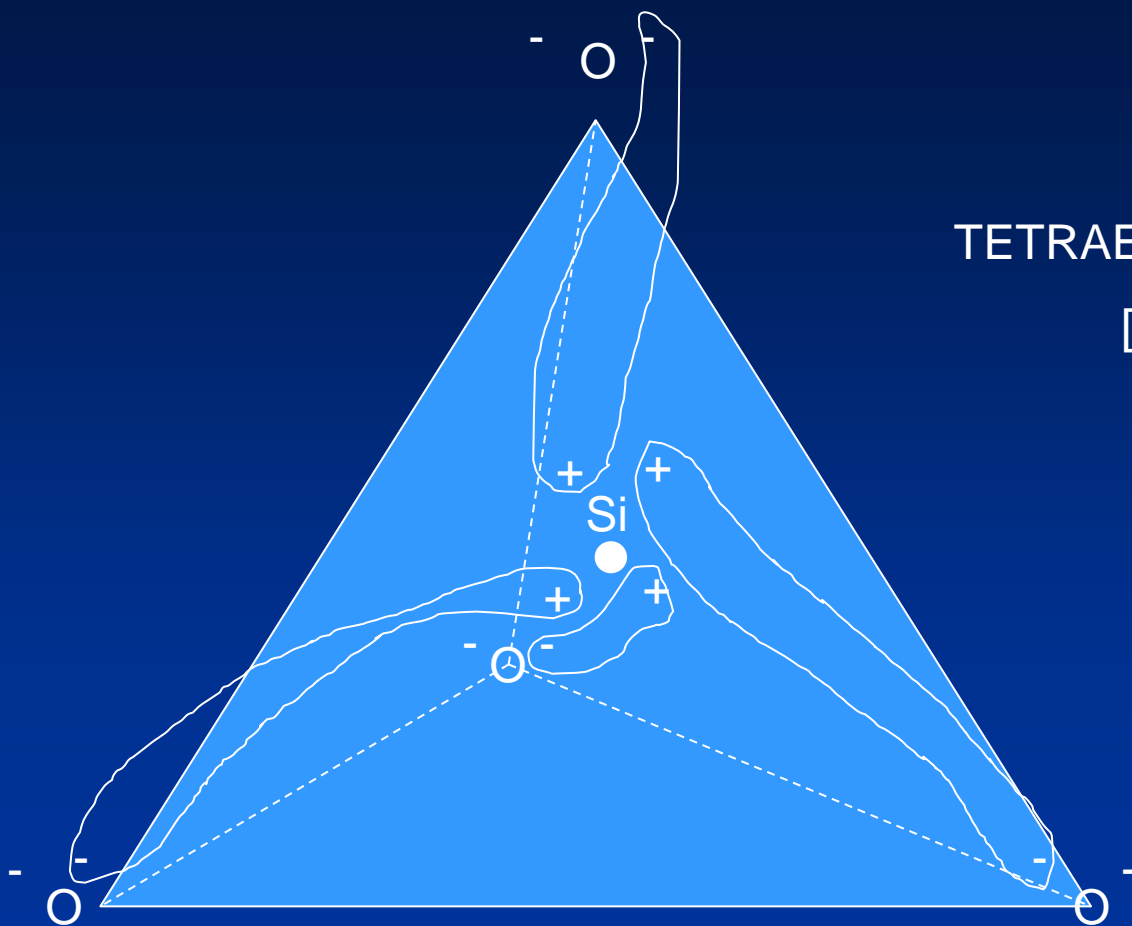
STRUCTURA RETICULARĂ A SILICAȚILOR



Unitatea chimico-structurală a silicaților
Tetraedrul de silice – $[SiO_4]^{4-}$



TETRAEDUL DE SILICE



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

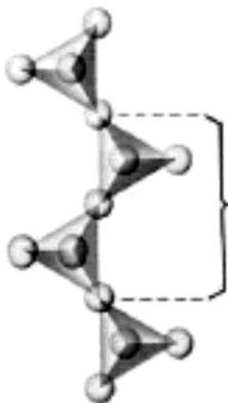
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



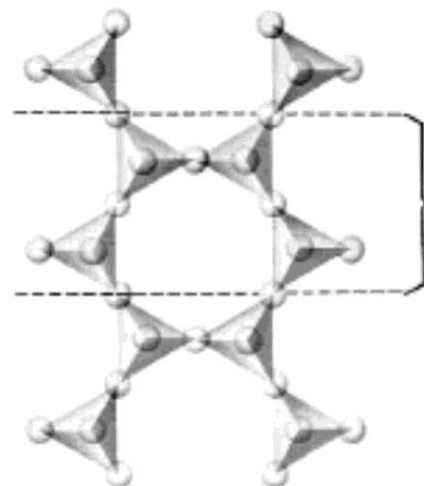
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



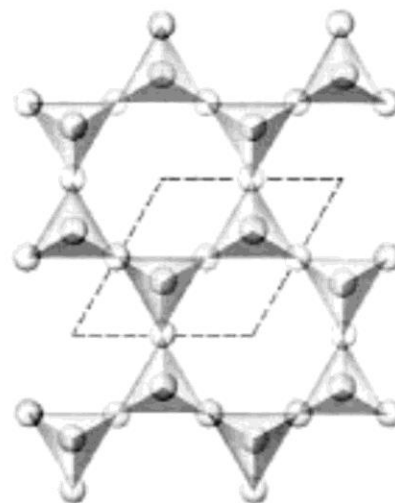
[Si₂O₃]²⁻
[Si₂O₆]⁴⁻



Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

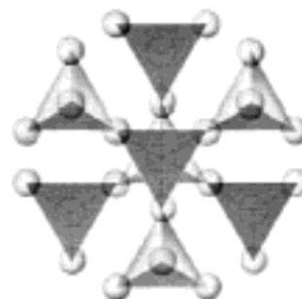
[Si₄O₁₁]⁶⁻
[(Si₄O₁₁)(OH)]⁷⁻



Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻
[AlSi₃O₁₀]⁵⁻
[Al₂Si₂O₁₀]⁶⁻



Tectosilicați

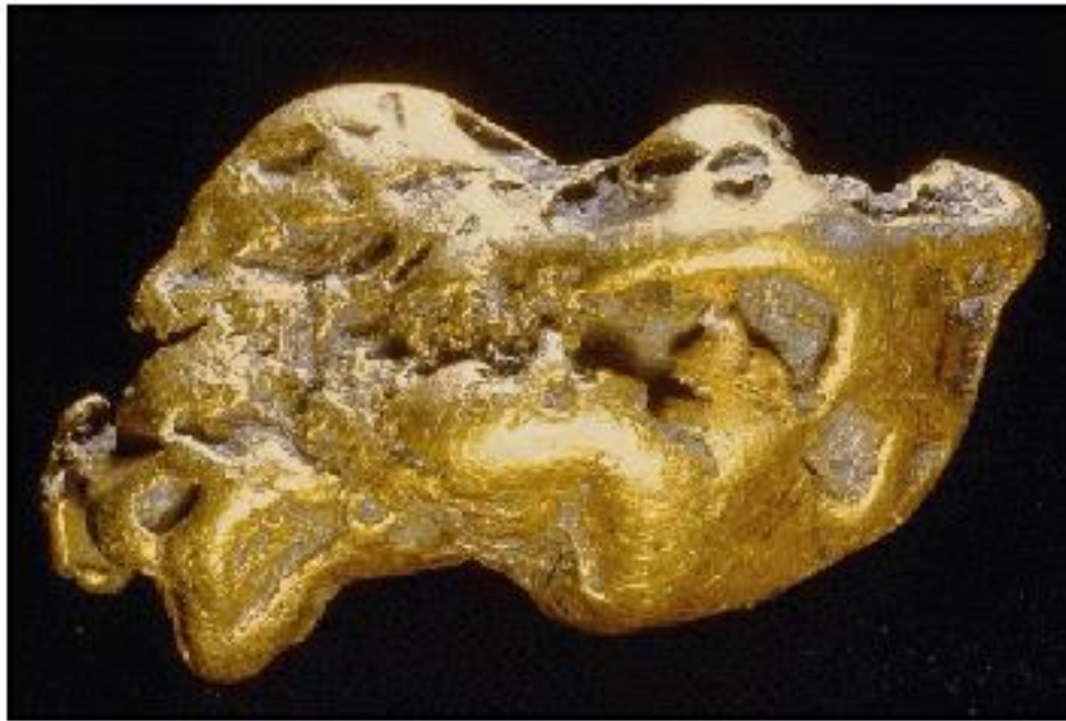
Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻
[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

- ***Elemente native***



Gold



Gold from
Yukon River, Alaska

GENERAL INFORMATION

Au

Strunz
number: 1.AA.3

Origin of
Name: from German geld

Synonyms

Varieties: electrum (Ag-rich var.),
porpezite (Pd-rich var.),
rhodite (Rh-rich var.)

Series with silver



1 cm



Gold (wire)

Ground Hog mine, Gilman, Eagle
Co., Colorado



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1 cm

©Wendell Wilson

Gold on Quartz
California

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1 cm

©Wendell Wilson

Gold

Santa Elena, Venezuela

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1 cm

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Gold

Magenta mine, Grass Valley, Nevada Co., Calif.

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1 mm

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Gold

Mt. Kare, Papua New Guinea

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Gold (arborescent)

Hope's Nose, Torquay, Devon, England



©Lou Perloff

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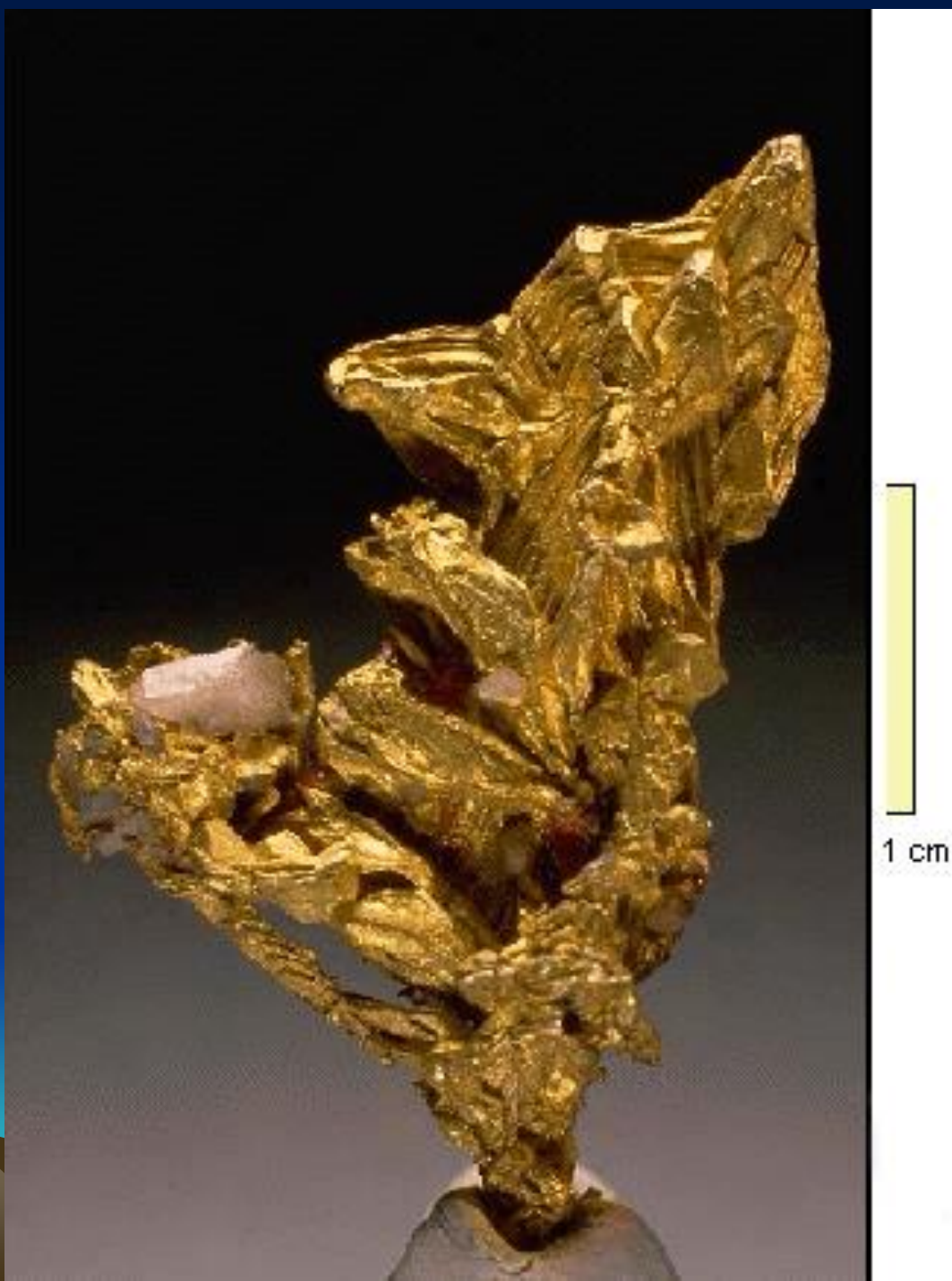
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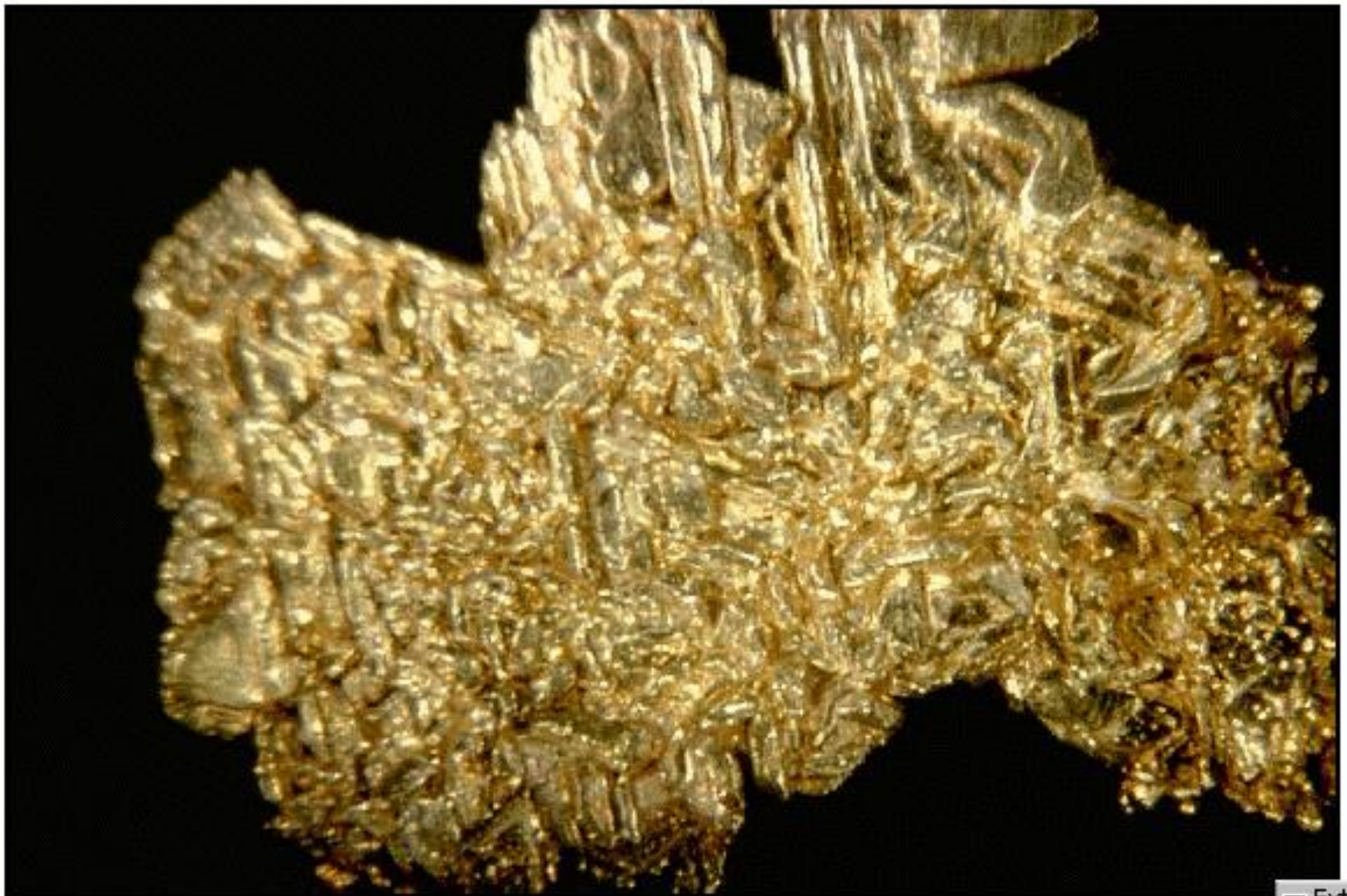
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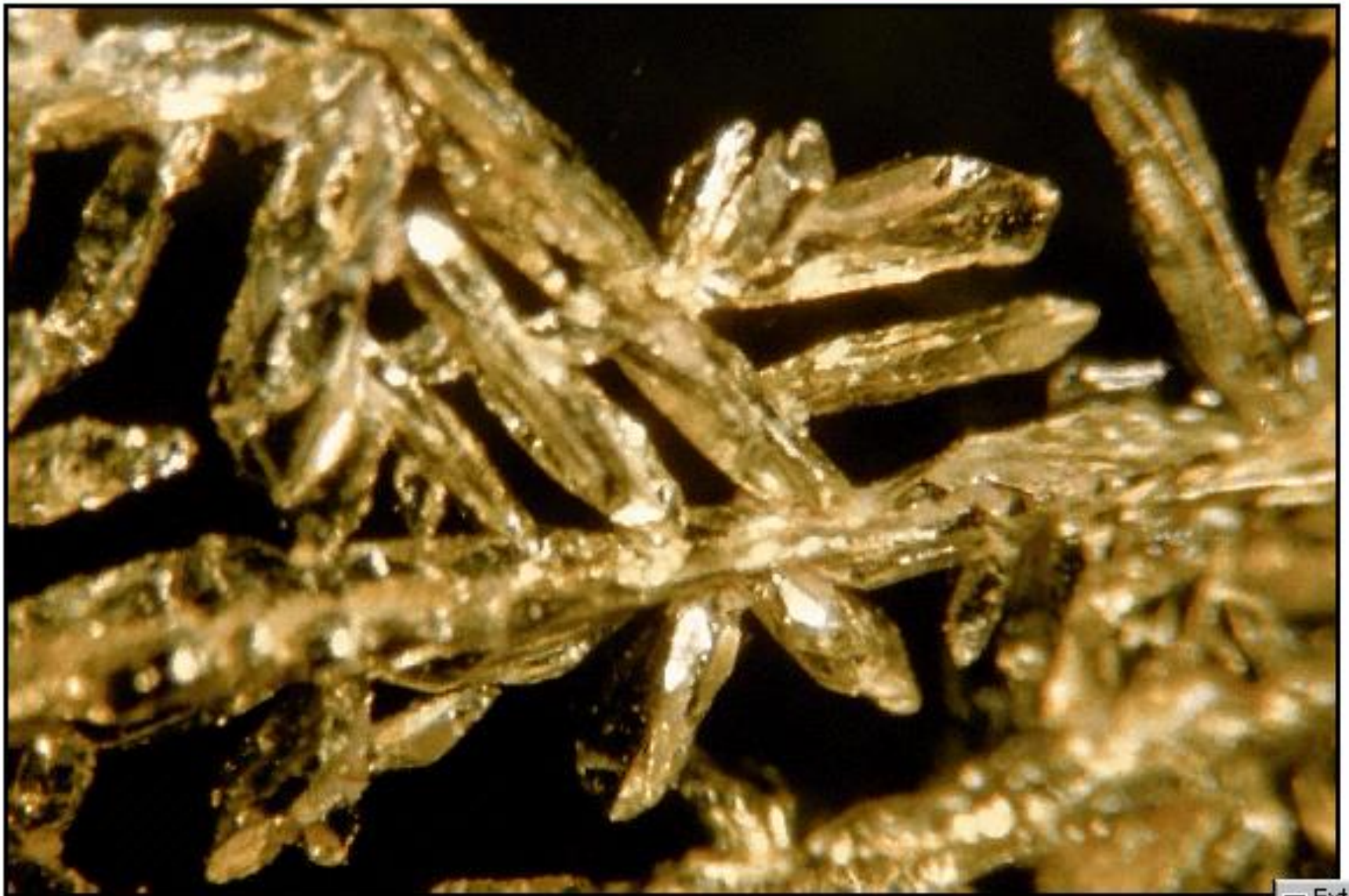
Gold

Breckenridge, Summit Co., Colorado



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Gold (arborescent)

Kittitas County, Washington

©Lou Perloff



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Gold

British Columbia, Canada



1 cm

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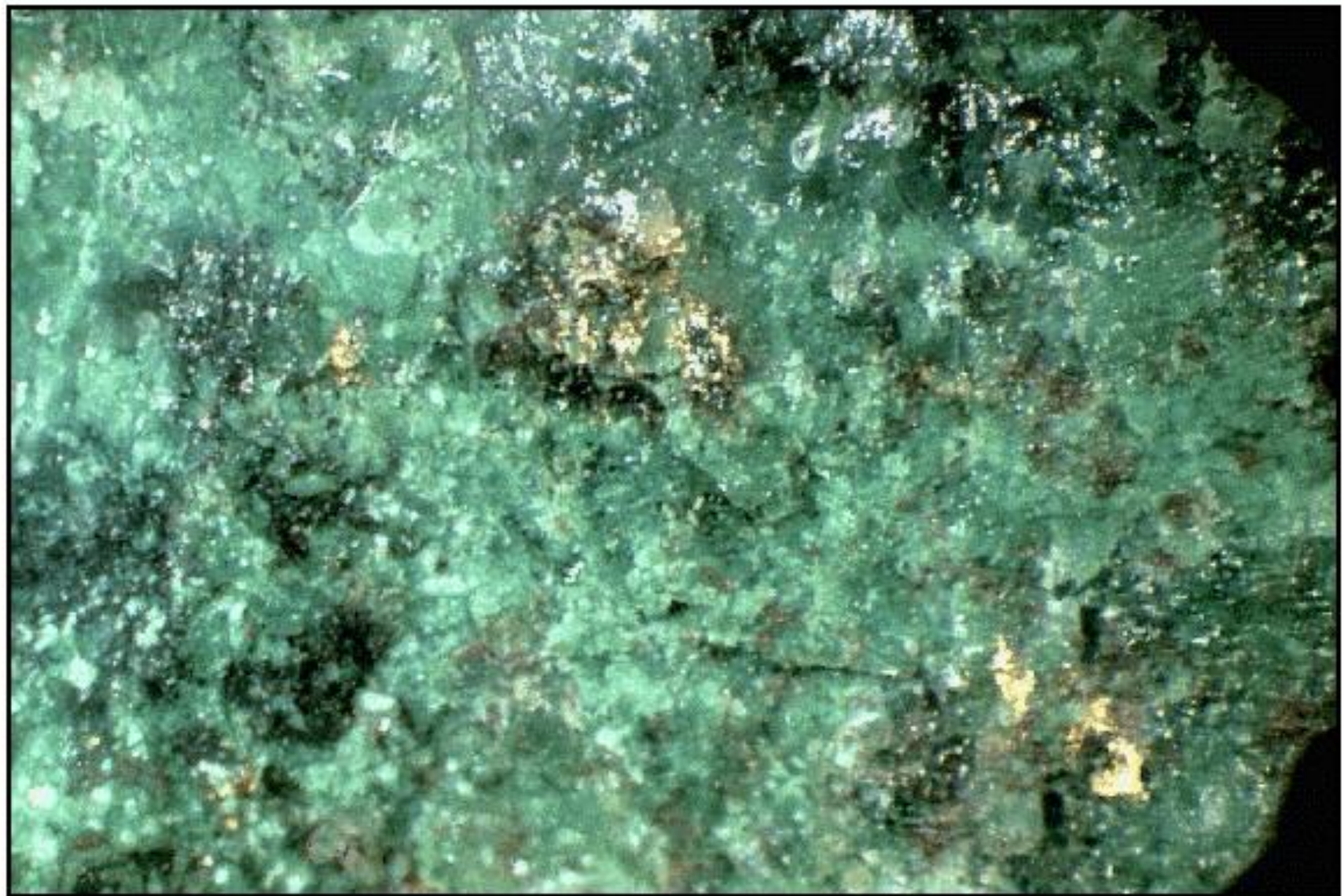
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








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Gold in Quartz

Found along Oregon Trail in 1850's



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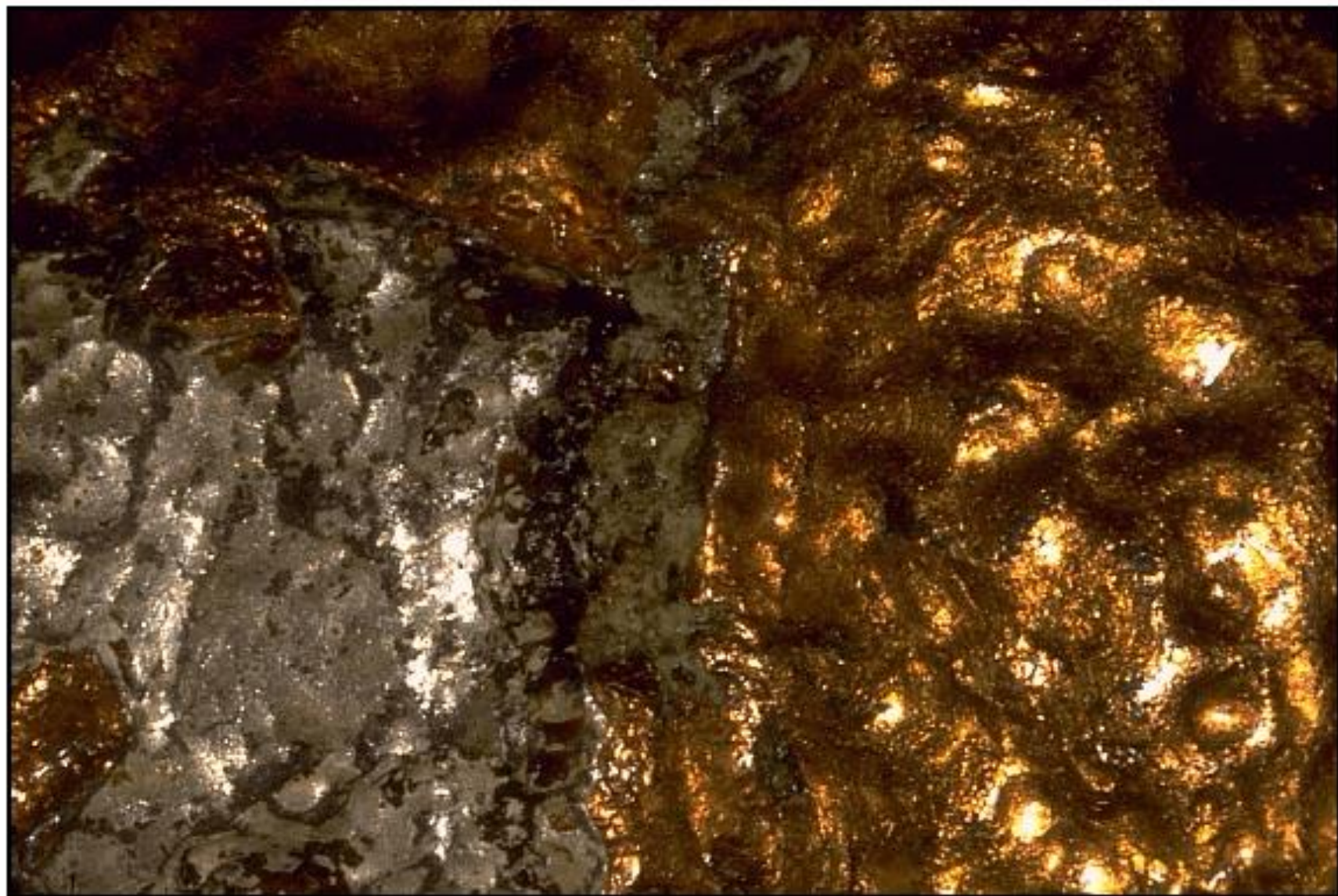
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Gold



Musonoi mine, Kolwezi, Shaba, Dem.Rep.Congo






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5 mm

©Milton Speckels

Gold and Silver
Michigan

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Gold

Tallapoosa City, Tallapoosa Co.,
Alabama



1 mm

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



Gold (wire)

Masabe Arroyo dist., Philippines



1 cm

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




Gold

Cavca, Colombia



1 cm

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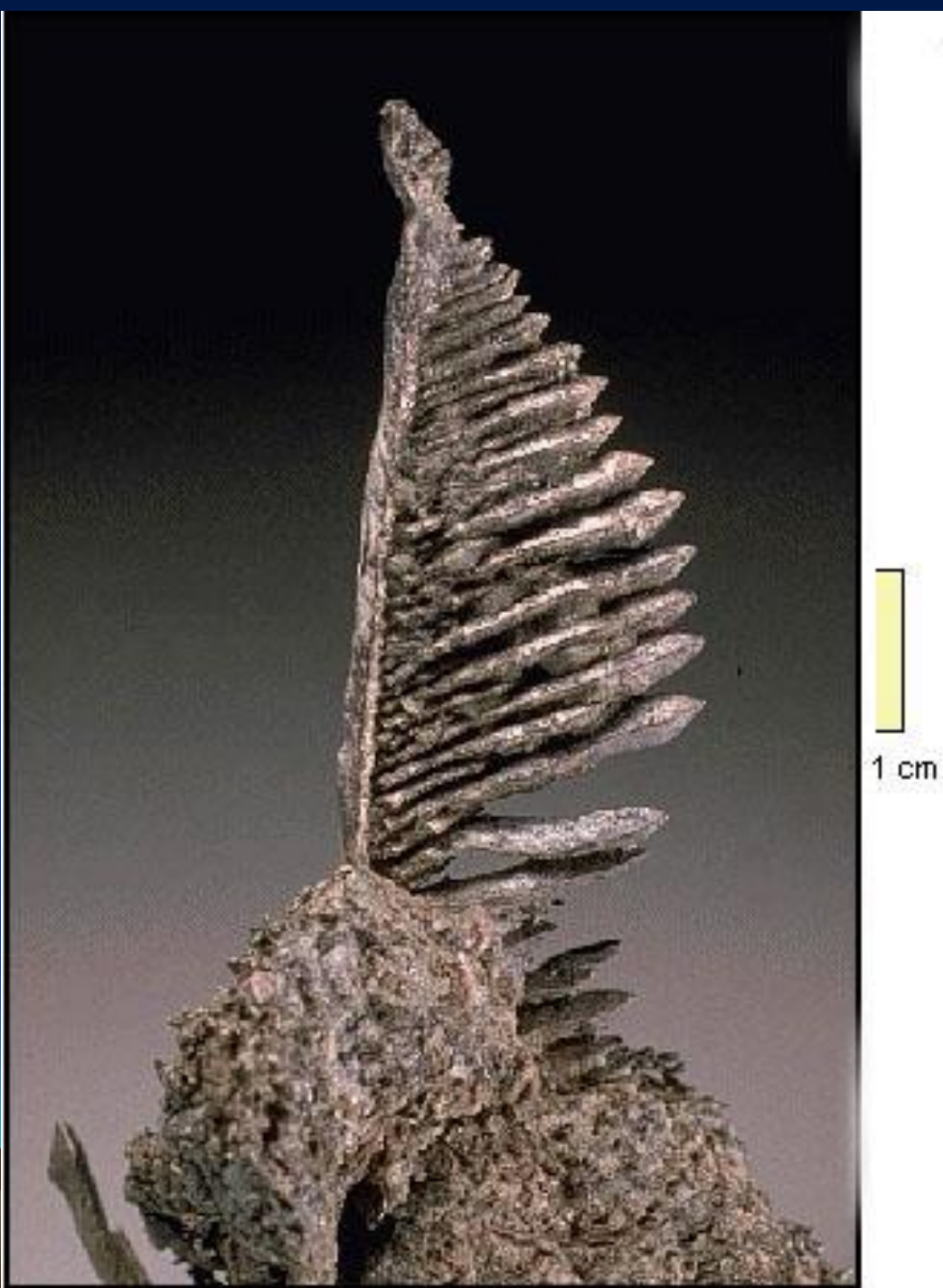
Argent: Ag



1 cm



1 cm



Copper



Copper from
Calumet mine, Houghton Co., Michigan

GENERAL INFORMATION

Cu

Strunz
number: 1.AA.1

Origin of
Name: from Latin
cuprum = metal from
Cyprus

Synonyms
Varieties: whitneyite (As-rich var.)



1 cm



1 cm





Copper

Mohawk mine, Keweenaw Co., Michigan



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






Copper

Bisbee, Cochise Co., Arizona



1 cm

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1 cm

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Copper

Phoenix mine, Keweenaw Co., Michigan

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Copper

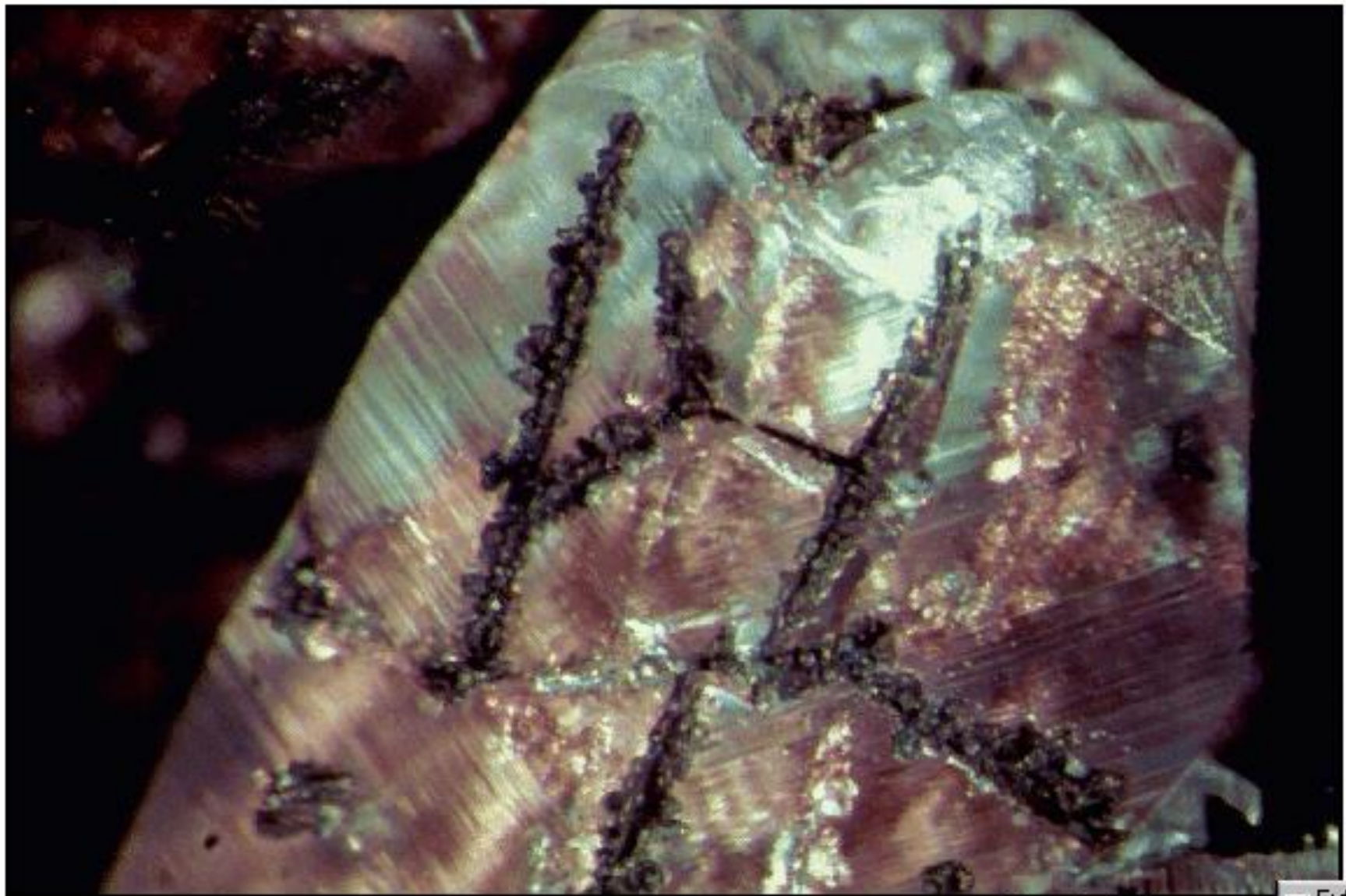
**Kelly mine, Kelly, Socorro Co.,
New Mexico**



1 cm

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Copper on and in Calcite

Sonora, Mexico



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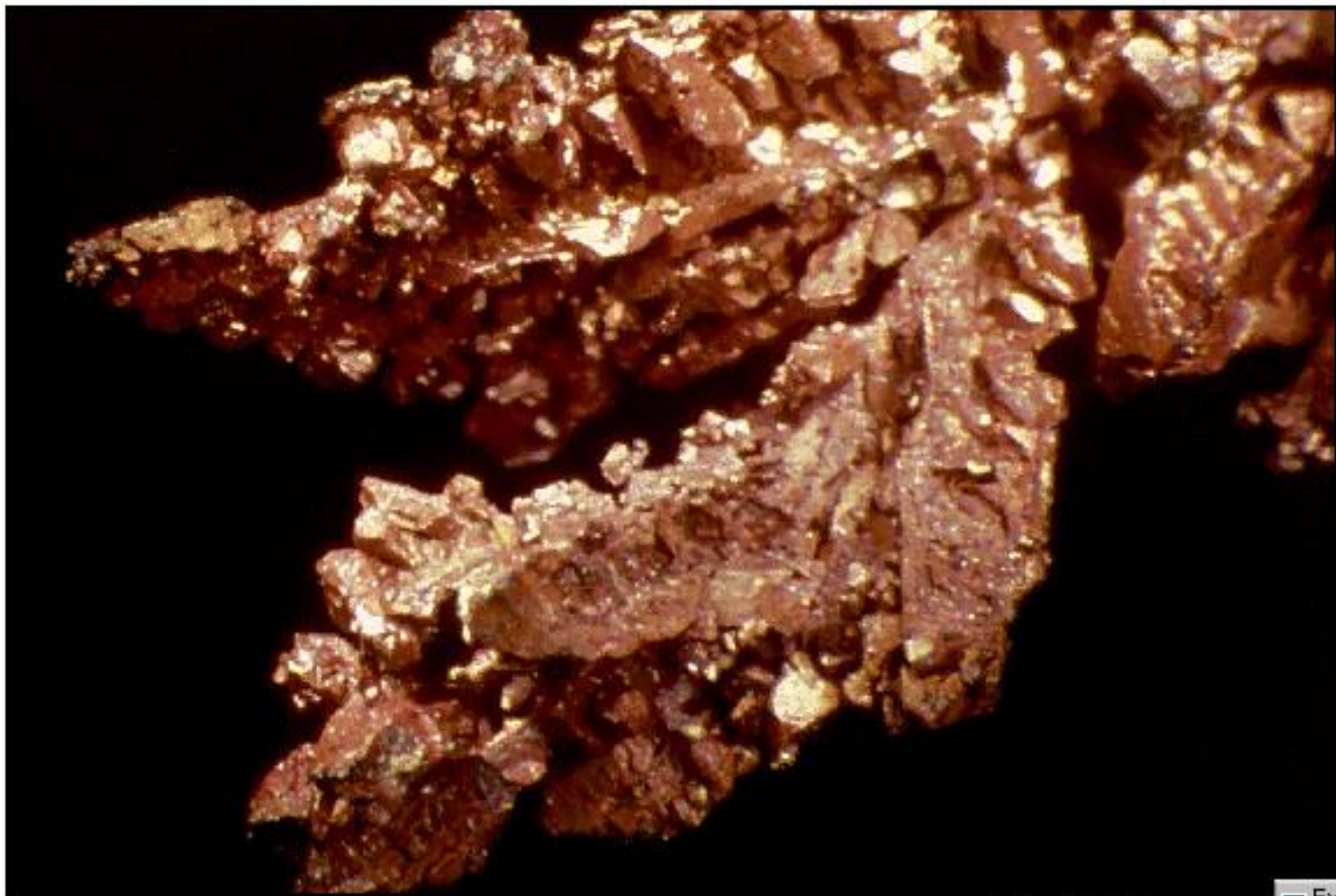
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Copper

Kennecott Pit, Ray, Pinal Co., Arizona



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Diamant: C



Diamond (cyclic twin)

Kasai Prov., Dem. Rep. of Congo



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Diamond

Kasai Prov., Dem. Rep. of Congo



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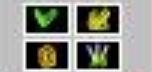
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1 mm



Diamond (spinel twin / macle)

Kimberley, Northern Cape, South Africa



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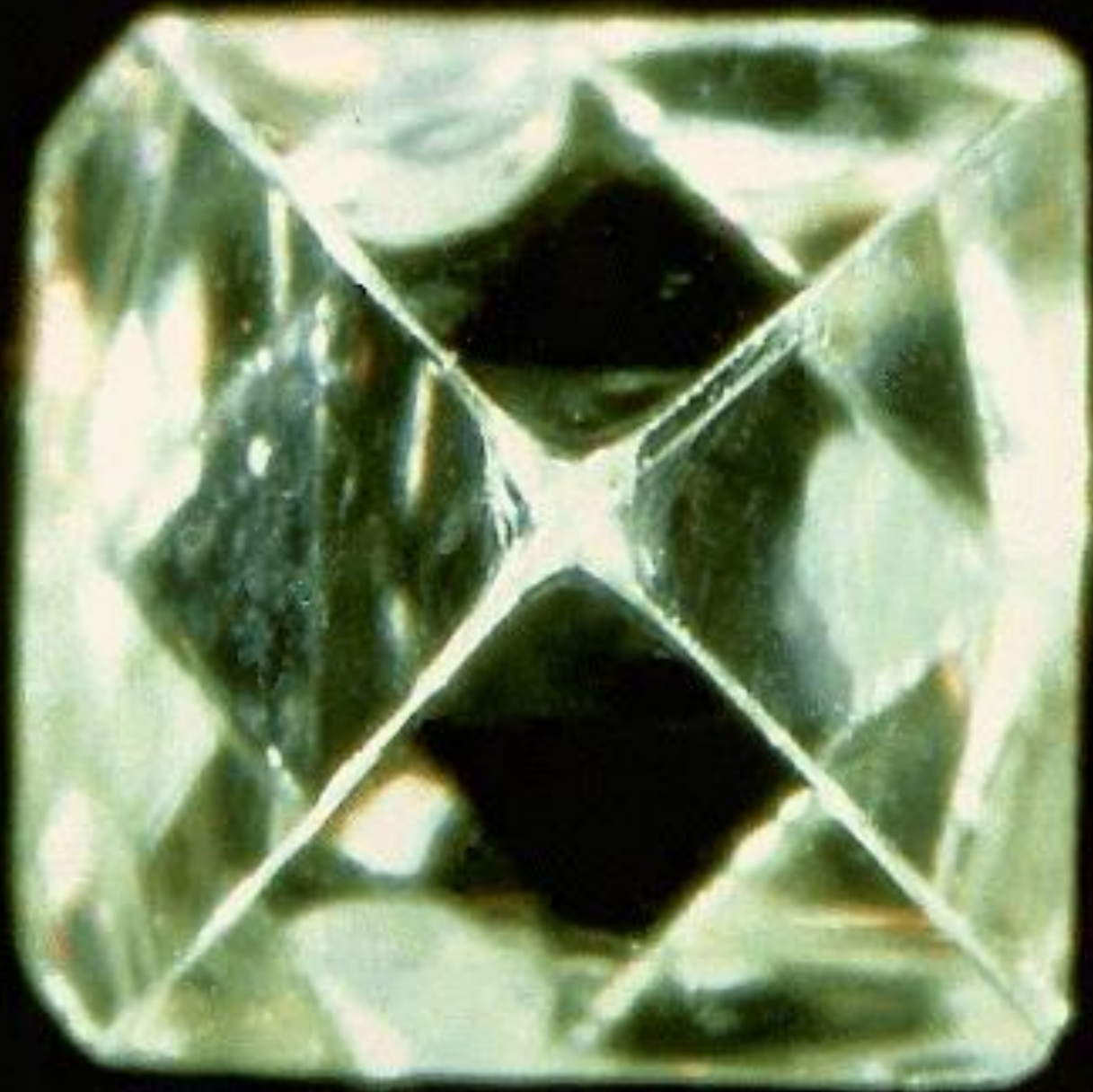
Diamond

Kimberley, Northern Cape, South Africa



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Palladium



**Palladium from
Corrego Bom Sucesso, Serro, M.G., Brazil**

GENERAL INFORMATION

Pd

Strunz
number: 1.AG.2

Origin of
Name: for the asteroid Pallas,
discovered at about
the same time

Synonyms
Varieties:

Platina



5 mm



1 cm

©Tony Kampf

Platinum

Trinity River, Trinity Co., California



Specimen
Data



User's
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Plumb



1 cm

Bismuth



**Bismuth from
Reinsburg, near Schneeberg, Saxony, Germany**

GENERAL INFORMATION

Bi

Strunz
number: 1.CA.3

Origin of
Name: from German,
probably for white
mass

Synonyms
Varieties:



©Lou Perloff

Bismuth

Schneeberg, Saxony, Germany



? Specimen
Data

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Note

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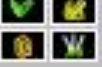


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- ***Sulfuri - sulfosăruri***



Acanthite



Acanthite from
Bolivia

GENERAL INFORMATION

Ag_2S

Strunz
number: 2.BA.3

Origin of
Name: from Greek for thorn
because of shape of
crystals

Synonyms
Varieties:

Dimorphous with argentite,
which is stable only above
 177°C



1 cm

©Wendell Wilson

Acanthite

Saxony, Germany



Specimen
Data



User's
Note

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Gallery

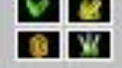


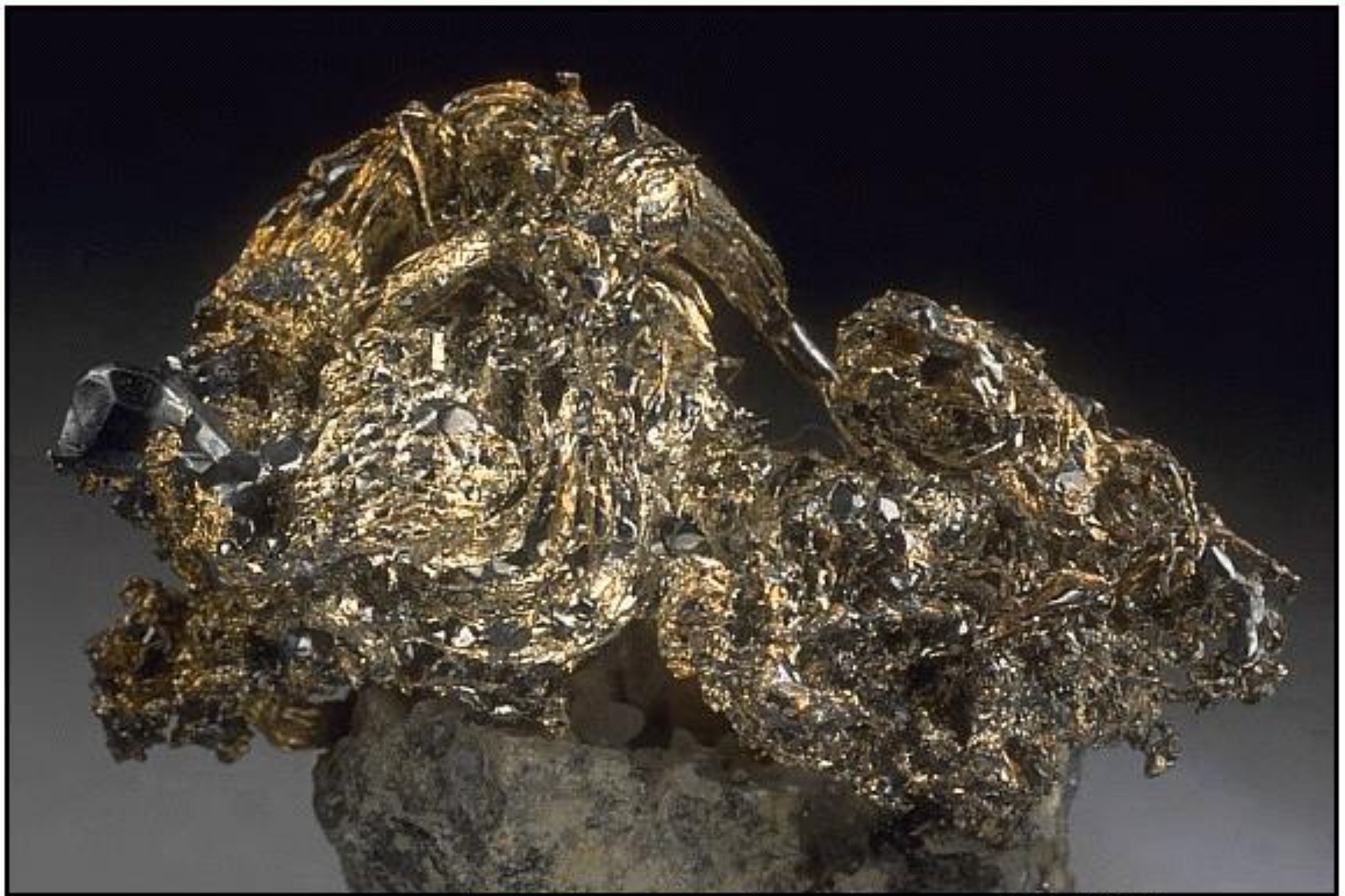
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1 cm

©Wendell Wilson

Acanthite on Silver

Uchucchacua mine, Lima Dept., Peru

 Specimen
Data

 User's
Note


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Realgar



Realgar from
Getchell mine, Golconda, Humboldt Co., Nevada

GENERAL INFORMATION

As S

Strunz
number: 2.KA.1

Origin of
Name: from Arabic Rahj al
ghar = powder of the
mine

Synonyms
Varieties:

Dimorphous with pararealgar;
alters to yellow-orange powder
on exposure to light



1 cm

©Wendell Wilson

Realgar with Calcite

Shimen, Hunan Prov., China

Extra
Images

? Specimen
Data

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Orpiment



Orpiment from
Quiruvilca, La Libertad Dept., Peru

GENERAL INFORMATION

As_2S_3

Strunz
number: 2.KA.2

Origin of
Name: from Latin
auripigmentum =
golden paint

Synonyms
Varieties:



1 cm

©Wendell Wilson

Orpiment with Calcite

Shimen, Hunan Prov., China

Extra Images

 Specimen Data

 User's Note




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©Lou Perloff

Orpiment

Zarheshuran mine, Takab, Iran




 Specimen Data

 User's Note

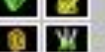
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1 cm

Bornite



**Bornite from
Mufulira mine, near Kitwe, Copperbelt, Zambia**

GENERAL INFORMATION



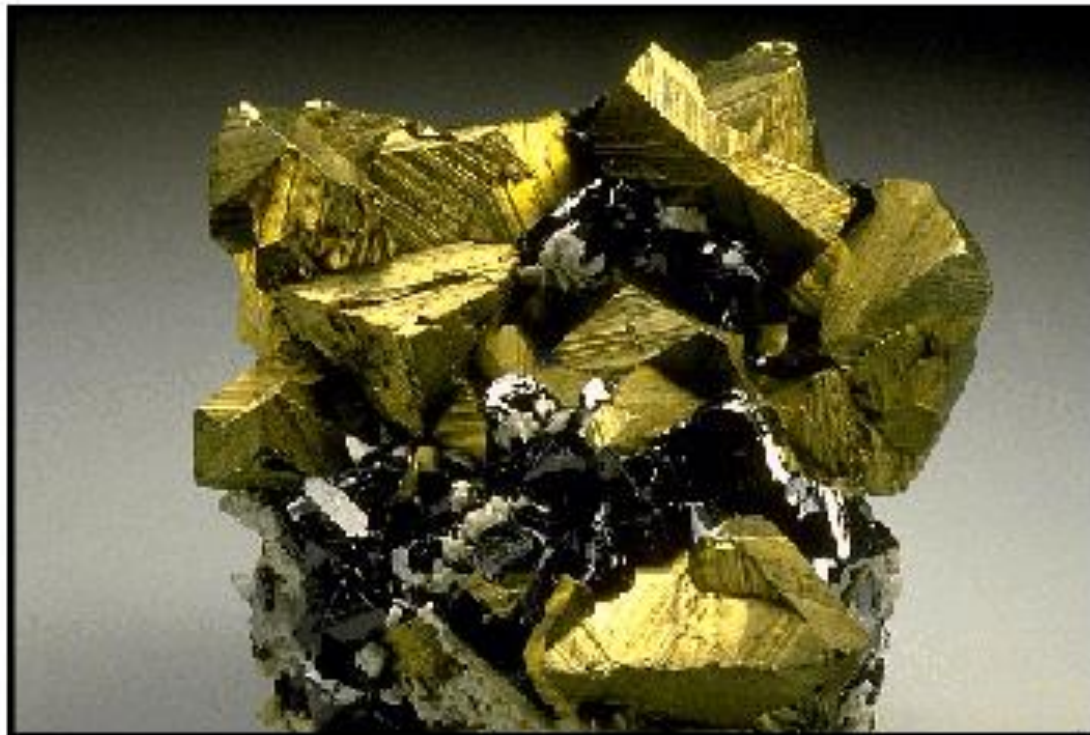
Strunz
number: 2.BA.1

Origin of
Name: for Ignaz Born,
Austrian mineralogist

Synonyms

Varieties: erubescite, peacock ore,
phillipsine

Chalcopyrite



Chalcopyrite (twins) with Sphalerite from
Camp Bird mine, Ouray, Ouray Co., Colorado

GENERAL INFORMATION

Cu Fe S_2

Strunz
number: 2.CB.2

Origin of
Name: from composition,
copper and pyrite

Synonyms
Varieties:





Series with eskebornite

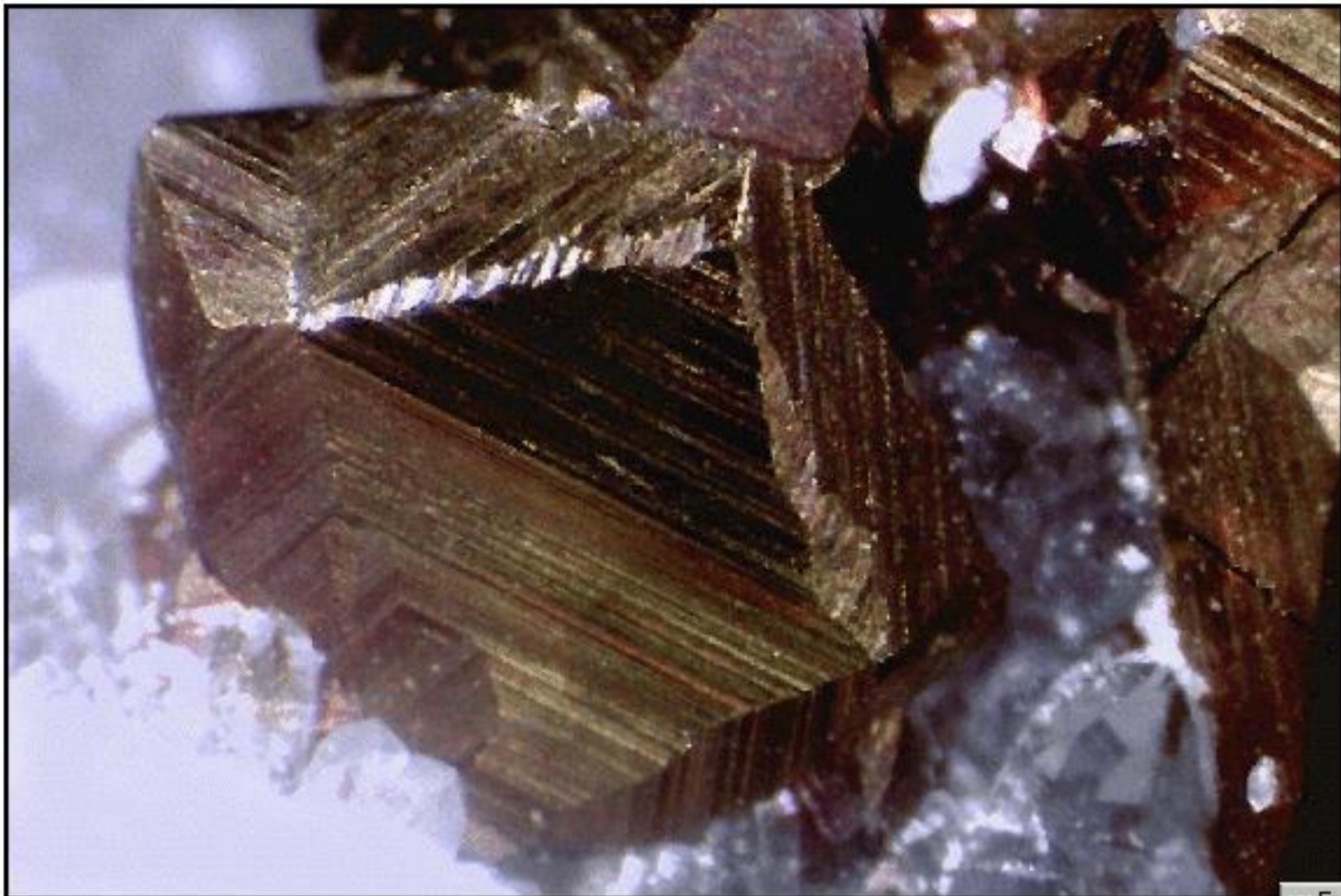
Chalcopyrite (twin) on Sphalerite

Huaron, Cerro de Pasco, Pasco
Dept., Peru



©Wendell Wilson

 Specimen Data	 User's Note	Prior Image ▲	Photo Gallery    
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Chalcopyrite (twin) on Quartz

Naica, Chihuahua, Mexico

©Lou Perloff



Extra
Images

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Pyrite



Pyrite from
Nanisivik mine, Baffin Is., Northwest Terr., Canada

GENERAL INFORMATION

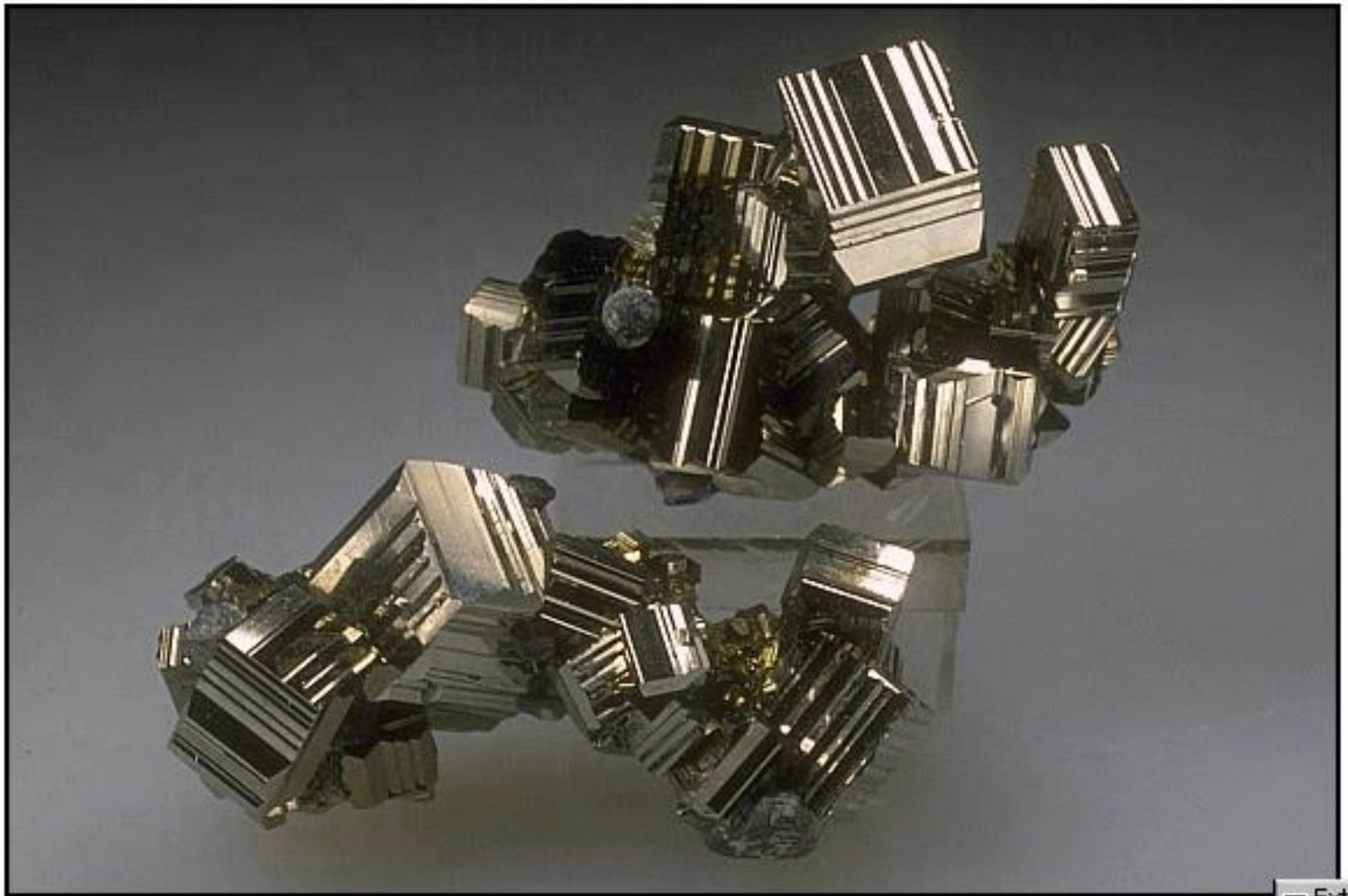
Fe S_2

Strunz
number: 2.EB.1

Origin of
Name: from Greek pyr = fire

Synonyms
Varieties: bravoite (Ni-rich var.)

Dimorphous with marcasite;
series with cattierite, ferroselite



1 cm

©Wendell Wilson

Pyrite

Daly-Judge mine, near Park City, Wasatch Co., Ut.

Extra
Images

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1 cm

©Wendell Wilson

Pyrite

Black Pine mine, Philipsburg, Granite Co., Mont.

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5 cm

©Wendell Wilson

Pyrite with Quartz

Huanzala mine, Huallanca dist., Huanuco Dept., Peru

Extra
Images

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Data

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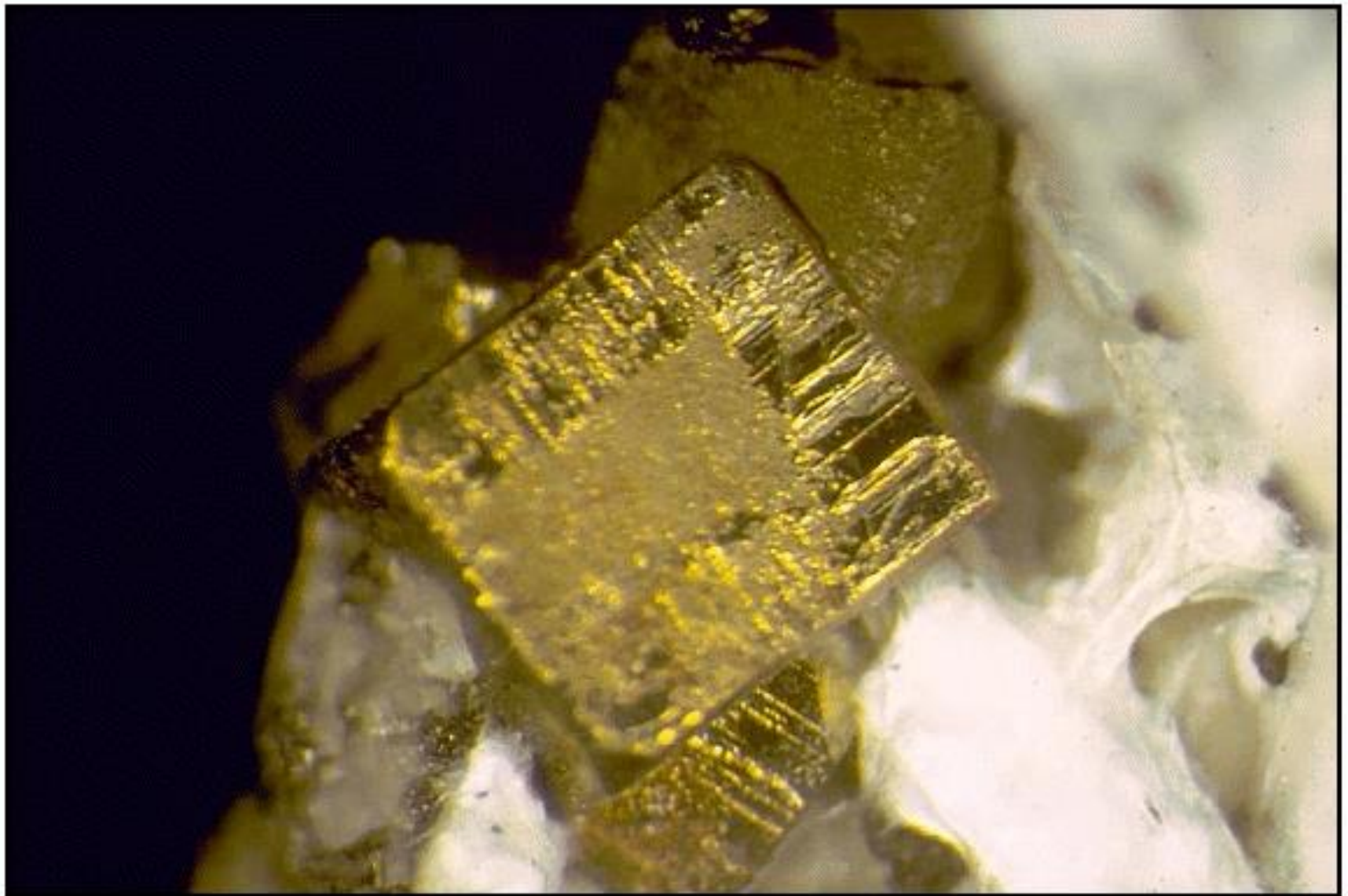
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©Lou Perloff

Pyrite

Fort Lee, Bergen Co., New Jersey



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©Lou Perloff

Pyrite (Iron Cross twin)



Vlotho on Weser, North Rhine-Westph., Germany

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1 cm

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Pyrite


Isle of Elba, Tuscany, Italy

 Specimen Data

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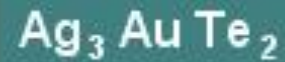
 
 

Petzite



**Petzite on Gold from
Cash mine, Gold Hill, Boulder Co., Colorado**

GENERAL INFORMATION



Strunz
number: 2.BA.8

Origin of
Name: for W. Petz, mineral
chemist

Synonyms
Varieties:



1 cm

©Wendell Wilson

Petzite on Gold

Cash mine, Gold Hill, Boulder Co., Colorado

? Specimen
Data

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Wurtzite



Wurtzite from
Llallagua, Potosi Dept., Bolivia

GENERAL INFORMATION

Zn S

Strunz
number: 2.CB.6

Origin of
Name: for C. Wurtz, French
chemist

Synonyms
Varieties:

Data are for wurtzite-2H; there are also -4H, -6H, -8H, -15R, -18R and -21R polytypes; trimorphous with matraite and sphalerite; fluoresces orange under LW

Sphalerite



Sphalerite from
Tiffin, Seneca Co., Ohio

GENERAL INFORMATION

(Zn, Fe) S

Strunz
number: 2.CB.1

Origin of
Name: from Greek for
treacherous

Synonyms

Varieties: blackjack, blende,
cleiophane
(pale-colored var.),
marasmolite, marmatite
(Fe-rich var.),
zincblende

Trimorphous with matraite and
wurtzite; also from a meteorite



1 cm

©Wendell Wilson

Sphalerite (spinel twin) with Galena

Iron Cap mine, Aravaipa dist., Graham Co., Ariz.

Extra Images

? Specimen Data

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Galena



Galena on Johannsenite from
Iron Cap mine, Aravaipa dist., Graham Co., Ariz.

GENERAL INFORMATION

Pb S

Strunz
number: 2.CD.2

Origin of
Name: from Latin for lead ore

Synonyms
Varieties: galenite, bleiglanz

Series with clausthalite



1 cm

©Wendell Wilson

Galena

Madan district, Rhodope Mts., Bulgaria

Extra
Images

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




1 cm

©Wendell Wilson

Galena

Picher, Ottawa Co., Oklahoma

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Cinnabar



Cinnabar on Calcite from
China

GENERAL INFORMATION

Hg S

Strunz
number: 2.CD.5

Origin of
Name: from Persian zinjifrah
= dragon's blood

Synonyms
Varieties:

Trimorphous with
metacinnabar and
hypercinnabar

Stibnite



Stibnite from
Taxco, Guerrero, Mexico

GENERAL INFORMATION



Strunz
number: 2.DB.1

Origin of
Name: from Greek stimmi
and Latin stibi, names
for metal

Synonyms
Varieties: antimonite

Dimorphous with metastibnite









Stibnite with Calcite

Kadamdzhai, Osh Oblast,
Kyrgyzstan



5 cm

©Wendell Wilson

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Stibnite

White Caps mine, Manhattan, Nye
Co., Nevada

1 cm

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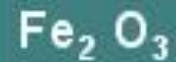
- ***Oxizii și hidroxizii***

Hematite



Hematite from
Framont, Vosges Alpes, Alsace, France

GENERAL INFORMATION



Strunz
number: 4.CC.1

Origin of
Name: from Greek
aima = blood

Synonyms

Varieties: martite (replacing
magnetite), specularite
(micaceous var.),
turgite, oligiste iron,
persian red






Dimorphous with maghemite



©Wendell Wilson

Hematite after Siderite with Quartz

Pike's Peak, Colorado

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Hematite

Wessels mine, Kuruman, No.Cape,
South Africa



1 cm

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? Specimen Data

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1 cm

©Wendell Wilson

Goethite and Hematite coating Quartz

Graves Mt., Washington, Lincoln Co., Georgia

Extra
Images

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User's
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Magnetite



**Magnetite (on right) and Ilmenite from
New Idria dist., San Benito Co., California**

GENERAL INFORMATION



Strunz
number: 4.BB.1

Origin of
Name: after locality; lands of
ancient Magnetes,
Thessaly, Greece,

Synonyms

Varieties: heraclion, ishkulite
(Cr-rich var.), lodestone
(magnetic var.)

Series with jacobsite and with
magnesioferrite











©Lou Perloff

Magnetite (penetration twin)

New Idria dist., San Benito Co., California



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








1 cm

©Wendell Wilson

Magnetite

Binntal, Valais, Switzerland

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Ilmenite



Ilmenite on/in Quartz from
Litchfield, Litchfield Co., Connecticut

GENERAL INFORMATION



Strunz
number: 4.CD.1

Origin of
Name: after locality;
Ilmen Mountains,
Russia

Synonyms
Varieties:

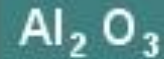
Series with geikielite and
pyrophanite

Corundum



Corundum (ruby) on Calcite from
Jegdalek, Kabul Prov., Afghanistan

GENERAL INFORMATION



Strunz
number: 4.CC.1

Origin of
Name: from an old East
Indian name for the
mineral

Synonyms

Varieties: ruby (red gem var.),
sapphire (non-red gem
var.), emery (impure
var.)

Sometimes fluoresces under
SW and LW



1 cm

©Wendell Wilson

Extra
Images

Corundum (ruby)

Franklin, Sussex Co., New Jersey

? Specimen
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1 cm

©Wendell Wilson

Corundum (ruby; rough and cut)

Balangoda, Sabaragamuwa Prov., Sri Lanka

Extra
Images

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Cassiterite



Cassiterite from
Merek, Khabarovsk Kray, Russia

GENERAL INFORMATION

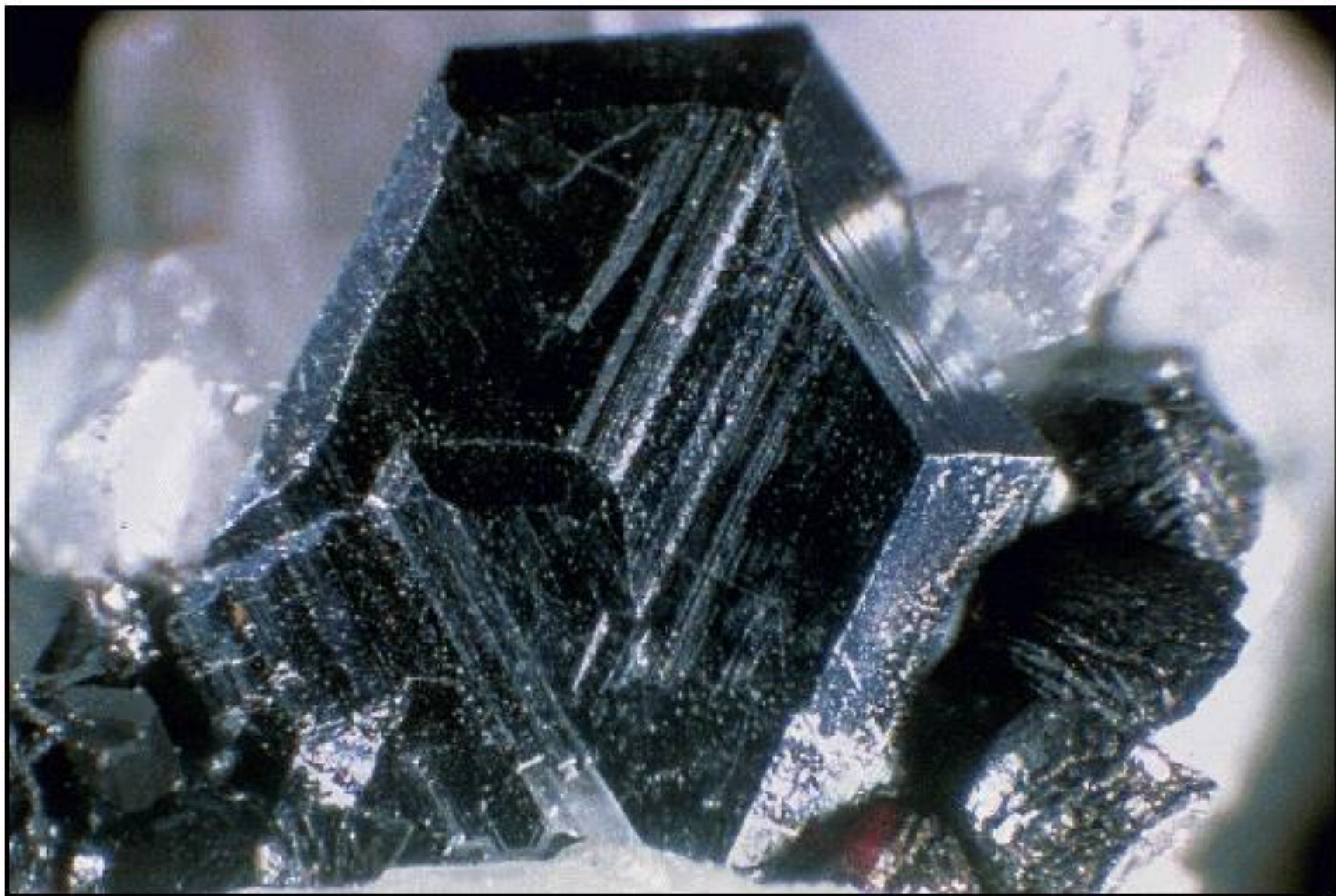
Sn O_2

Strunz
number: 4.DD.1

Origin of
Name: from Greek for tin

Synonyms

Varieties: ainalite (Ta-rich var.),
wood tin (colloform
var.), stannite,
varlamoffite (Fe³⁺-rich
var.)



©Lou Perloff

Cassiterite on Quartz

Bennett quarry, Buckfield, Oxford Co., Maine



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








Cassiterite (twin) on Muscovite

Huya mine, Sichuan Prov., China



1 cm

©Wendell Wilson

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Cuprite



Cuprite on Smithsonite from
Tsumeb mine, Tsumeb, Namibia

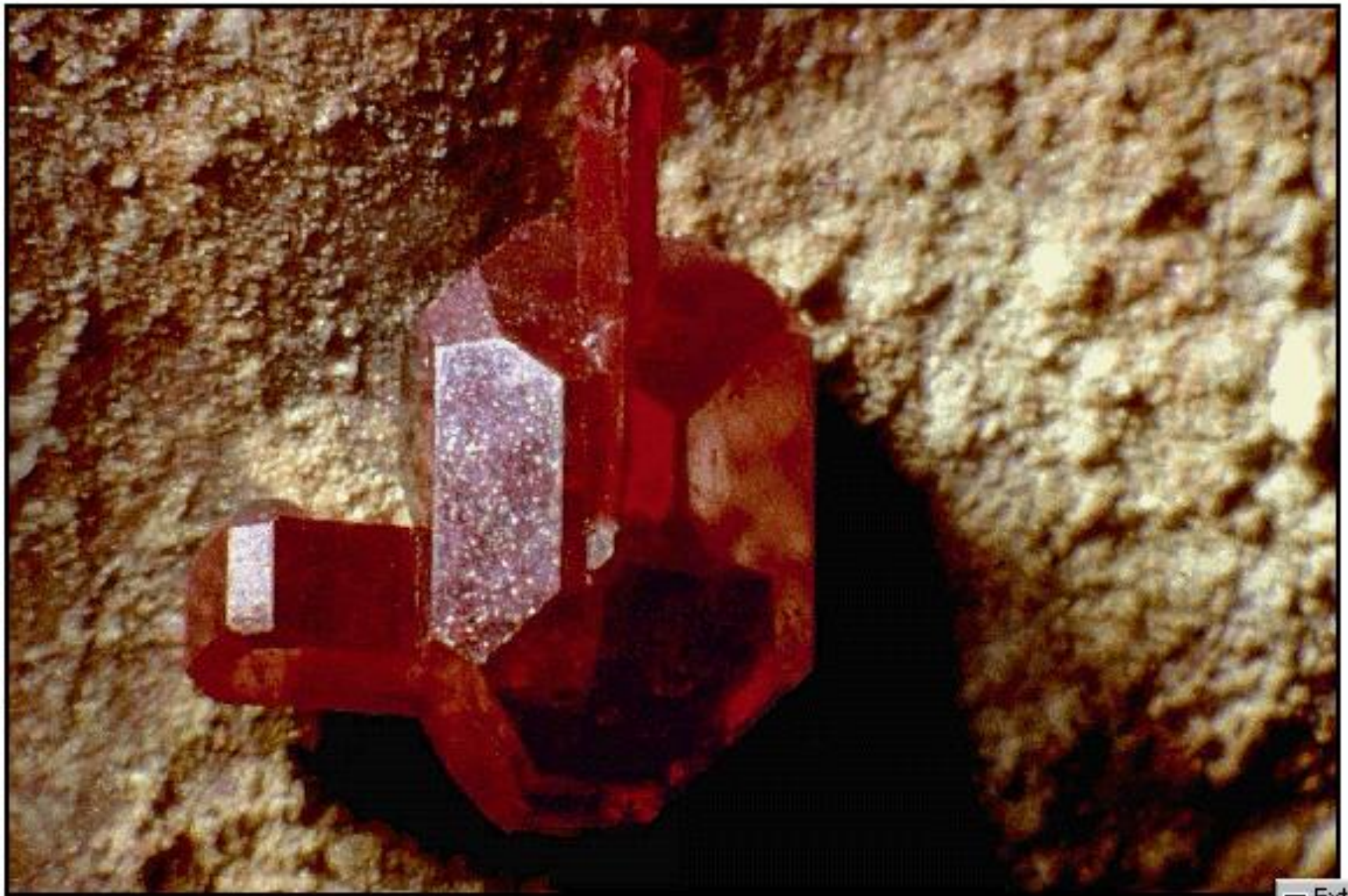
GENERAL INFORMATION

Cu_2O

Strunz
number: 4.AA.1

Origin of
Name: from Latin for copper

Synonyms
Varieties: chalcotrichite (capillary
var.)



Cuprite

Ray mine, Ray, Pinal Co., Arizona



©Lou Perloff

Extra Images

Specimen Data

User's Note

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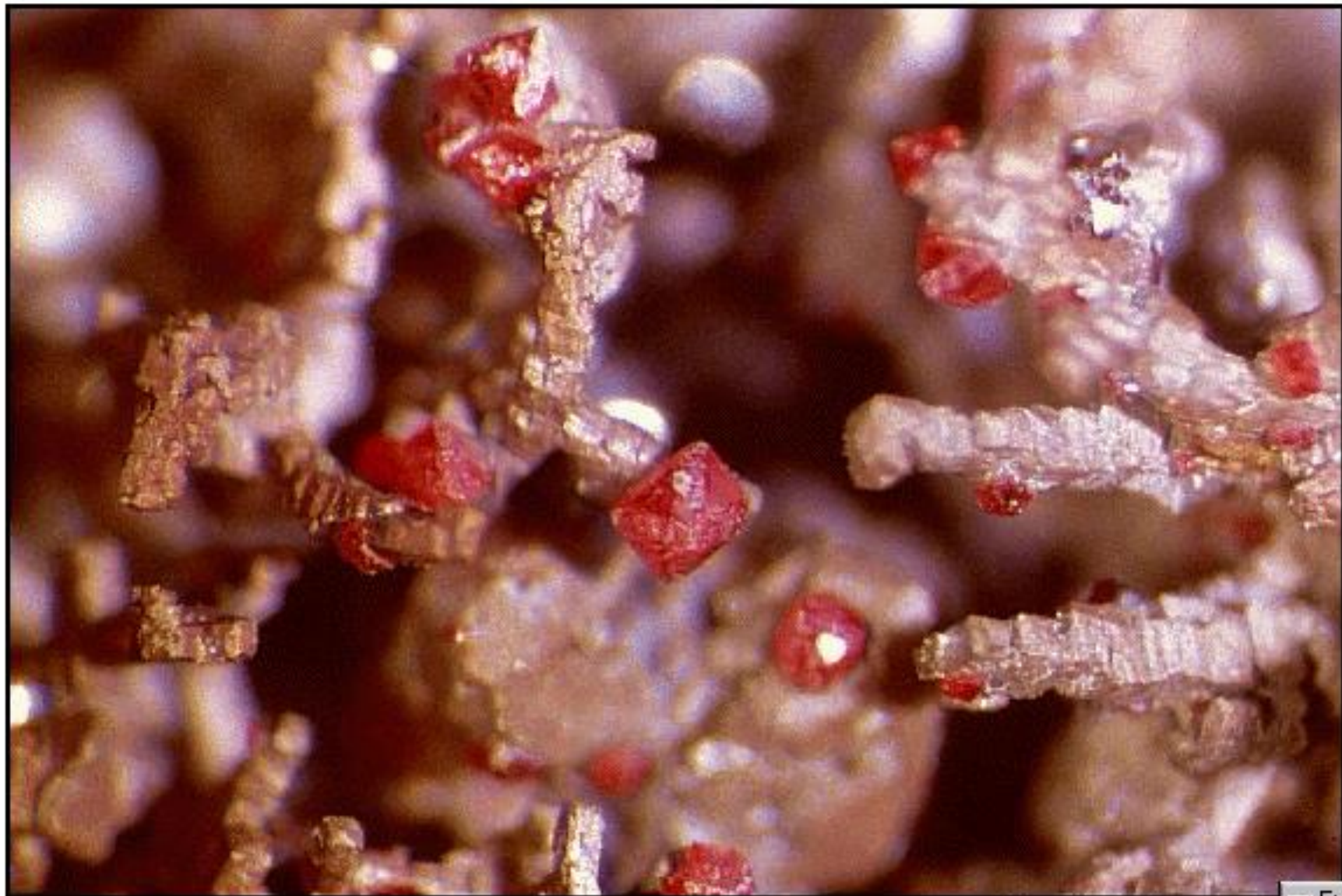
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Social media icons



Cuprite on Copper

Tsumeb mine, Tsumeb, Namibia



©Lou Perloff

Extra Images

? Specimen Data

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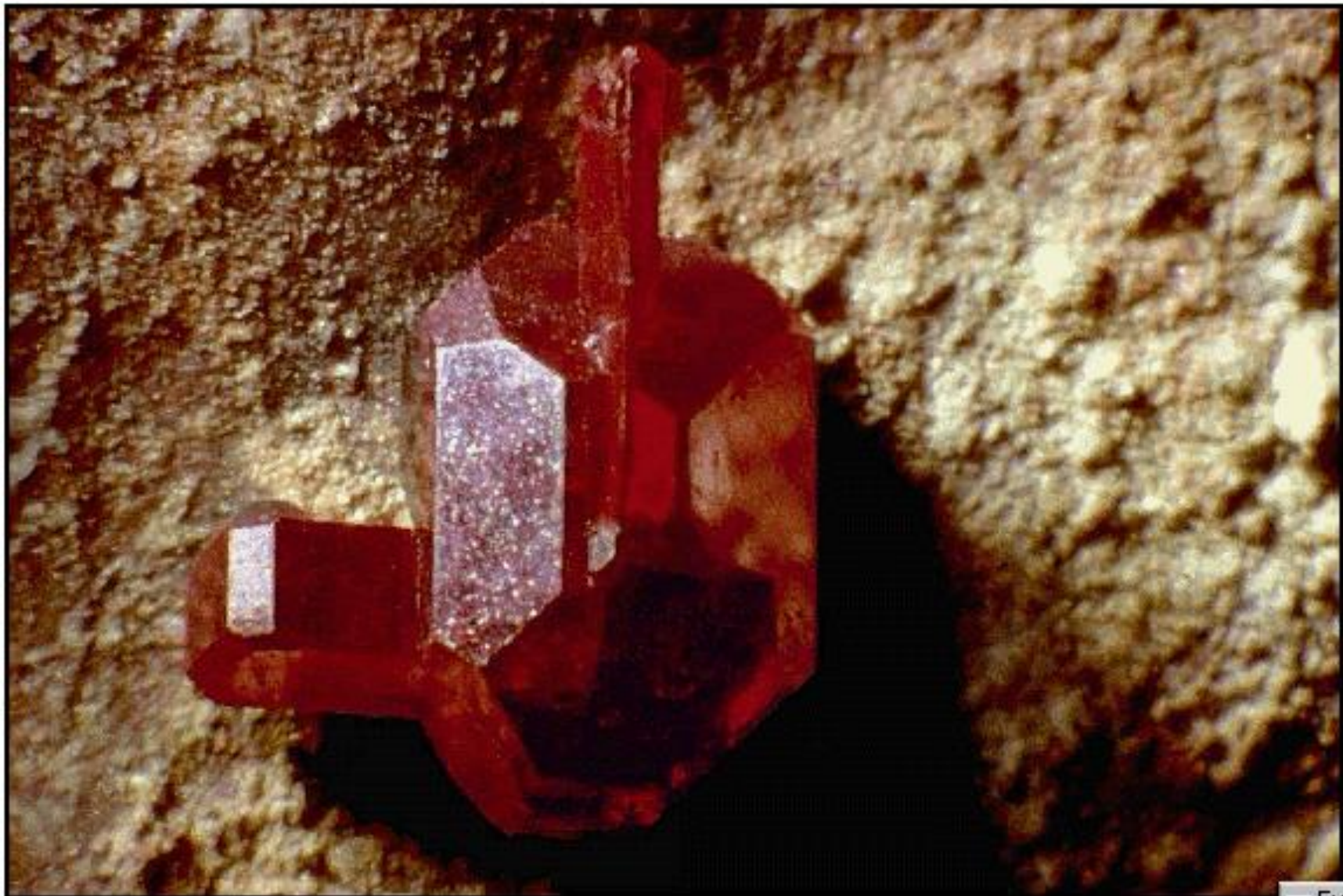
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Cuprite

Ray mine, Ray, Pinal Co., Arizona



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Extra Images

? Specimen Data

User's Note

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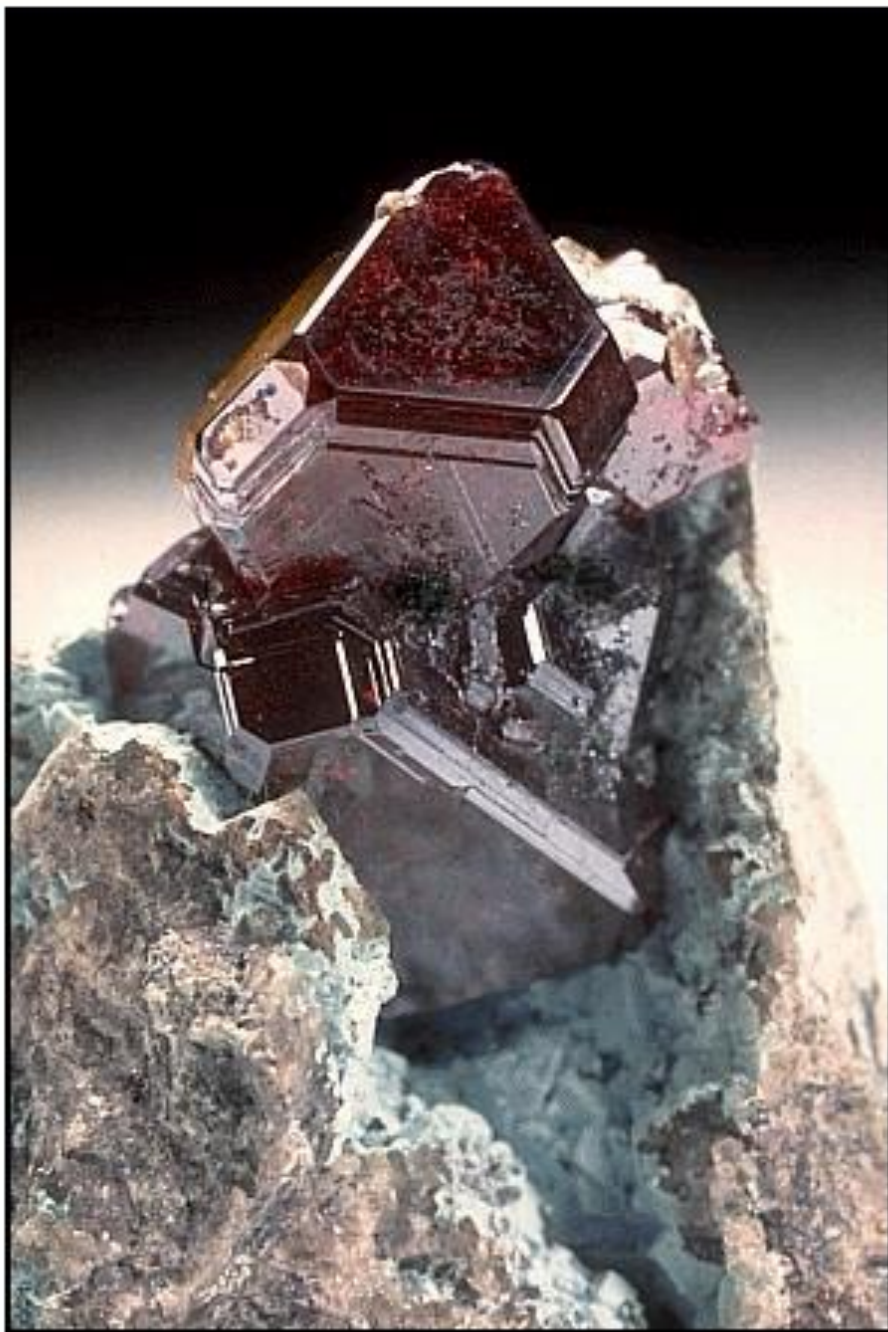
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








Cuprite

Dikuluwe mine, Kolwezi, Shaba,
Dem.Rep.Congo

1 cm

©Wendell Wilson

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- ***Halogenuri***



Fluorite



Fluorite from
Ft. Wayne, Allen Co., Indiana

GENERAL INFORMATION

CaF_2

Strunz
number: 3.AB.1

Origin of
Name: from Latin for to flow

Synonyms

Varieties: antozonite (dark purple var.), blue john (massive color-banded var.), chlorophane (thermoluminescent var.), fusspat, yttrocerite (Ce,Y-rich var.)

Often fluoresces blue, yellow, white, reddish or pale violet, may thermoluminesce




1 cm

©Wendell Wilson

Fluorite on Calcite

Naica, Chihuahua, Mexico

Extra Images

 Specimen Data

 User's Note

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1 cm

©Wendell Wilson

Fluorite (rough and cut)

Penfield quarry, Penfield, Monroe Co., New York

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Halite



Halite from
Grimberg shaft, near Heringen, Thuringia, Ger.

GENERAL INFORMATION

Na Cl

Strunz
number: 3.AA.3

Origin of
Name: from Greek hals = salt

Synonyms
Varieties: rock salt

Sometimes fluoresces orange,
reddish or greenish in UV light
due to inclusions of organic or
inorganic impurities; soluble in
water













1 cm

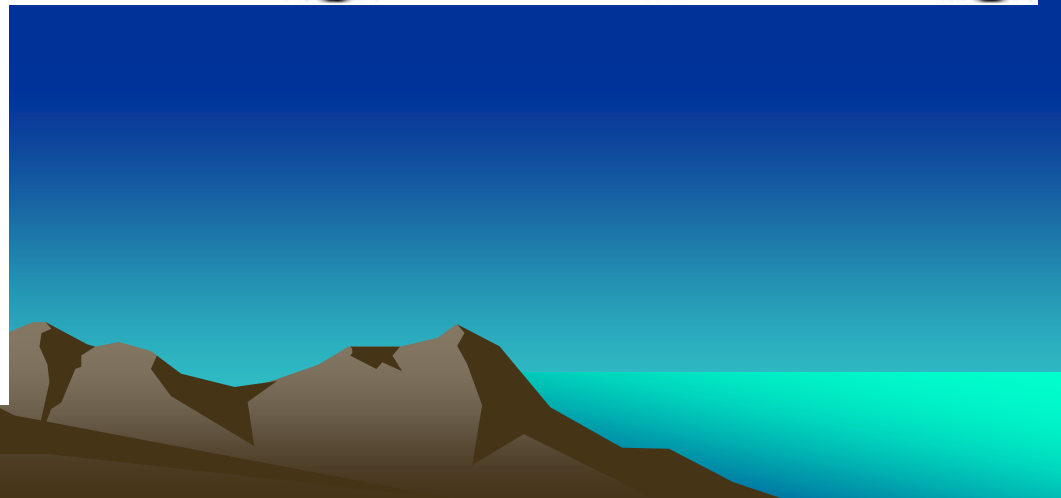
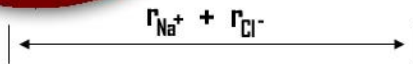
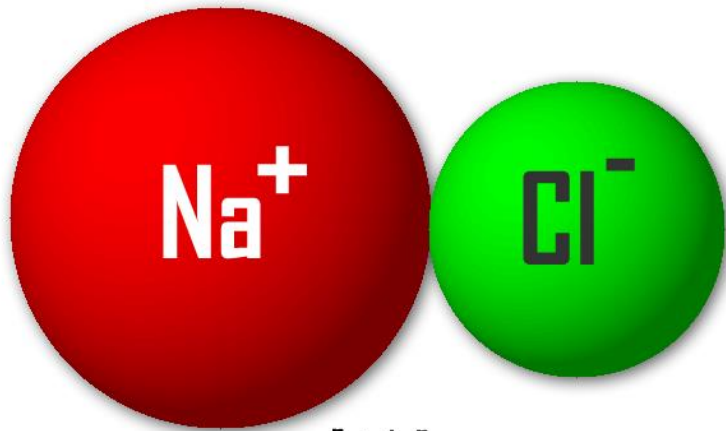
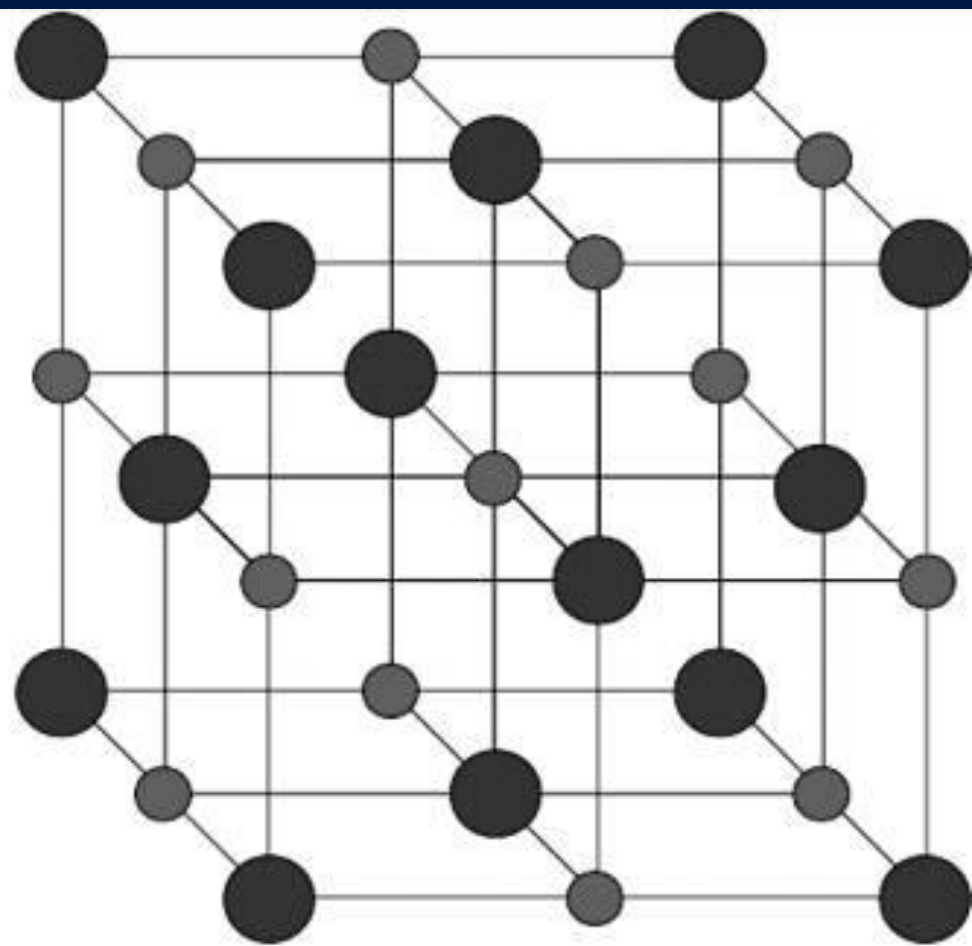
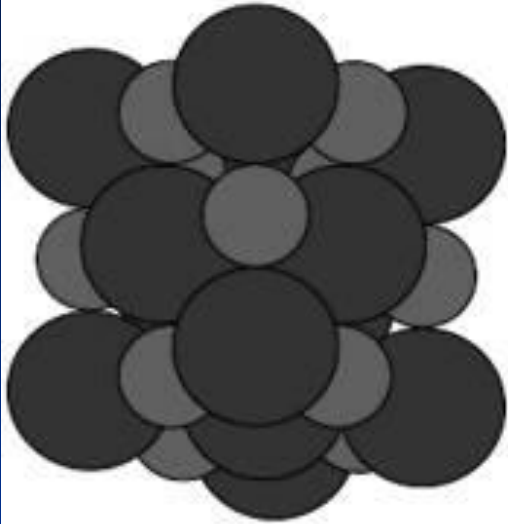
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Halite

Searles Lake, San Bernardino Co., California

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Structura reticulară a halitului













1 cm

©Milton Speckels

Halite

Searles Lake, San Bernardino Co., California

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1 cm

©Milton Speckels

Halite

Searles Lake, San Bernardino Co., California



Specimen
Data



User's
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Photo
Gallery



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







5 mm

©Wendell Wilson

Halite

Searles Lake, San Bernardino Co., California

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- **Carbonații**



Calcite



Calcite from
Elmwood mine, Carthage, Smith Co., Tennessee

GENERAL INFORMATION

CaCO_3

Strunz
number: 5.AB.1

Origin of
Name: from Latin for lime

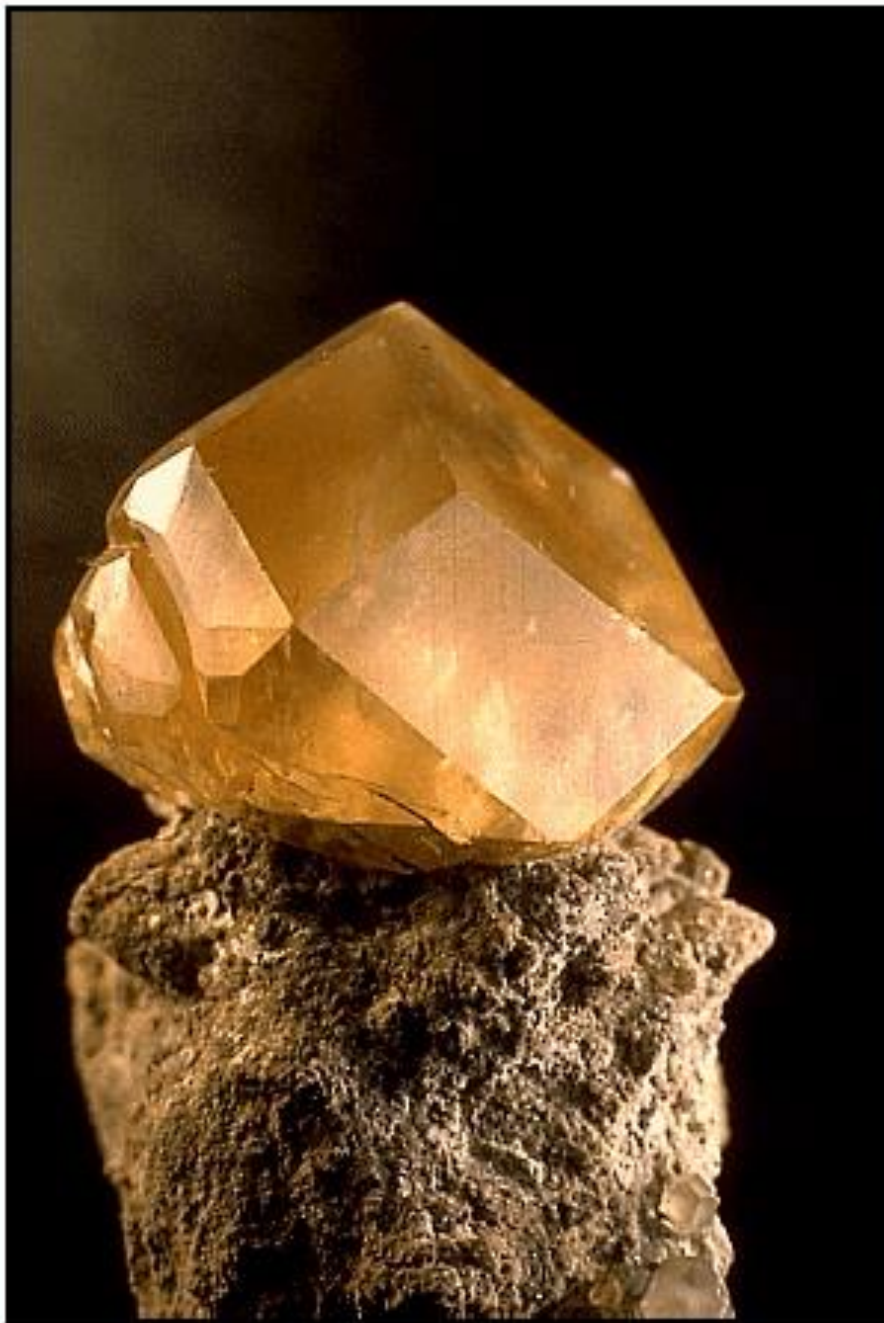
Synonyms

Varieties: iceland spar, travertine
(hard compact var.)

Trimorphous with aragonite
and vaterite; series with
magnesite, siderite,
smithsonite and rhodochrosite






Calcite

North Vernon, Jennings Co.,
Indiana



1 cm

©Wendell Wilson

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Calcite

Pallaflat mine, Cumberland,
England



1 cm

©Wendell Wilson

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Calcite

Dal'negorsk, Primorskiy Kray,
Russia



1 cm

©Wendell Wilson

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CALCIT (CaCO_3)



1 cm

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Calcite

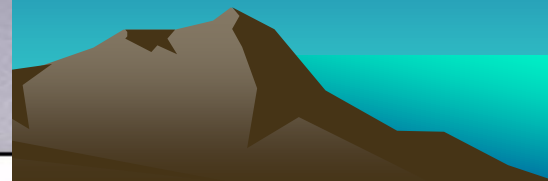
Bigrigg mine, Egremont, Cumbria, England

Specimen Data	User's Note	Prior Image ▲	Extra Images
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CUARȚ (SiO_2)



1 cm





1 cm

©Wendell Wilson

Extra Images

Calcite (cobaltian) with Malachite

Mupine mine, Kolwezi, Shaba, Dem.Rep.of Congo

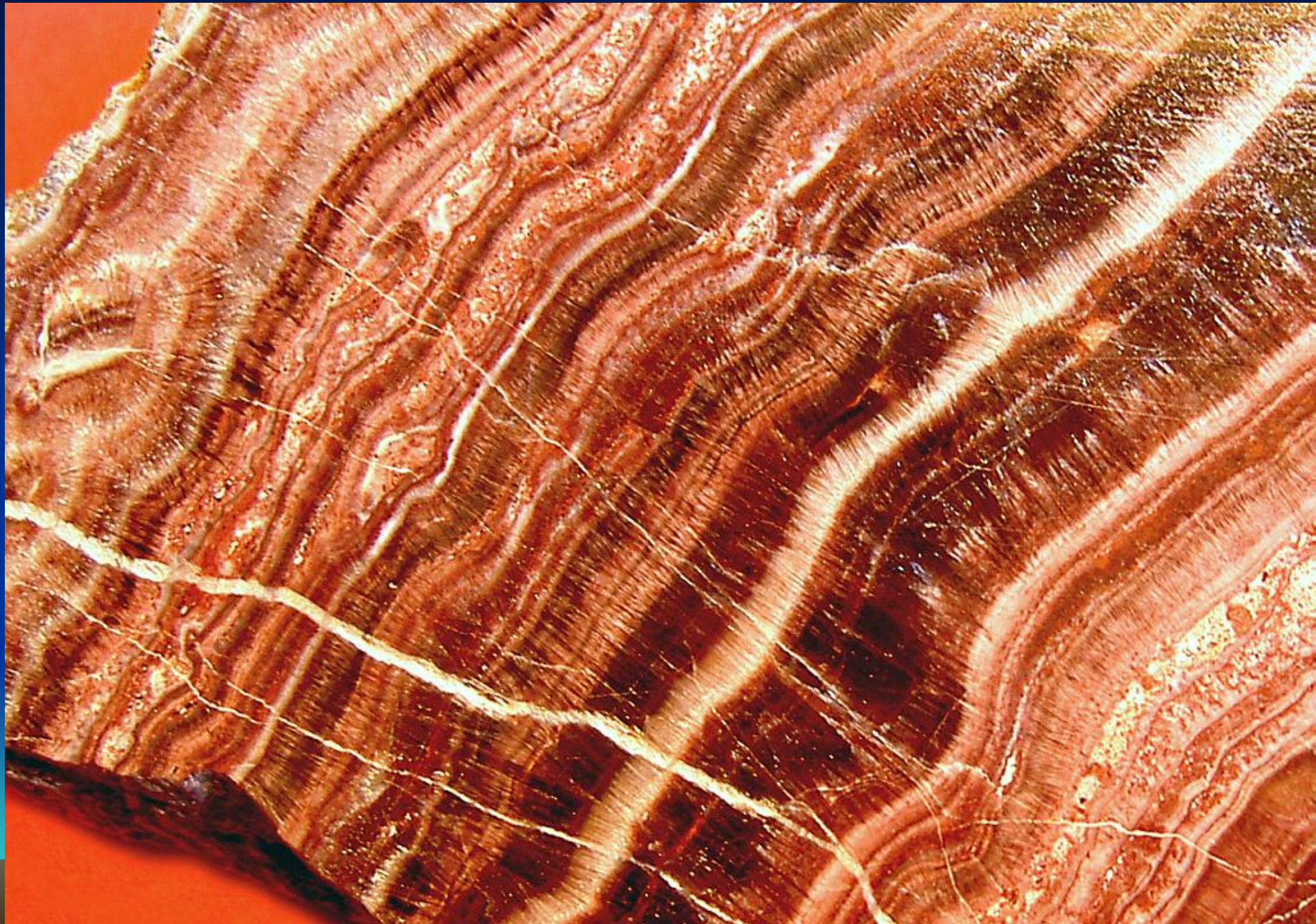
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Aragonit tabular

CaCO_3 - rhombic



Aragonit acicular: CaCO_3 - rombic



Dolomite



**Dolomite from
Lengenbach quarry, Binntal, Valais, Switzerland**

GENERAL INFORMATION



Strunz
number: 5.AB.2

Origin of
Name: for D. de Dolomieu,
French geologist

Synonyms
Varieties:

Series with ankerite and with
kutnohorite



©Lou Perloff

Dolomite

Lengenbach quarry, Binntal, Valais, Switzerland



Specimen
Data



User's
Note

Prior
Image ▲

Photo
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1 cm

©Wendell Wilson

Dolomite with Chalcopyrite

Joplin, Jasper Co., Missouri

 Specimen
Data

 User's
Note



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Gallery

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Malachite



Malachite from
Czar shaft, Bisbee, Cochise Co., Arizona

GENERAL INFORMATION



Strunz
number: 5.BA.2

Origin of
Name: from Greek for mallow

Synonyms
Varieties:

Luster of fibers silky or velvety








Malachite

New Cornelia mine, Ajo, Pima Co.,
Arizona



1 cm

©Wendell Wilson

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Malachite on Quartz

Denny Mountain, King Co.,
Washington

1 cm

©Rick Dillhoff

? Specimen
Data

📝 User's
Note

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Image

🖼️ Photo
Gallery

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Rhodochrosite



Rhodochrosite on Manganite from
N'Chwaning mine, Kuruman, No.Cape, So. Africa

GENERAL INFORMATION

Mn CO_3

Strunz
number: 5.AB.1

Origin of
Name: from Greek for rose
and color

Synonyms
Varieties: dialogite

Series with calcite and with
siderite



Rhodochrosite


Santa Eulalia, Chihuahua, Mexico





©Lou Perloff


 Specimen Data

 User's Note

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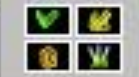
 Extra Images

Photo Gallery






1 cm

©Wendell Wilson

Rhodochrosite on Quartz

Cavnic, Maramures, Romania

 Specimen Data

 User's Note





Prior Image 

Photo Gallery

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


1 cm

©Wendell Wilson

Rhodochrosite on Quartz


Madan district, Rhodope Mts., Bulgaria

 Specimen Data

 User's Note

Prior Image 

Photo Gallery

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Next Image 

Magnesite



**Magnesite from
Dudweiler, Saarland, Germany**

GENERAL INFORMATION

Mg CO_3

Strunz
number: 5.AB.1

Origin of
Name: from Greek, magnesia
lithos = magnesian
stone

Synonyms

Varieties: baudisserite,
breunnerite (Fe-rich
var.), giobertite, hoshiite
(Ni-rich var.), mesitite
(Fe-rich var.)

Series with gaspeite and with
siderite

Cerussite



Cerussite (**reticulated** twin) from
Touissit mine, Touissit, near Ojuda, Morocco

GENERAL INFORMATION

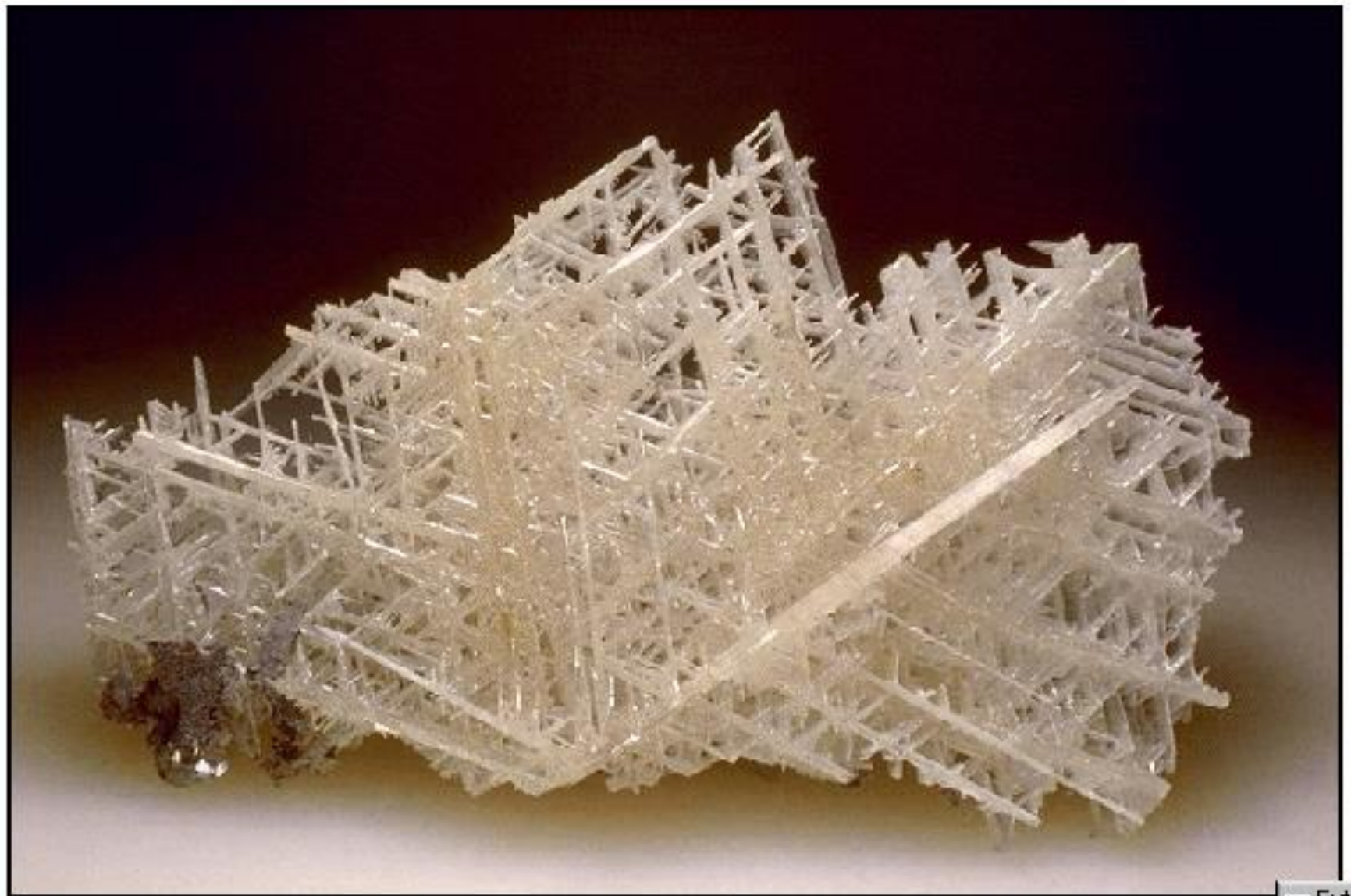
Pb CO_3

Strunz
number: 5.AC.1

Origin of
Name: from Greek for lead
carbonate

Synonyms
Varieties:

Sometimes fluoresces
yellowish in LW



1 cm

©Wendell Wilson

Cerussite (reticulated twin)

Tsumeb mine, Tsumeb, Namibia

Extra Images

? Specimen Data

User's Note

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Photo Gallery

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- ***Sulfații***



Gypsum



Gypsum from
Zaragoza, Zaragoza Prov., Aragon, Spain

GENERAL INFORMATION



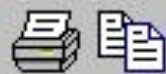
Strunz
number: 7.CE.2

Origin of
Name: from Greek *gypos* =
plaster

Synonyms

Varieties: alabaster (massive, fine-
grained variety), gips,
selenite (colorless,
transparent variety),
satin spar (columnar,
fibrous variety)

Sometimes fluoresces and
phosphoresces greenish white



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SELECT
MINERAL



FROM ALPHABETIC LIST

General
Info.



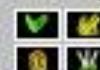
Physical
Prop.



Crystal-
lography



Photo
Gallery





©Lou Perloff

Gypsum

Manhattan, Nye Co., Nevada



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
Gypsum

Newton, Alberta, Canada



1 cm

©Milton Speckels

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Barite



Barite on Calcite from
Elk Creek, Meade Co., South Dakota

GENERAL INFORMATION

$BaSO_4$

Strunz
number: 7.AD.2

Origin of
Name: from Greek for heavy

Synonyms
Varieties: baryte, hokutolite
(Pb-rich var.)

Sometimes fluoresces or
phosphorescent







Barite

Palos Verdes, Los Angeles Co.,
California



1 cm

©Tony Kampf

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1 cm

©Wendell Wilson

Barite

Pohla mine, Crottendorf, Saxony, Germany

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1 cm

©Wendell Wilson


Extra Images


Barite

Cumbria, England

 Specimen Data

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Photo Gallery



Celestine



Celestine from
Austin, Travis Co., Texas

GENERAL INFORMATION

Sr SO_4

Strunz
number: 7.AD.1

Origin of
Name: from Latin caelestis =
sky (blue)

Synonyms

Varieties: celestite, cliftonite
(impure var.)

Sometimes fluoresces













1 cm

©Wendell Wilson

Celestine

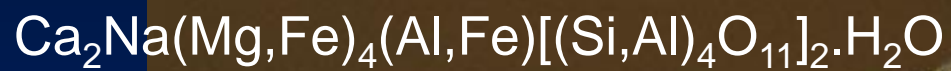
Maybe, Monroe Co., Michigan

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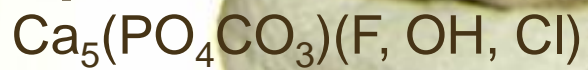
- ***Fosfații***



Hornbledă



Apatit













Monazite on Muscovite

Brook's Farm, Cleveland Co., North
Carolina



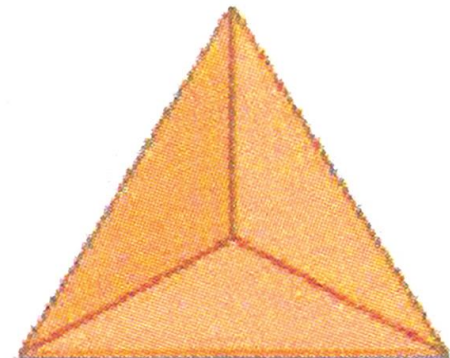
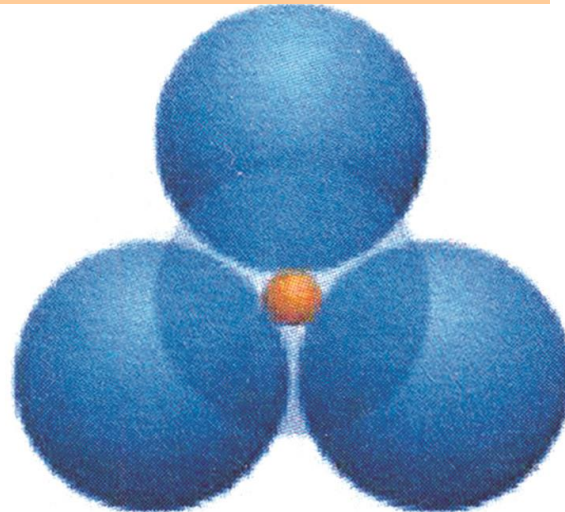
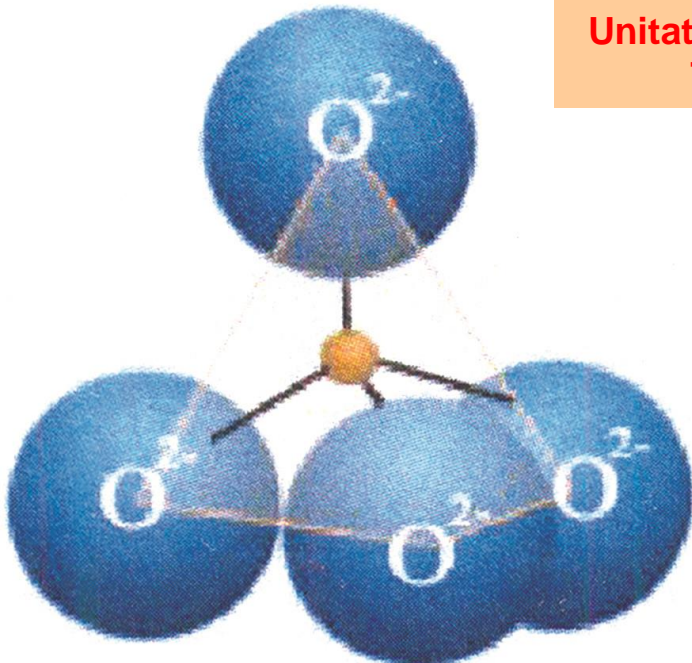
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• Silicații

Clasificarea silicaților are la bază criteriul structural, fiind împărțiți în **nezosilicați** (silicați alcătuiți din tetraedrii solitari de silice, legați prin cationi de Ca, Mg, Na, etc., dar nu prin atomi de oxigen ai tetraedrului), **sorosilicați** (doi tetraedrii de silice legați printr-un atom de oxigen aparținând tetraedrului), **ciclosilicați** (o structură ciclică din minim trei tetraedrii de silice, legați prin atomi de oxigen), **inosilicați** (lanțuri infinite simple – **piroxeni** și duble – **amfibolili**, de tetraedrii de silice legați prin atomi de oxigen), **filosilicații** (tetraedrii sunt dispuși în ochiurile unei rețele plane, hexagoane) și **tectosilicații** (tetraedrii de silice legați prin atomi de oxigen sunt dispuși într-o rețea tridimensională). La valențele libere ale oxigenului adăunează ceilalți cationi și ioni complexi, formând speciile minerale.

Unitatea chimico-structurală a silicaților
Tetraedrul de silice – $[\text{SiO}_4]^{4-}$



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

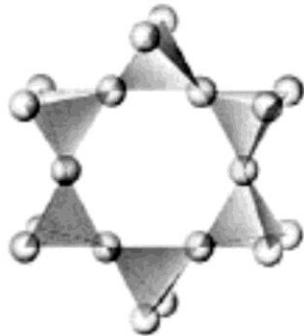
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

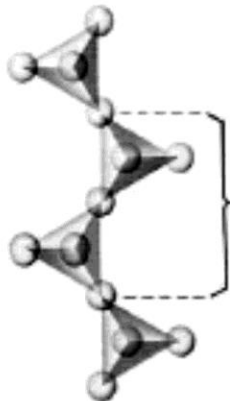
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



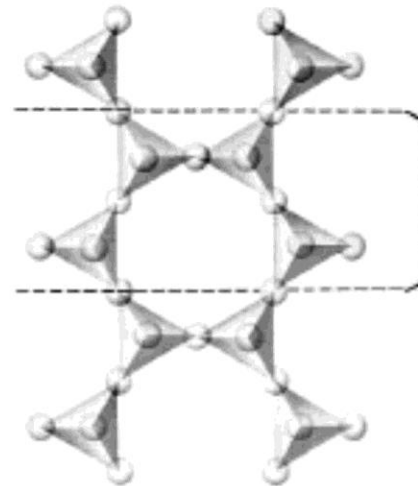
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



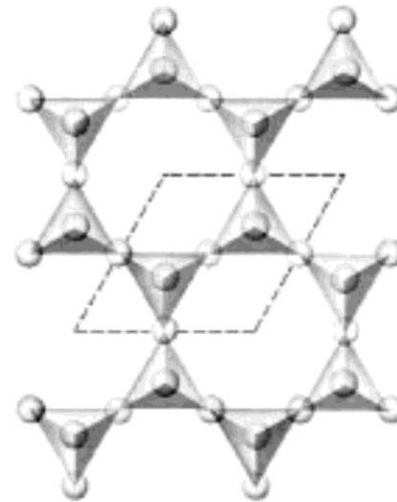
[Si₂O₃]²⁻
[Si₂O₆]⁴⁻



Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

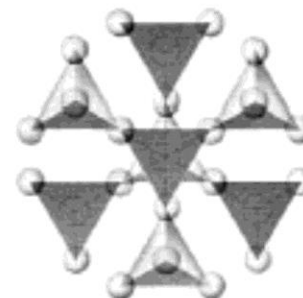
[Si₄O₁₁]⁶⁻
[(Si₄O₁₁)(OH)]⁷⁻



Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻
[AlSi₃O₁₀]⁵⁻
[Al₂Si₂O₁₀]⁶⁻



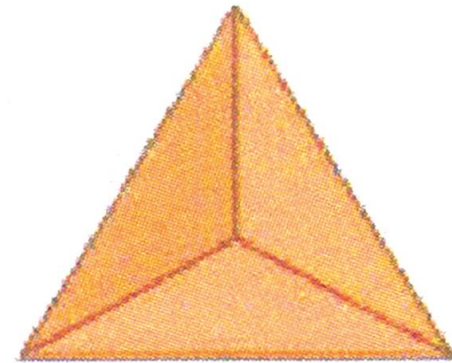
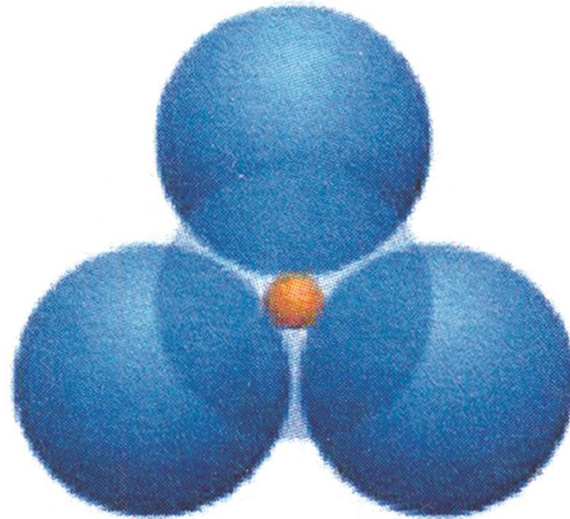
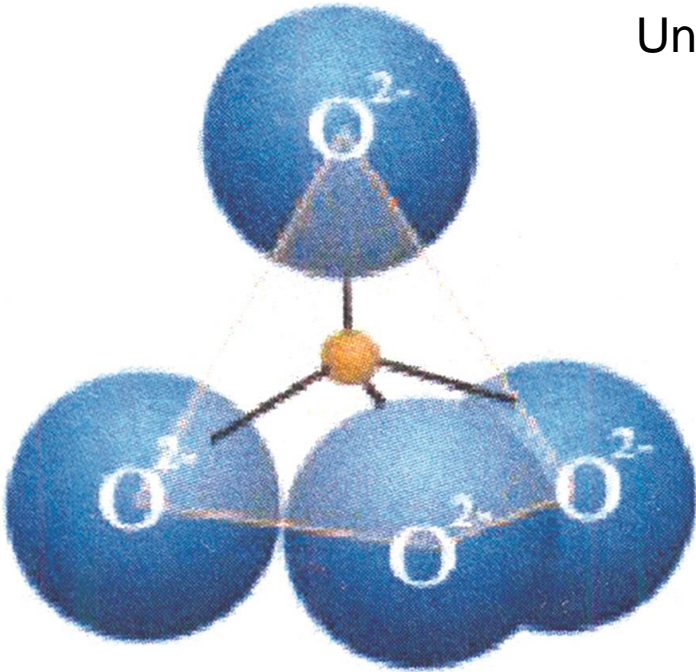
Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

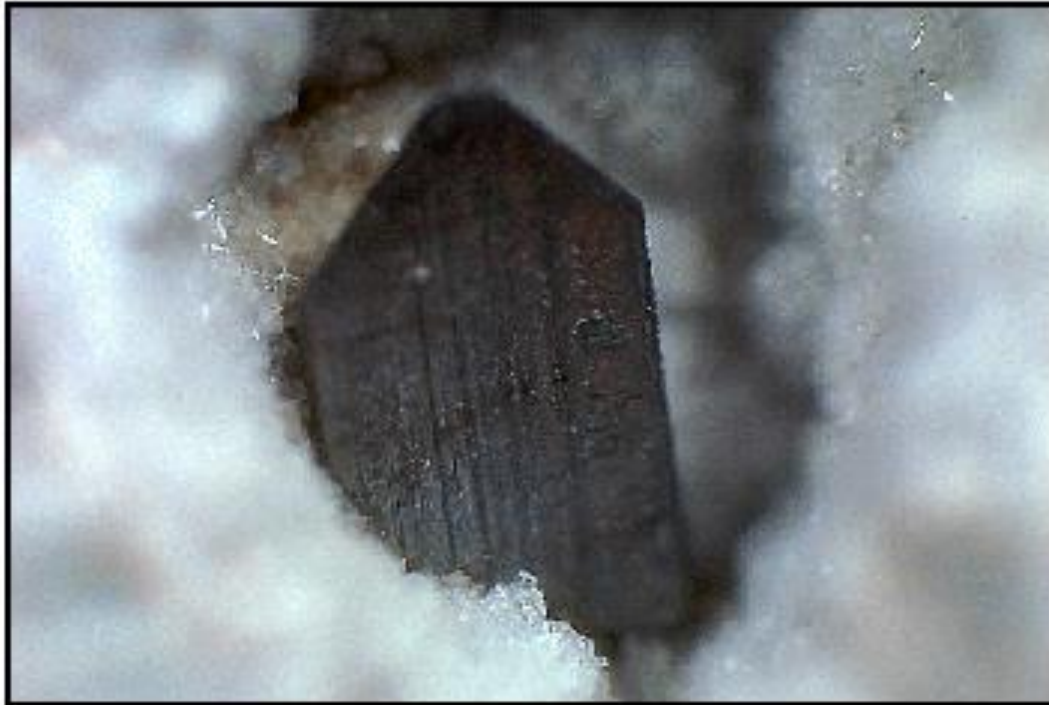
[SiO₂], [AlSiO₄]⁻
[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

NESOSILICAȚI (SILICAȚI INSULARI)

Unitatea chimico-structurală a nesolicaților: $[\text{SiO}_4]^{4-}$



Fayalite



Fayalite from
Upper Cascades, Multnomah Co., Oregon

GENERAL INFORMATION



Strunz
number: 9.AB.1

Origin of
Name: locality; Fayal Island,
Azores

Synonyms

Varieties: hortonolite (Mg, Mn-rich
var.), knebelite (Mn-rich
var.), olivine (group
name), roepperite (Mn,
Zn-rich var.)

Series with forsterite and with
tephroite



©Milton Speckels

Fayalite on Cristobalite

Coso Hot Springs, Inyo Co., California










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1 cm

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Fayalite on Cristobalite in Obsidian
Coso Hot Springs, Inyo Co., California

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Forsterite



Forsterite from
St. John's Island, Red Sea, Egypt

GENERAL INFORMATION



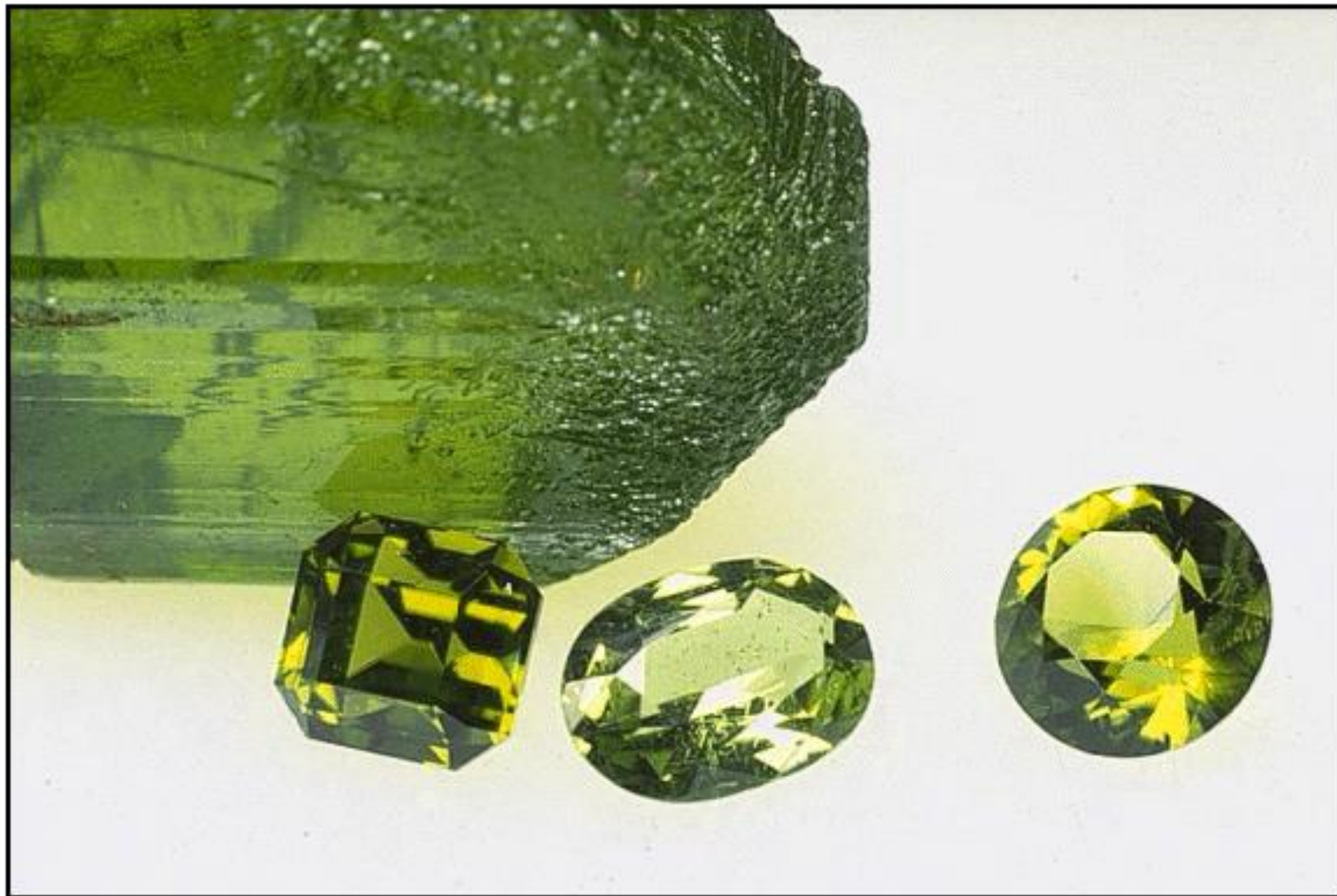
Strunz
number: 9.AB.1

Origin of
Name: for A. Forster, English
collector

Synonyms

Varieties: boltonite, chrysolite,
olivine (group name),
peridot (gem variety)

Series with fayalite;
trimorphous with ringwoodite
and wadsleyite










1 cm

©Wendell Wilson

Forsterite (rough and cut)

St. John's Island, Red Sea, Egypt


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Forsterite

Sapat, Indus-Kohistan, NW
Frontier, Pakistan



©Wendell Wilson

 Specimen Data	 User's Note	Prior Image ▲	Photo Gallery 
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1 cm

©Lou Perloff

Forsterite (faceted)

Pyauung Guang, Myanmar

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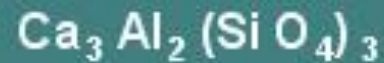
SERIA IZOMORFĂ A GRANAȚILOR

Grossular



Grossular (hessonite) on Diopside from Lowell (Eden Mills), Orleans Co., Vermont

GENERAL INFORMATION



Strunz number: 9.AC.1

Origin of Name: from Latin for gooseberry

Synonyms

Varieties: grossularite, hessonite/essonite (orange to red var.), tsavorite/tsavolite (green, Cr/V-rich var.)

Forms three series: with andradite, with hibschite and katoite, and with uvarovite

Grossular with Clinocllore

Val d'Ala, Piedmont, Italy



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Specimen
Data



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





Grossular on Diopside

Vesper Peak, Snohomish Co.,
Washington



©Rick Dillhoff

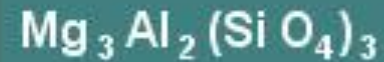
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Pyrope



Pyrope (rough and cut) from
Arizona

GENERAL INFORMATION



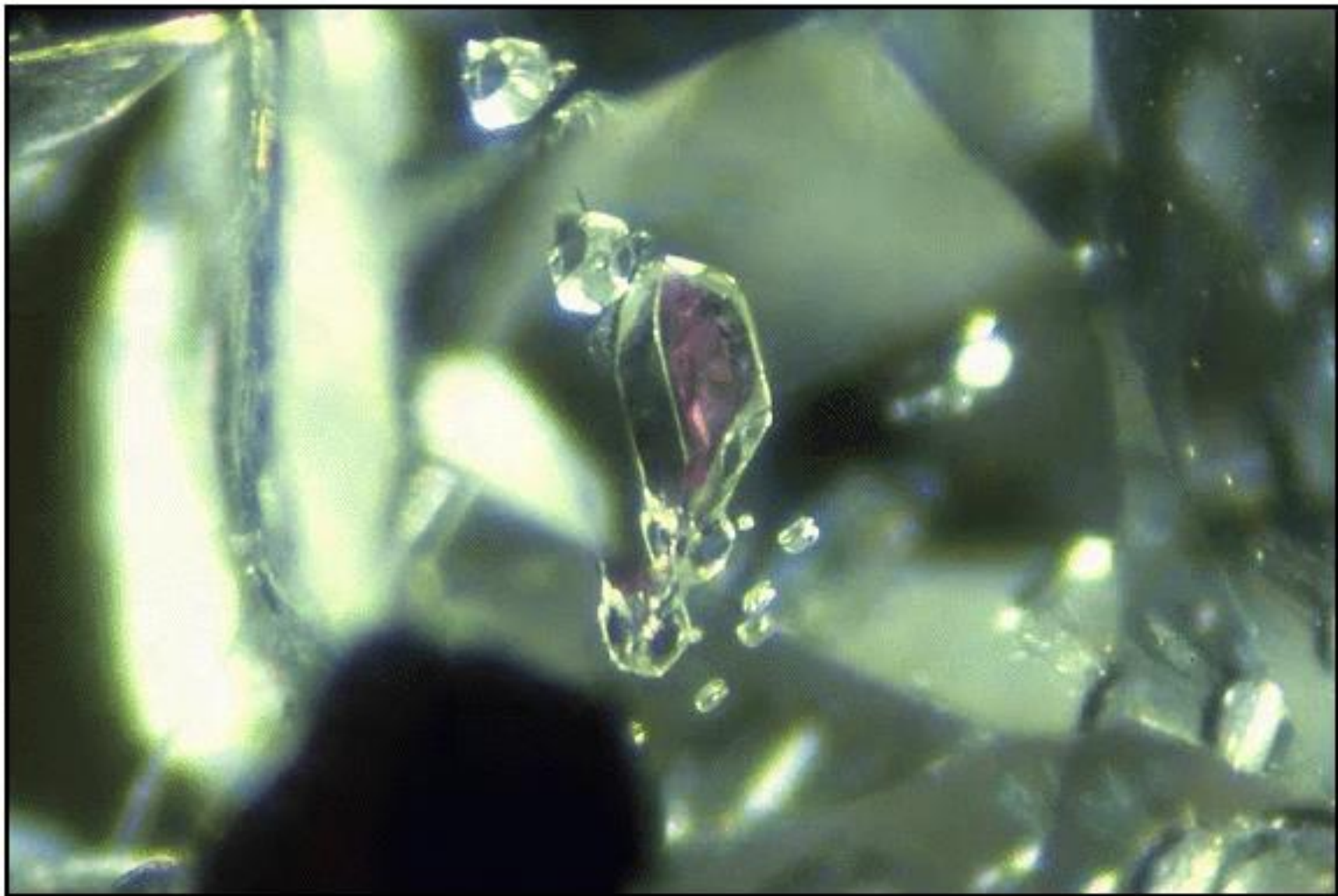
Strunz
number: 9.AC.1

Origin of
Name: from Greek pyropos =
fiery

Synonyms

Varieties: carbuncle, rhodolite
(purple-red gem var.)

Series with almandine, with
spessartine and with
knorringite



©Anthony de Goutière

Pyrope in Diamond
unknown locality



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Spessartin



1 cm



1 cm

Topaz



Topaz from
Thomas Range, Juab Co., Utah

GENERAL INFORMATION



Strunz
number: 9.A1.1

Origin of
Name: from Greek Topazion,
a Red Sea island often
covered in mist

Synonyms

Varieties: imperial topaz (yellow
to red-orange gem var.),
pycnite (columnar
massive var.)




©Wendell Wilson

Imperial Topaz

Vermelho mine, Ouro Preto, Minas Gerais, Brazil

 Extra Images

 Specimen Data

 User's Note




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Zircon



Zircon from
Franklin, Sussex Co., New Jersey

GENERAL INFORMATION

Zr Si O_4

Strunz
number: 9.AD.1

Origin of
Name: from Arabic zarqun
and Persian zar = gold
gun = color

Synonyms
Varieties:

Transparent to opaque if
metamict













1 cm

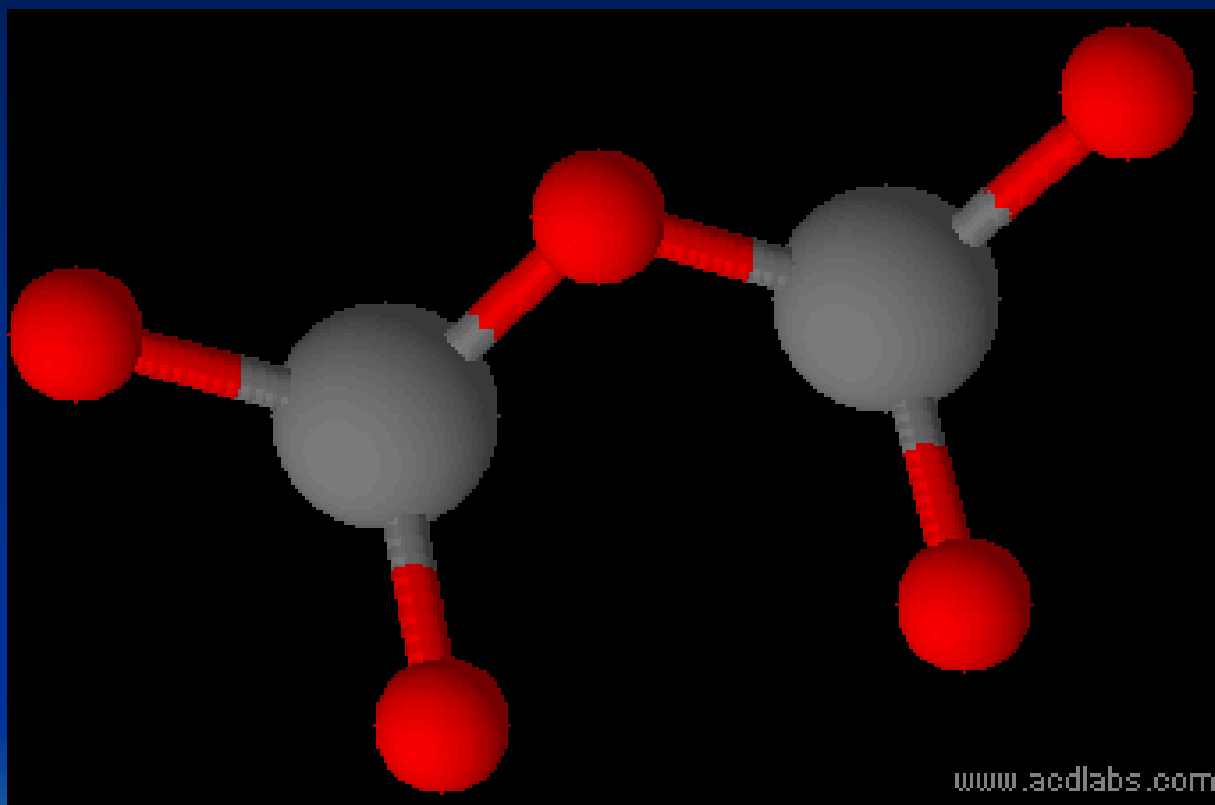
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Zircon (rough and cut)

Renfrew, Ontario, Canada

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SOROSILICAȚII



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

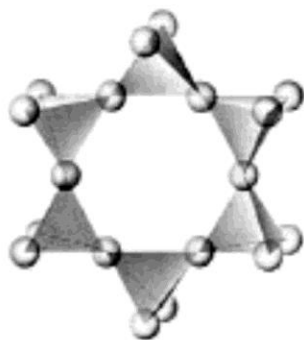
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

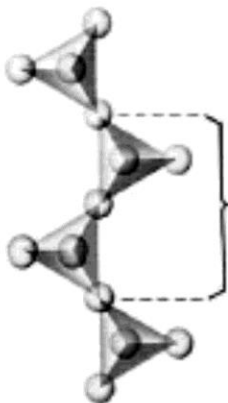
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



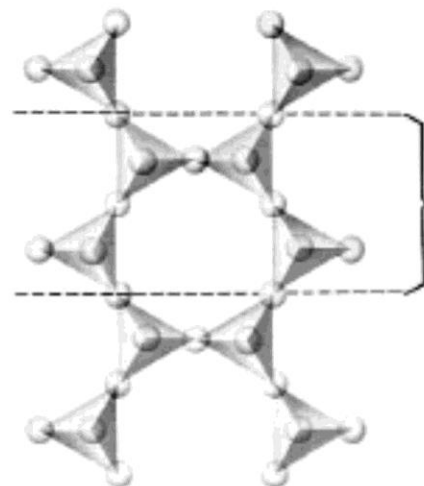
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻
[Si₂O₆]⁴⁻

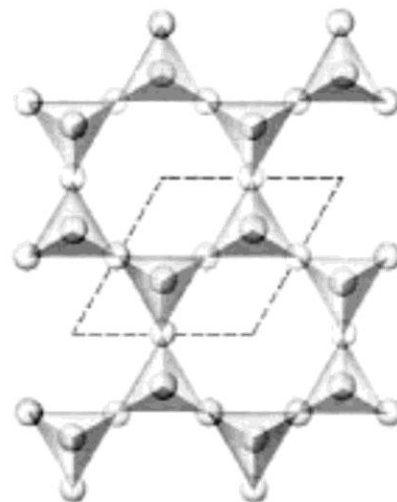


Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻



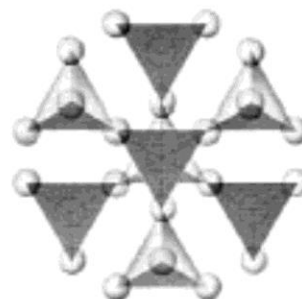
Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻



Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻

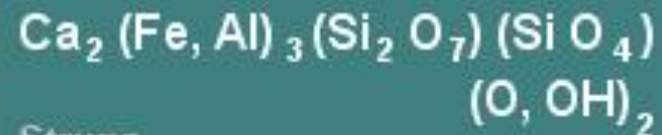
[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

Epidote



**Epidote from
Haramosh Mts., Baltistan, Northern Areas, Pak.**

GENERAL INFORMATION



Strunz
number: 9.BN.1

Origin of
Name: from Greek for
increase

Synonyms
Varieties:

Series with clinozoisite



Epidote

Knappenwand, Untersulzbachtal,
Salzburg, Austria



1 cm

©Wendell Wilson

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Epidote

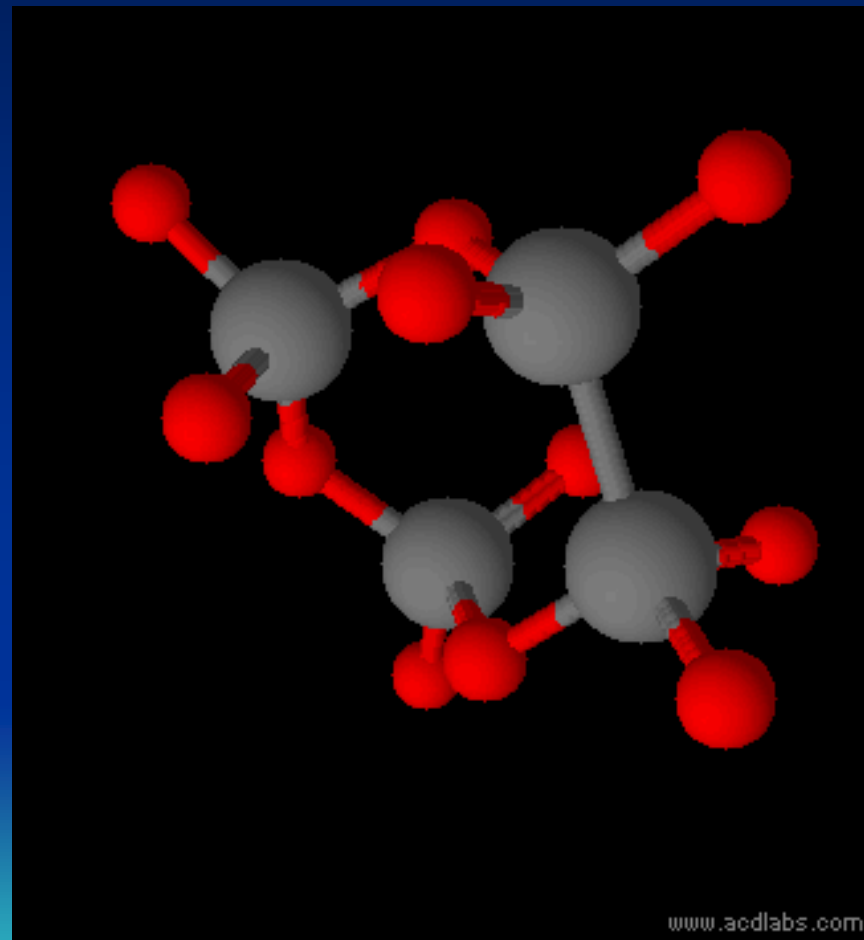
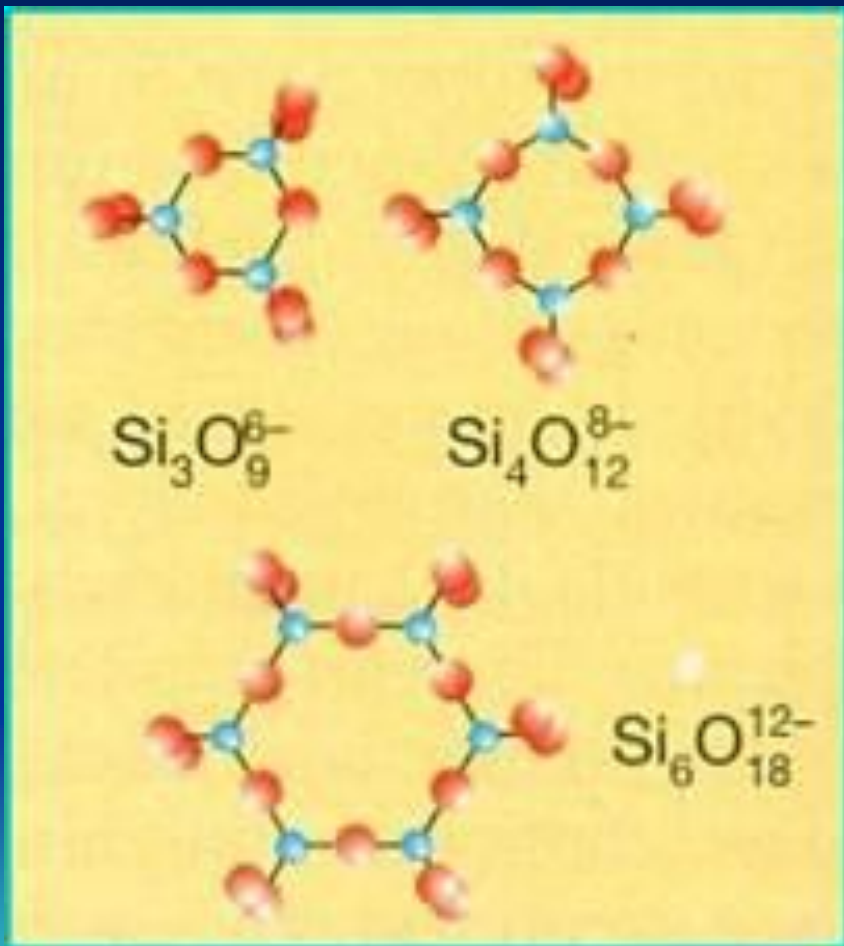
Le Grand Mont, Albertville,
Haute-Savoie, France



©Lou Perloff

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CICLOSILICAȚII



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

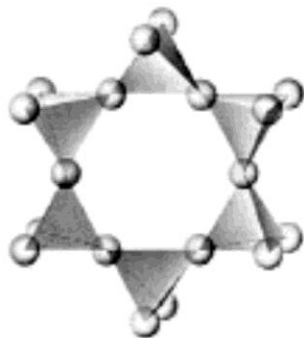
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

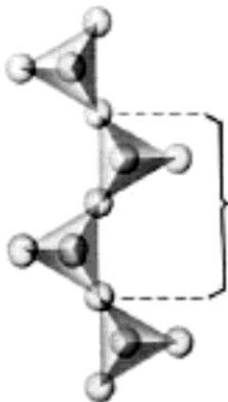
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



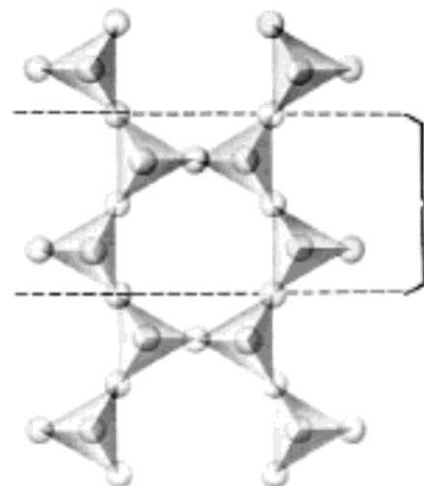
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻
[Si₂O₆]⁴⁻

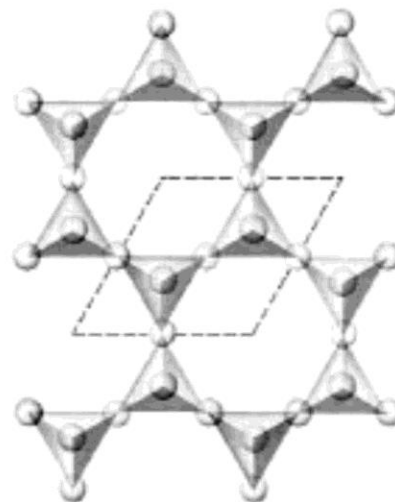


Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻



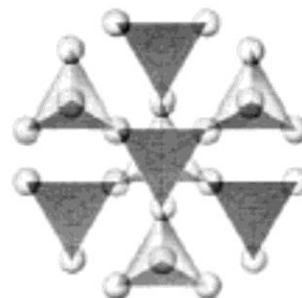
Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻



Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻

[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

TURMALINA



Beryl



**Beryl (aquamarine) from
Jaqueto, Bahia, Brazil**

GENERAL INFORMATION



Strunz
number: 9.CC.1

Origin of
Name: from Greek
beryllos = a blue-
green gem

Synonyms

Varieties: aquamarine (green-blue
var.), emerald (green
var.), goshenite
(colorless var.), heliodor
(yellow var.), morganite
(pink var.), bixbite (red
var.)

Beryl (aquamarine)

Gilgit, Northern Areas, Pakistan



1 cm

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Extra Images

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Beryl (heliodor)

Fano mine, Cahuilla Mt., Riverside
Co., California



1 cm

©Tony Kampf

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Beryl (emerald)

Muzo, Boyaca, Colombia



©Lou Perloff

Extra Images

Specimen Data

User's Note

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Photo Gallery

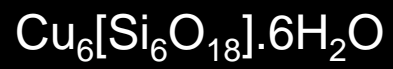
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DIOPTAZ



INOSILICAȚI



INOSILICAȚI-PIROXENI

CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

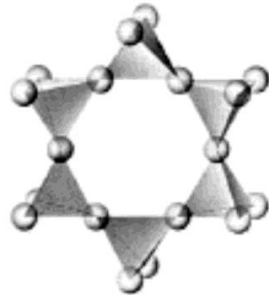
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



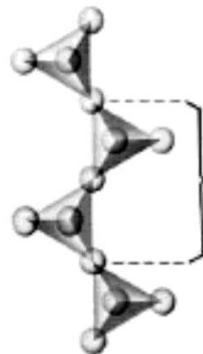
[Si₃O₉]⁶⁻

[Si₄O₁₂]⁸⁻

[Si₆O₁₈]¹²⁻

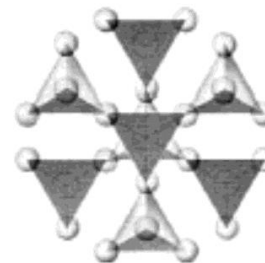
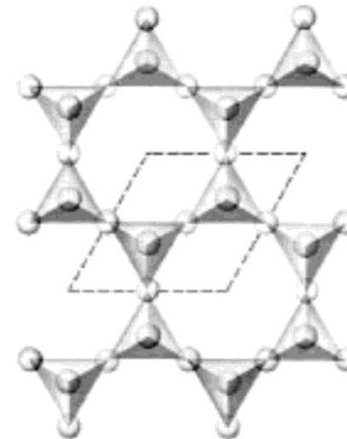
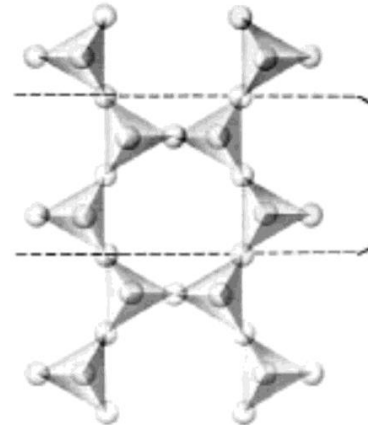
Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻

[Si₂O₆]⁴⁻



Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻

Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻

Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻

[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

INOSILICAȚI

PIROXENI - CATENE SMPLE

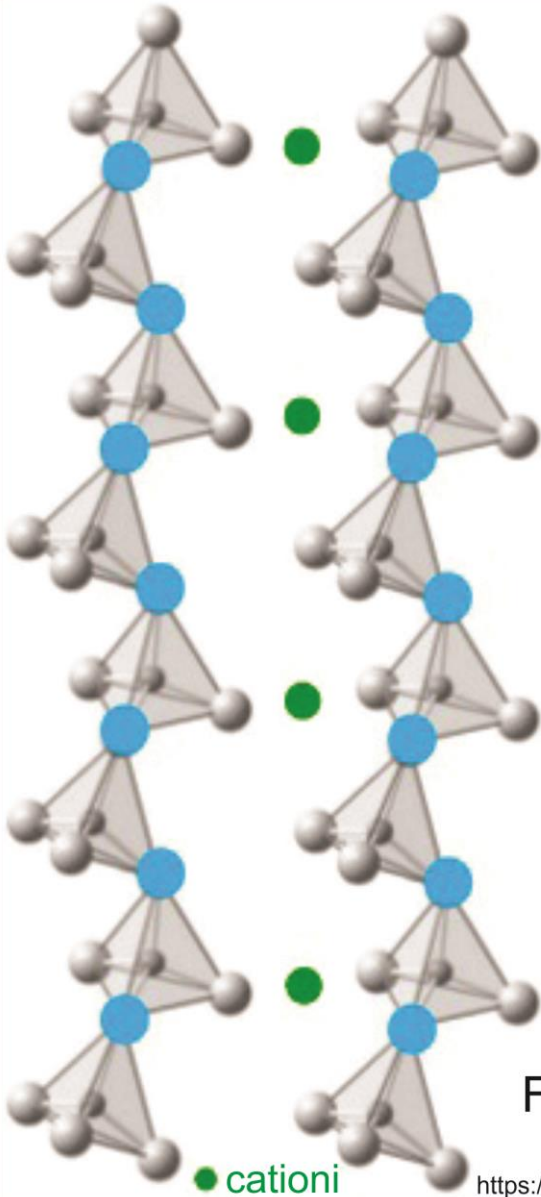
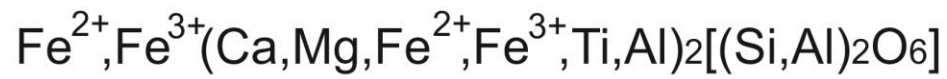
Egirin (sin. Acmit)



Si : O
1 : 3



Augit



Jadeite



Jadeite from
Russian River, by Cloverdale, Mendocino Co., Ca.

GENERAL INFORMATION



Strunz
number: 9.DD.1

Origin of
Name: from Spanish, piedra
de yjada = stone of the
side

Synonyms

Varieties: chloromelanite
(compact dark green to
black var.), feitsui,
imperial jade (compact
translucent emerald-
green gem var.), jade
(compact gem var.)

Diopside



Diopside from
Kunlun Mts., Xinjiang Uygur Zizhou, China

GENERAL INFORMATION



Strunz
number: 9.DB.1

Origin of
Name: from Greek
dis = double and
opsis = view

Synonyms

Varieties: fassite (Fe³⁺, Al-rich
var.), jeffersonite
(Mn, Zn, Fe in 1:1:1 ratio
var.), lavrovite (V, Cr-rich
var.), salite (Fe-rich
var.), violan (Mn-rich,
purple color)

Series with hedenbergite and
with johannsenite



Diopside on Grossular
Val d'Ala, Piedmont, Italy

©Lou Perloff



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Rhodonite



Rhodonite in Calcite from
Franklin, Sussex Co., New Jersey

GENERAL INFORMATION

(Mn, Fe, Mg, Ca) Si O₃

Strunz
number: 9.DP.1

Origin of
Name: from Greek for rose

Synonyms

Varieties: fowlerite (Zn-rich var.),
bustamite (Ca-rich var.),
manganamphibole,
rhodoarsenian



©Lou Perloff

Rhodonite

Harstig mine, Pajsberg, Varmland, Sweden



Specimen
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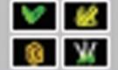


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Rhodonite

Harstig mine, Pajsberg, Varmland, Sweden



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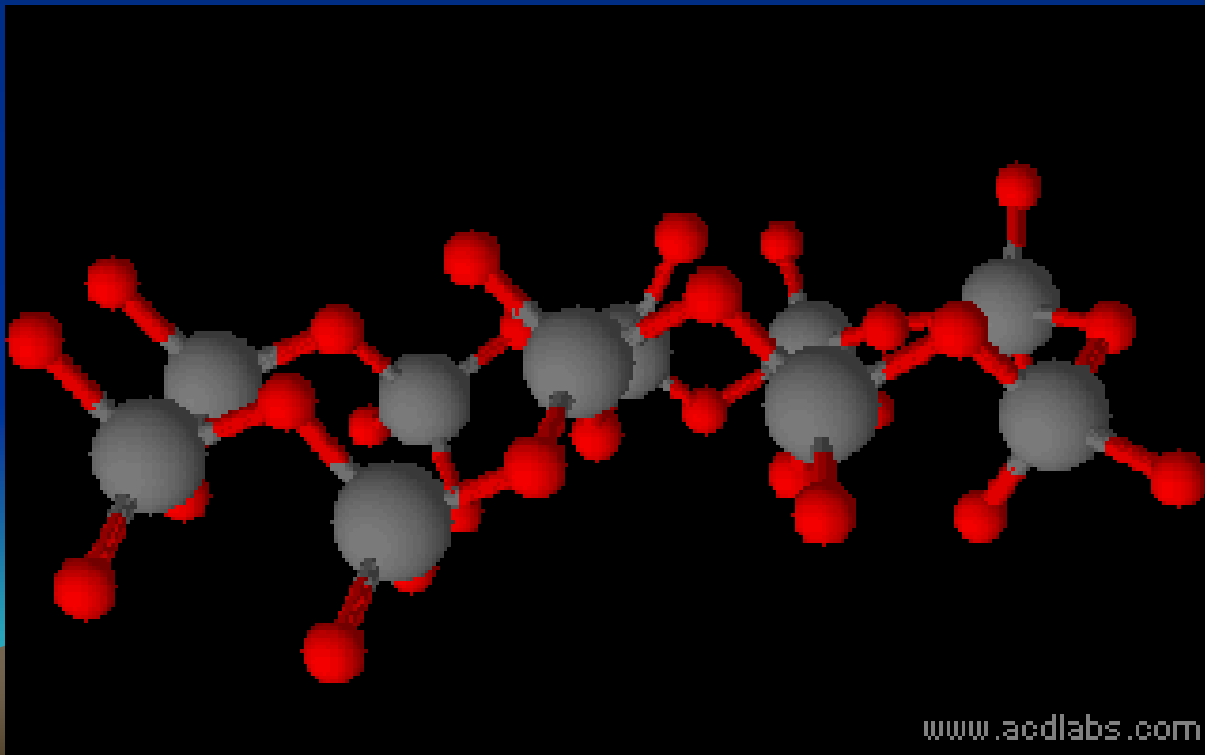
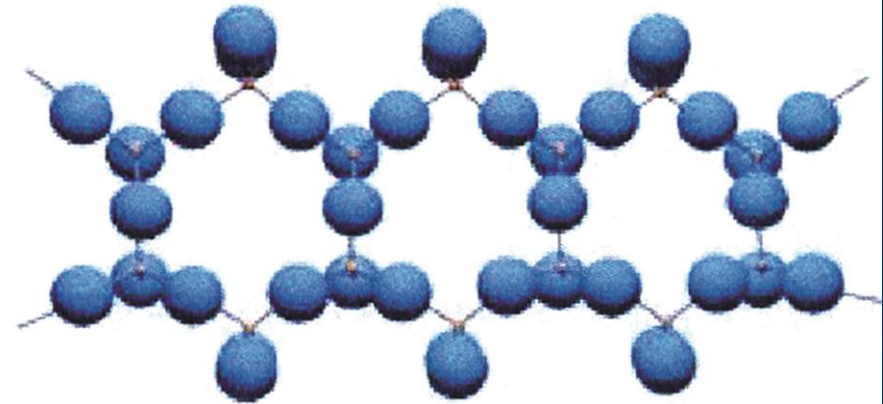
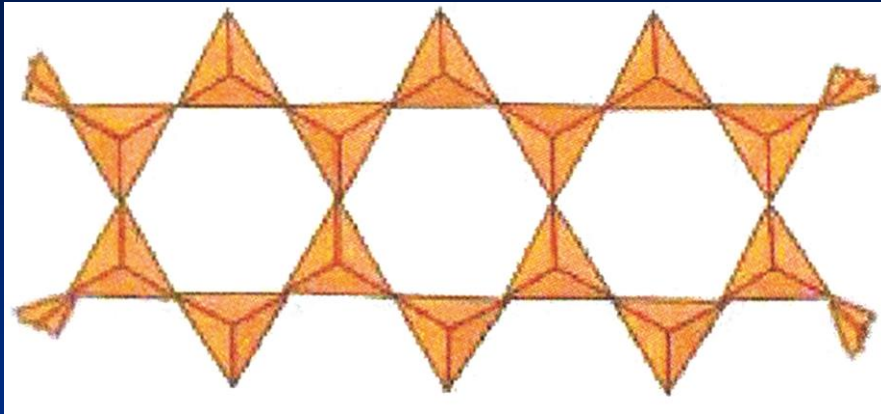


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INOSILICAȚI - AMFIBOLI



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CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

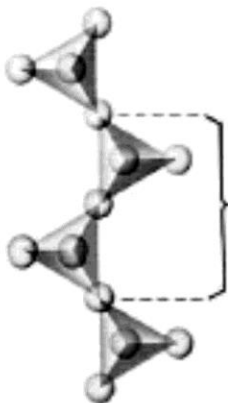
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



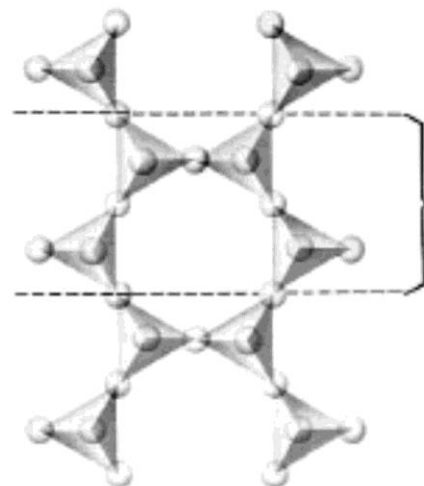
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻
[Si₂O₆]⁴⁻

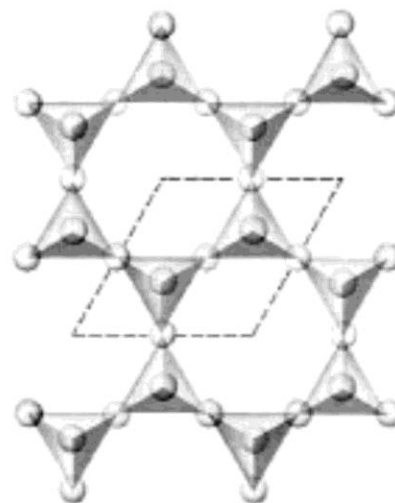


Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻



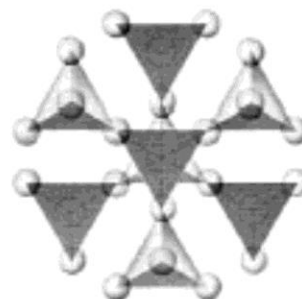
Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻



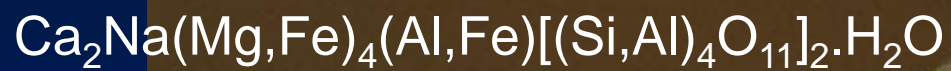
Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

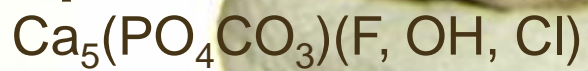
[SiO₂], [AlSiO₄]⁻

[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

Hornbledă



Apatit



Actinolite



Actinolite from
Gouverneur, St. Lawrence Co., New York

GENERAL INFORMATION



Strunz
number: 9.DH.1

Origin of
Name: from Greek for ray

Synonyms

Varieties: jade (compact gem var.),
nephrite (compact var.),
byssolite (fibrous var.),
smaragdite/uralite
(replacing pyroxene),
strahlstein, zillerite,
zillerthite

Intermediate member of the
series tremolite -
ferro-actinolite

Actinot (termen intermediar din seria izomorfă Tremolit – Actinot – Feroactinot)






5 cm

©Wendell Wilson

Actinolite (nephrite jade; rough and cut)

Washington, California (2), Wyoming

 Specimen Data

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FILOSILICAȚII



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

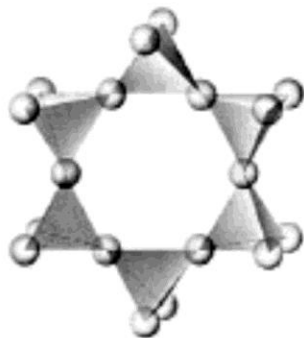
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

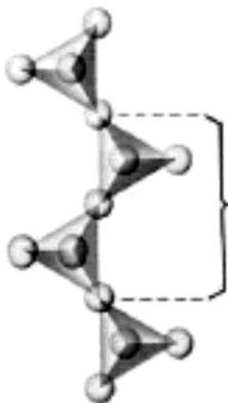
Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



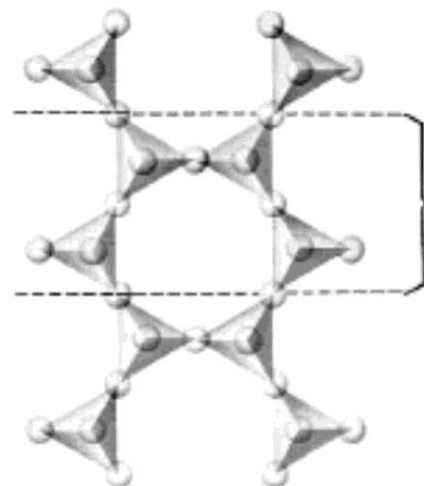
[Si₃O₉]⁶⁻
[Si₄O₁₂]⁸⁻
[Si₆O₁₈]¹²⁻

Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻
[Si₂O₆]⁴⁻

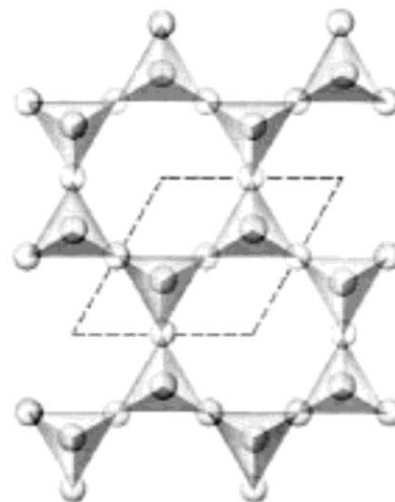


Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻



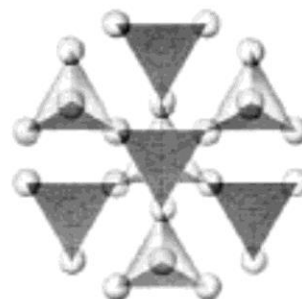
Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻



Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻

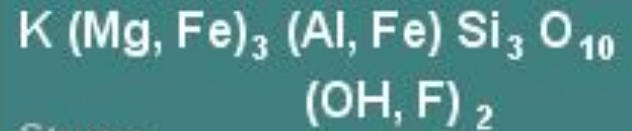
[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

Biotite



**Biotite from
Bellerberg quarry, Laacher See, Rh.-Pal., Germany**

GENERAL INFORMATION



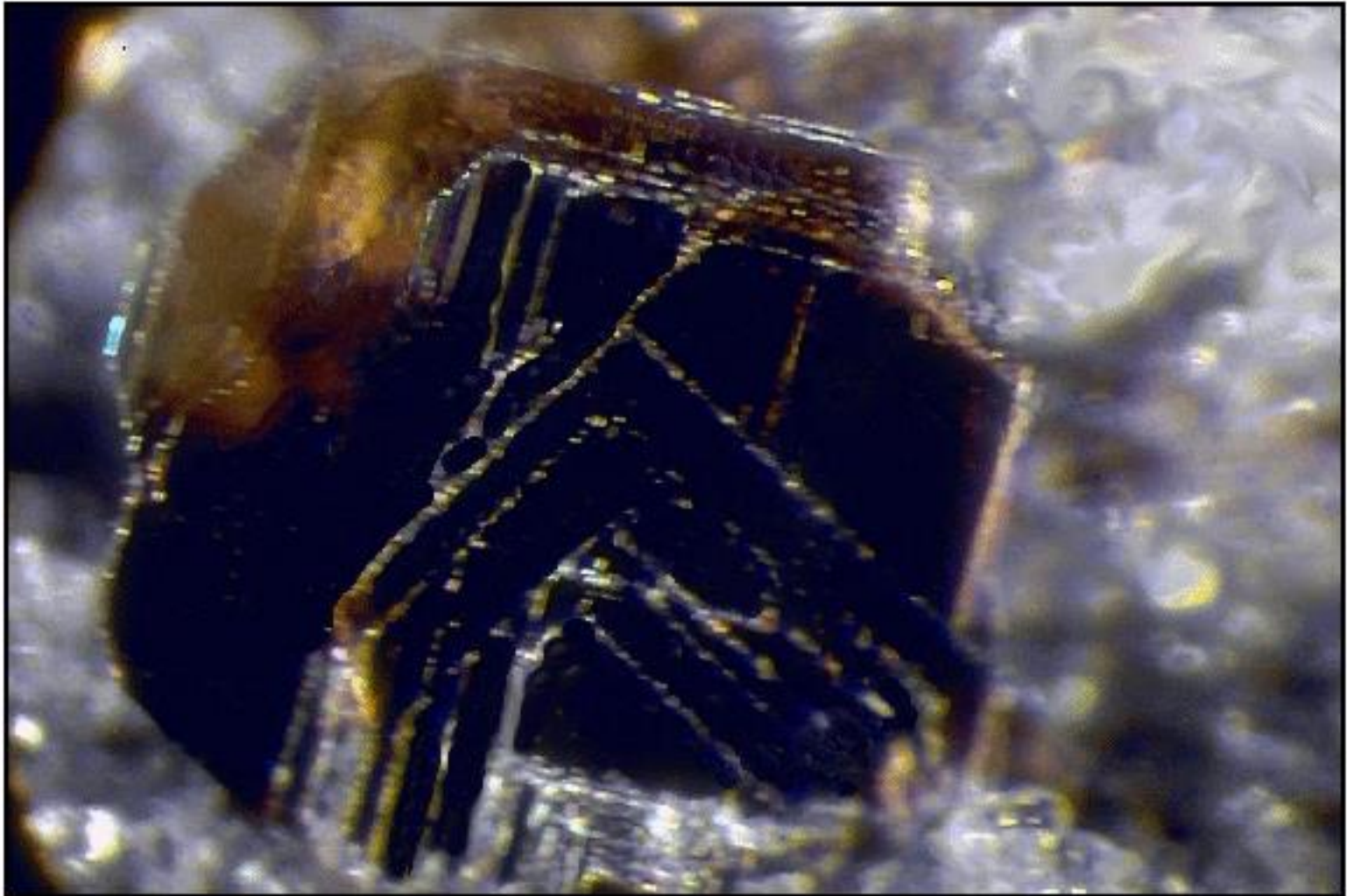
Strunz
number: 9.ED.1

Origin of
Name: for Jean Biot, French
physicist

Synonyms

Varieties: iron mica, lepidomelane
(Fe³⁺-rich var.),
manganophyllite
(Mn-rich var.)

Series with phlogopite



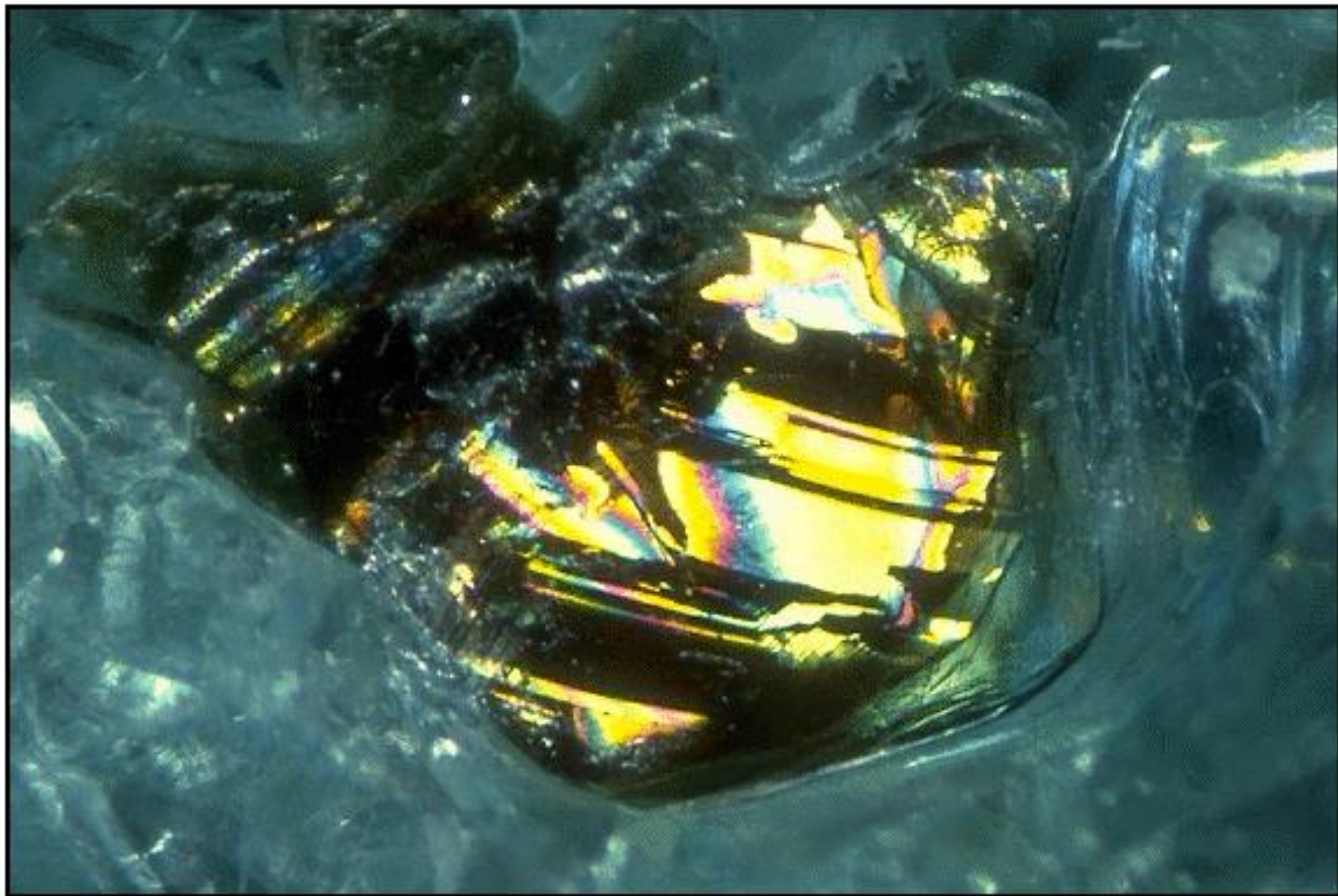
©Lou Perloff

Biotite

Sattleberg, Laacher See, Rh.-Pal., Germany



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©Anthony de Goutière

Biotite in Beryl (emerald)

Brazil



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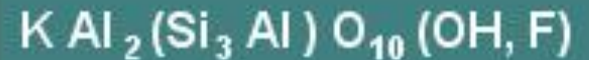


Muscovite



**Muscovite from
Goshen, Sullivan Co., New Hampshire**

GENERAL INFORMATION



Strunz
number: 9.EC.2

Origin of
Name: from Russian name
Muscovy glass

Synonyms

Varieties: fuchsite/mariposite
(Cr-rich var.), sericite
(fine-grained var.),
roscoelite (V-rich var.),
phengite (Al-poor var.),
alurgite (Mg,Fe,Mn-rich
var.), astrolite

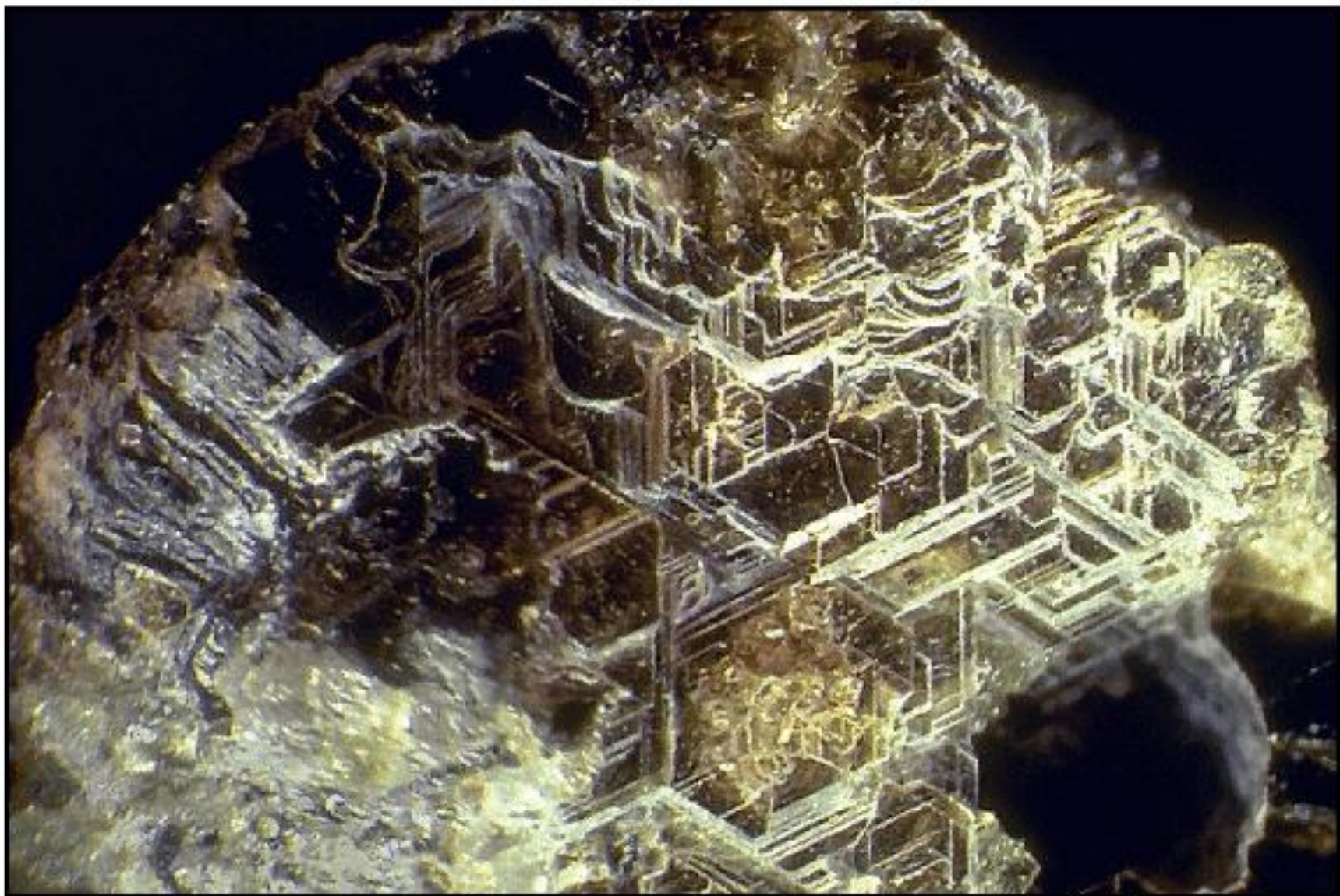


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Muscovite

Templeton, Quebec, Canada

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©Lou Perloff

Muscovite in Olivine

Monte Somma (Vesuvius), Campania, Italy



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TECTOSILICAȚI



CLASIFICAREA SILICAȚILOR

Nesosilicați



Tetraedrii solitari
[SiO₄]⁴⁻

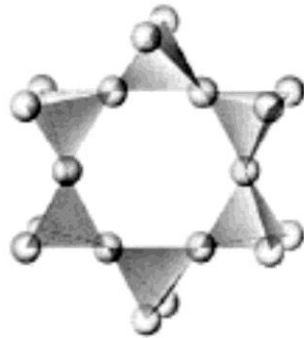
Sorosilicați



Doi tetraedrii solitari, cu un oxigen comun
[Si₂O₇]⁶⁻

Ciclosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează bucle (inele) închise (3, 4, 6 tetraedrii).



[Si₃O₉]⁶⁻

[Si₄O₁₂]⁸⁻

[Si₆O₁₈]¹²⁻

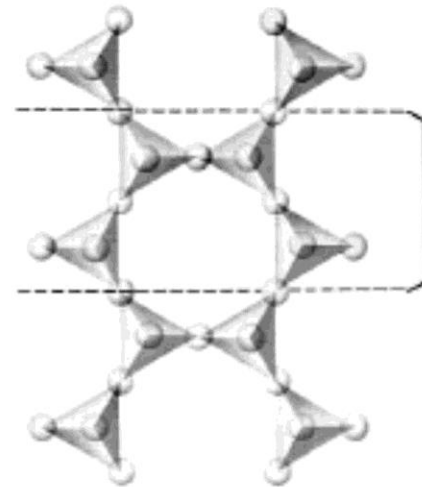
Inosilicați *-piroxeni-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri simple, infinite.



[Si₂O₃]²⁻

[Si₂O₆]⁴⁻

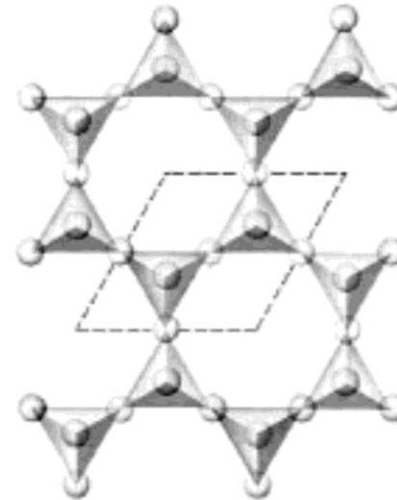


Ionosilicați *-amfiboli-*

Tetraedrii legați prin câte un anion comun de oxigen, formează lanțuri duble, infinite.

[Si₄O₁₁]⁶⁻

[(Si₄O₁₁)(OH)]⁷⁻



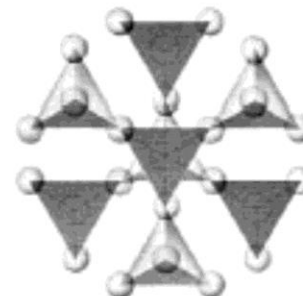
Filosilicați

Tetraedrii legați prin câte un anion comun de oxigen, formează structuri planare, infinite.

[Si₄O₁₀]⁴⁻

[AlSi₃O₁₀]⁵⁻

[Al₂Si₂O₁₀]⁶⁻



Tectosilicați

Tetraedrii legați prin câte un anion comun de oxigen, prin toate cele 4 vîrfuri, formează rețele tridimensionale.

[SiO₂], [AlSiO₄]⁻

[AlSi₃O₈]⁻, [Al₂Si₂O₈]²⁻

GRUPA SILICEI

OPAL - CALCEDONIE - CUARȚ















1 cm

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Quartz (Japanese twin)

Prince of Wales Island, Alaska

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Smoky Quartz (Japanese twin)

Mina Tiro Estrella, Capitan Mts.,
Lincoln Co., N.M.



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1 cm

Quartz (amethyst scepter)

Crystal Park, Park Co., Montana



1 cm

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1 cm



1 cm

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Quartz (amethyst)

Junction shaft, Bisbee, Cochise Co., Arizona

Extra
Images

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Quartz (amethyst)

Artigas, Uruguay

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Quartz (citrine; rough and cut)

Brazil

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1 cm

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Quartz (chrysoprase)

Kalgoorlie, Western Australia

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1 cm

©Rick Dillhoff

Extra
Images

Quartz (scepter) with Pyrite

Spruce claim, King Co., Washington

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1 cm



1 cm

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Extra
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Quartz on Calcite (manganoan)

Pachapaqui, Ancash Dept., Peru

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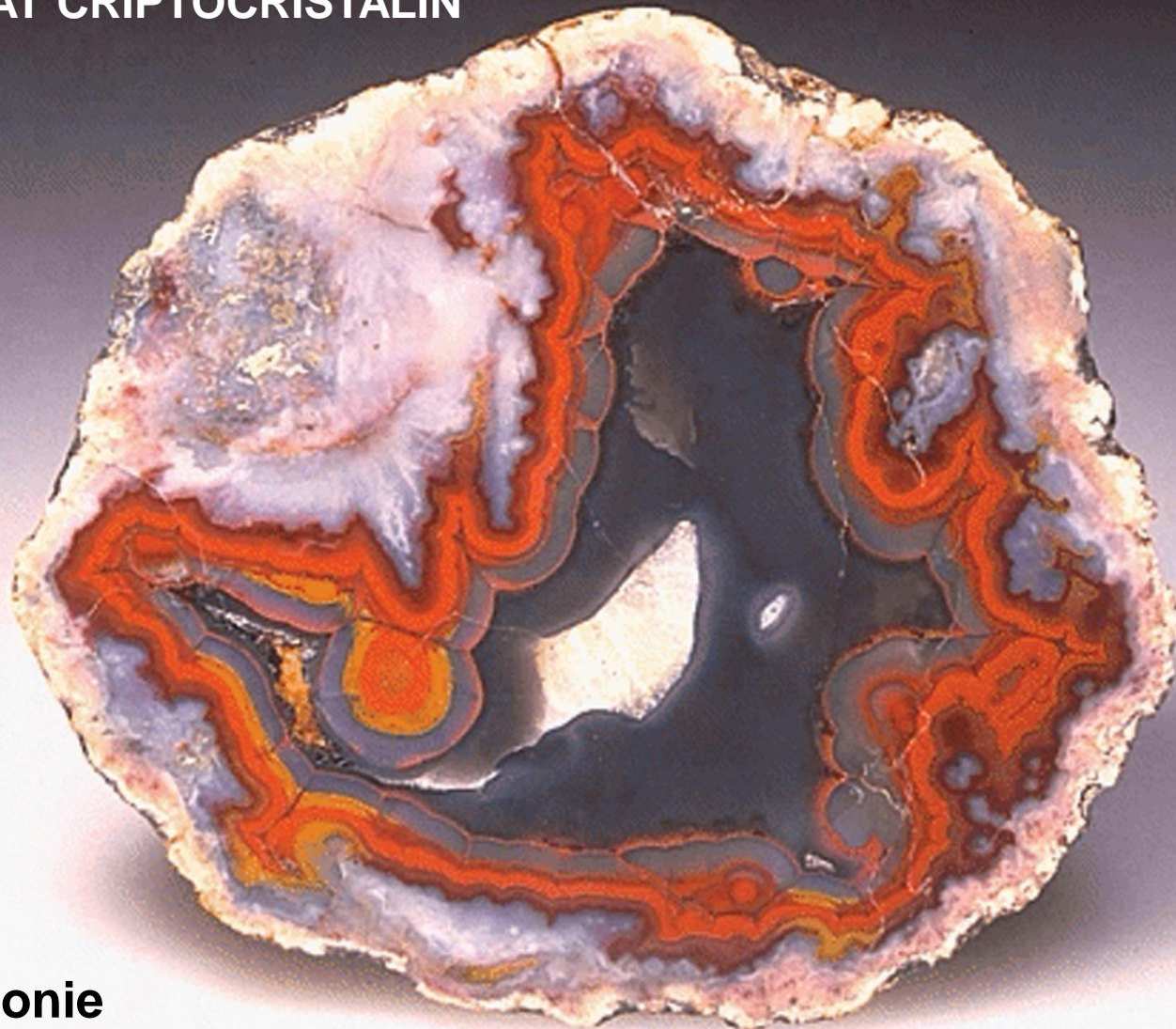
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AGREGAT CRPTOCRISTALIN




Calcedonie

1 cm

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Quartz (agate)

Lexington, Fayette Co., Kentucky

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AGREGAT AMORF



1 cm

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Fire Opal (rough and cut)

Zimapan, Hidalgo, Mexico

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GRUPA FELDSPAȚILOR

**potasici (K)*

**plagioclazi (Na, Ca)*



Orthoclase



Orthoclase from
Goodsprings, Clark Co., Nevada

GENERAL INFORMATION



Strunz
number: 9.FC.1

Origin of
Name: from Greek orthos =
right and klas = to
fracture

Synonyms

Varieties: adularia (wedge-shaped
var.), K-feldspar,
potassium feldspar,
potash feldspar;
moonstone
(adularescent gem var.)

Trimorphous with microcline
and sanidine; series with
celsian and hyalophane

Microcline



**Microcline (amazonite), Quartz, Albite from
Lake George, Park Co., Colorado**

GENERAL INFORMATION



Strunz
number: 9.FC.3

Origin of
Name: from Greek for little
and slanted

Synonyms

Varieties: amazonite (blue-green
var.), barbierite,
K-feldspar, potassium
feldspar, potash feldspar

Trimorphous with orthoclase
and sanidine




1 cm

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Microcline (amazonite; rough and cut)


Pike's Peak, Colorado

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



5 cm

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Microcline (amazonite), Quartz, Albite

Crystal Peak, Park/Teller Co., Colorado

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Albite



Albite with Lepidolite on Quartz from
Himalaya mine, Mesa Grande, San Diego Co., Cal.

GENERAL INFORMATION



Strunz
number: 9.FD.1

Origin of
Name: from Latin, albus -
white

Synonyms

Varieties: cleavelandite (platy
var.), soda feldspar,
sodium feldspar,
plagioclase [An 0-10]

Series with anorthite
(plagioclase series) and with
microcline

Oligoclase



Oligoclase from
Mitchell County, North Carolina

GENERAL INFORMATION

70 - 90% $(\text{Na, Ca}) \text{Al} (\text{Al, Si}) \text{Si}_2 \text{O}_8$
10 - 30% $\text{Ca Al}_2 \text{Si}_2 \text{O}_8$

Strunz
number: 9.FD.1

Origin of
Name: from Greek oligas =
small and klan = to
fracture

Synonyms

Varieties: plagioclase [An 10-30],
sunstone (iridescent gem
variety)

Intermediate member of the
plagioclase series

Andesine



Andesine from
Baltimore, Baltimore Co., Maryland

Triclinic

GENERAL INFORMATION



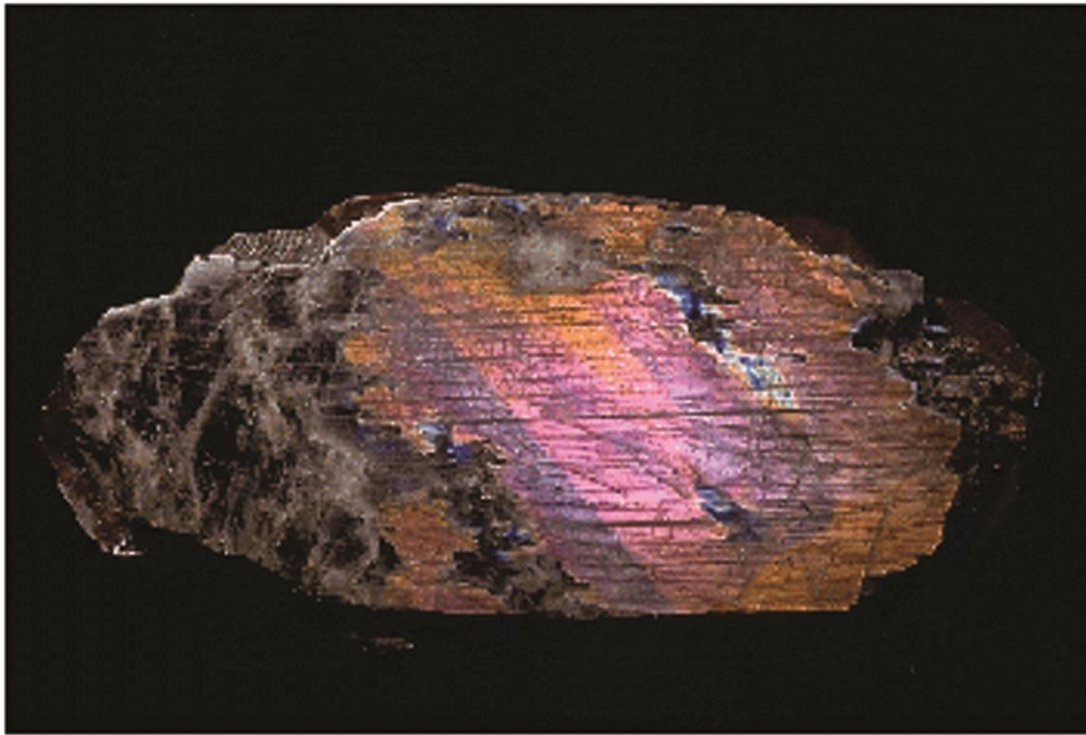
Strunz
number: 9.FD.1

Origin of
Name: after locality; in
Andes Mountains

Synonyms
Varieties: plagioclase [An 30-50]

Intermediate member of
plagioclase series

Labradorite



Labradorite (schiller effect) from
Sweden

Triclinic

GENERAL INFORMATION



Strunz
number: 9.FD.1

Origin of
Name: after locality; island
off Labrador, Canada

Synonyms

Varieties: plagioclase [An 50-70]

Intermediate member of
plagioclase series

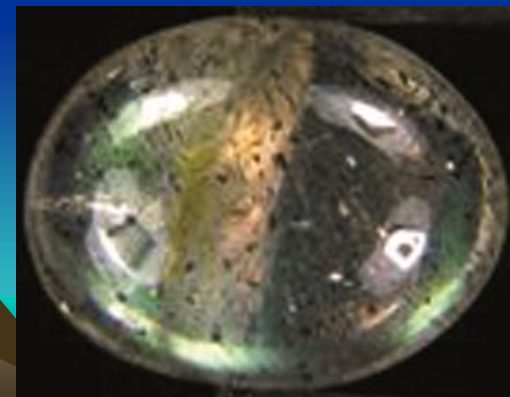
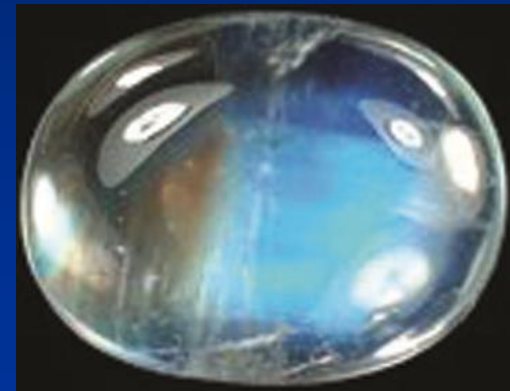
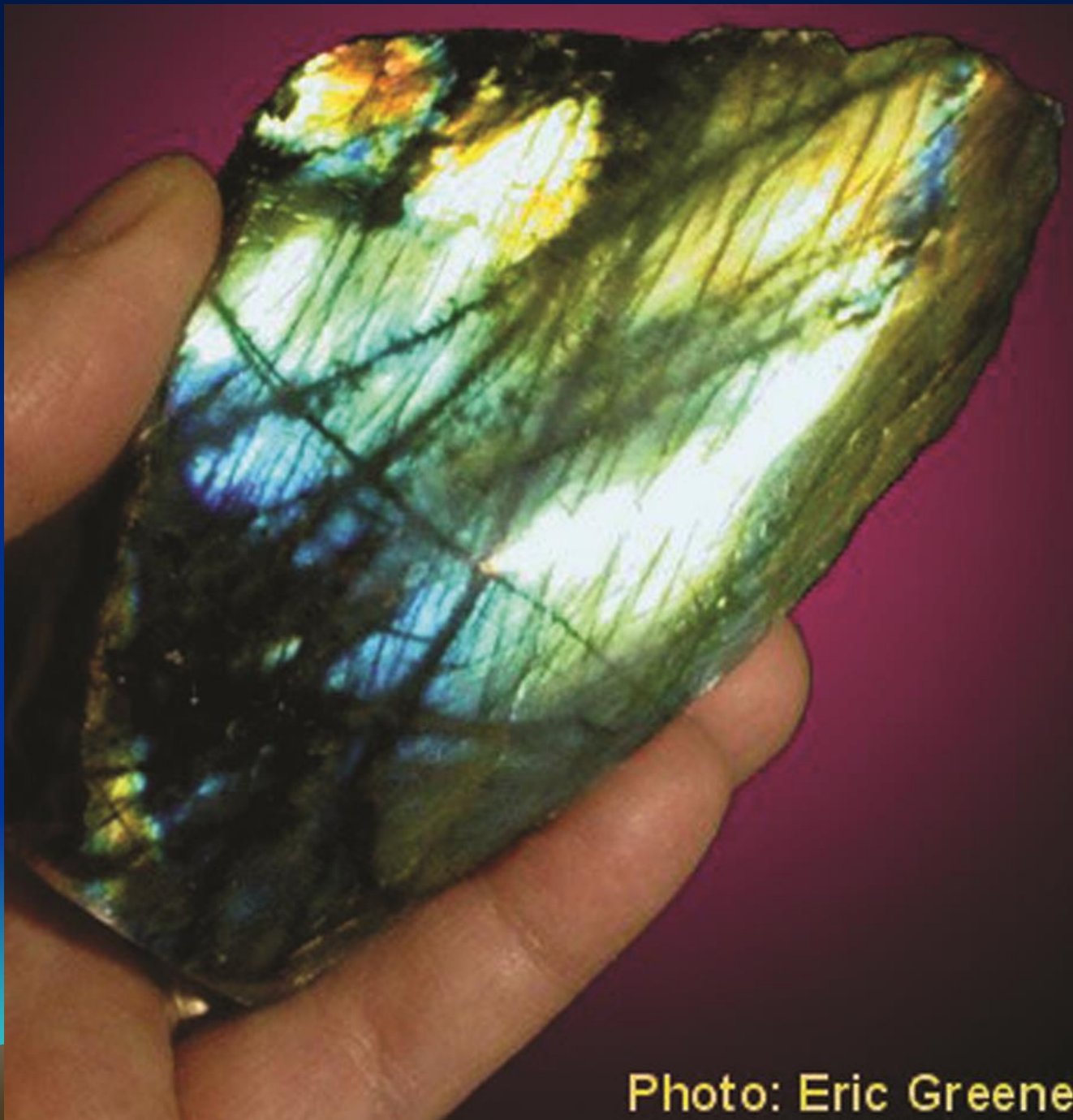


Photo: Eric Greene

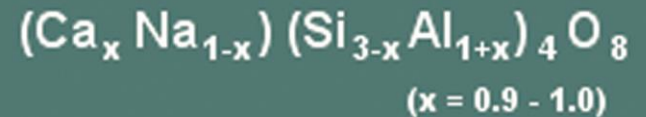
Anorthite



Anorthite from
Monte Somma (Vesuvius), Campania, Italy

Triclinic

GENERAL INFORMATION



Strunz
number: 9.FD.1

Origin of
Name: from Greek an = not
and
orthos = right (angle)

Synonyms

Varieties: plagioclase [An 90-100]

End member of the plagioclase
series

GRUPA FELDSPATOIZILOR

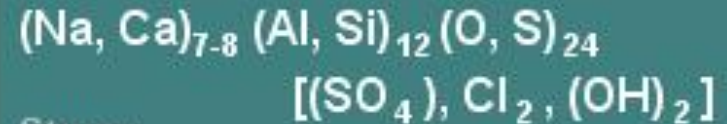


Lazurite



Lazurite (rough and cut) from
Cazadero River, Ovalle, Coquimbo, Chile

GENERAL INFORMATION



Strunz
number: 9.FF.3

Origin of
Name: from Persian,
lazward = blue

Synonyms

Varieties: cyanus, lapis lazuli,
ultramarine

May also be monoclinic,
triclinic or orthorhombic











1 cm

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Lazurite with **Pyrite** on/in **Calcite**

Firgamu, Badakhshan Prov., Afghanistan

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FAMIGLIA DI MICHAEL J. COLLINS

KATHE E JOHN S. DYSON

ED IL SOSTEGNO DI

GLYNN COHEN PER LA FONDAZIONE D'ARTE MANGIACANE

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500° ANNIVERSARIO - SETTEMBRE 2004

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