II. SULPHIDES, SELENIDES, TELLURIDES, ARSENIDES, ANTIMONIDES.

The sulphides, etc, fall into two Groups according to the character of the positive element.

I. Sulphides, Selenides, Tellurides of the Semi-Metals.
II. Sulphides, Selenides, Tellurides, Arsenides, Antimonides of the Metals.

I. Sulphides, etc., of the Semi-Metals.

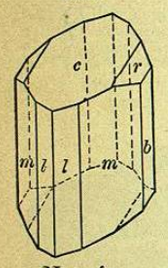
This section includes one distinct group, the Stibnite Group, to which orpiment is related; the other species included stand alone.

REALGAR.

Monoclinic. Axes $\dot{a} : \dot{b} : \dot{c} = 1{\cdot}4403 : 1 : 0{\cdot}9729$; $\beta = 66° 5'$.

589.

mm''', $110 \wedge 1\bar{1}0 = 105° 34'$. rr', $012 \wedge 0\bar{1}2 = 47° 57'$.



Nagyág.

Crystals short prismatic; striated vertically. Also granular, coarse or fine; compact; as an incrustation.

Cleavage: b, rather perfect. Fracture small conchoidal. Sectile. H. = 1·5–2. G. = 3·556. Luster resinous. Color aurora-red or orange-yellow. Streak varying from orange-red to aurora-red. Transparent—translucent.

Comp.—Arsenic monosulphide, AsS = Sulphur 29·9, arsenic 70·1 = 100.

Pyr., etc.—In the closed tube melts, volatilizes, and gives a transparent red sublimate; in the open tube (if heated very slowly) sulphurous fumes, and a white crystalline sublimate of arsenic trioxide. B.B. on charcoal burns with a blue flame, emitting arsenical and sulphurous odors. Soluble in caustic alkalies.

Obs.—Often associated with orpiment; occurs with ores of silver and lead, at Felsöbánya and Kapnik, Hungary; Nagyág; Joachimsthal; Schneeberg; Andreasberg; Binnenthal, Switzerland, in dolomite; near Julamerk in Kurdistan. In the U. S., in Iron county, Utah; also in California, San Bernardino Co.; Trinity Co., in calcite. Norris Geyser Basin, Yellowstone Park, as a deposition from the hot waters. The name *realgar* is from the Arabic Rahj al ghār, *powder of the mine.*

ORPIMENT.

Monoclinic.* Axes $\dot{a} : \dot{b} : \dot{c} = 1{\cdot}2061 : 1 : 0{\cdot}6743$, $\beta = 90°$. approx.

Crystals small, rarely distinct. Usually in foliated or columnar masses; sometimes with reniform surface.

Cleavage: b highly perfect, cleavage face vertically striated; a in traces; gliding-plane c (001). Sectile. Cleavage laminæ flexible, inelastic. H. = 1·5–2. G. = 3·4–3·5. Luster pearly on b (cleavage); elsewhere resinous. Color lemon-yellow of several shades; streak the same, but paler. Subtransparent—subtranslucent.

Comp.—Arsenic trisulphide, As_2S_3 = Sulphur 39·0, arsenic 61·0 = 100.

* See Groth, Tab. Ueb., 17, 1898. The fine crystals from Mercur, Utah, are distinctly monoclinic in habit (Penfield).

Pyr., etc.—In the closed tube, fuses, volatilizes, and gives a dark yellow sublimate; other reactions the same as under realgar. Dissolves in aqua regia and caustic alkalies.

Diff.—Distinguished by its fine yellow color, pearly luster, easy cleavage, and flexibility when in plates.

Obs.—Occurs in small crystals in clay at Tajowa, in Upper Hungary; in foliated and fibrous masses, at Moldawa in the Banat; at Kapnik and Felsöbánya in metalliferous veins; at the Solfatara near Naples. Near Julamerk in Kurdistan a large Turkish mine. Occurs with realgar in seams in compact clay beneath lava in Iron county, Utah; also finely crystallized at Mercur. Among the deposits of the Steamboat Springs, Nevada; also with realgar in the Yellowstone Park.

The name orpiment is a corruption of its Latin name auripigmentum, "*golden paint,*" given in allusion to the color, and also because the substance was supposed to contain gold.

Stibnite Group.

		$\breve{a} : b : \dot{c}$
Stibnite	Sb_2S_3	0·9926 : 1 : 1·0179
Bismuthinite	Bi_2S_3	0·9679 : 1 : 0·9850
Guanajuatite	Bi_2Se_3	1 : 1 approx.

The species of the Stibnite Group crystallize in the orthorhombic system and have perfect brachydiagonal cleavage, yielding flexible laminæ.

The species orpiment is in physical properties somewhat related to stibnite, but seems to be monoclinic in crystallization. Groth notes that the oxide, As_2O_3, is monoclinic in claudetite, while the corresponding compound, Sb_2O_3 (valentinite), is orthorhombic; further he remarks on the relation in form and physical characters between orpiment and claudetite.

STIBNITE. Antimonite, Antimony Glance, Gray Antimony, Antimonglanz *Germ.*

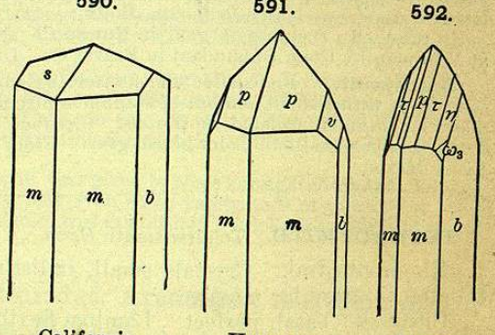
Orthorhombic. Axes $\breve{a} : \bar{b} : \dot{c} = 0{\cdot}9926 \cdot 1 : 1{\cdot}0179$.

mm''', $110 \wedge 1\bar{1}0 = 89° 34'$.
pp', $111 \wedge \bar{1}11 = 71° 24\frac{1}{2}'$.
ss', $113 \wedge \bar{1}13 = 35° 52\frac{1}{2}'$.
ss''', $113 \wedge 1\bar{1}3 = 35° 36'$.

bv, $010 \wedge 121 = 35° 8'$.
$b\eta$, $010 \wedge 353 = 40° 10\frac{1}{2}'$.
$b\tau$, $010 \wedge 343 = 46° 33'$.
bp, $010 \wedge 111 = 54° 36'$.

Crystals prismatic; striated or furrowed vertically; often curved or twisted (cf. p. 148). Common in confused aggregates or radiating groups of acicular crystals; massive, coarse or fine columnar, less often granular to impalpable.

590. 591. 592.



California. Hungary. Japan.

Cleavage: b highly perfect. Slightly sectile. Fracture small subconchoidal. H. = 2. G. = 4·52–4·62. Luster metallic, highly splendent on cleavage or fresh crystalline surfaces. Color and streak lead-gray, inclining to steel-gray: subject to blackish tarnish, sometimes iridescent.

Comp.—Antimony trisulphide, Sb_2S_3 = Sulphur 28·6, antimony 71·4 = 100. Sometimes auriferous, also argentiferous.

Pyr., etc.—Fuses very easily (at 1), coloring the flame greenish blue. In the open tube sulphurous (SO_2) and antimonial (chiefly Sb_2O_4) fumes, the latter condensing as a white sublimate which B.B. is non-volatile. On charcoal fuses, spreads out, gives sulphurous

fumes, and coats the coal white with oxide of antimony; this coating treated in R. F. volatilizes and tinges the flame greenish blue. When pure perfectly soluble in hydrochloric acid; in nitric acid decomposed with separation of antimony pentoxide.

Diff.—Distinguished (*e.g.*, from galena) by cleavage, color, softness; also by its fusibility and other blowpipe characters. It is harder than graphite. Resembles sometimes certain of the rarer sulphantimonites of lead, but yields no lead coating on charcoal.

Obs.—Occurs with quartz in beds or veins in granite and gneiss, often accompanied with various other antimony minerals produced by its alteration. Also associated in metalliferous deposits with sphalerite, galena, cinnabar, barite, quartz; sometimes accompanies native gold.

Occurs at Wolfsberg, in the Harz; Braunsdorf, near Freiberg; Přibram; Casparizeche, near Arnsberg, Westphalia; Felsöbánya, Hungary; in Cornwall, abundant Also abundant in Borneo; in Victoria and New South Wales. Groups of large splendent crystals have come from the antimony mines in the Province of Iyo, island of Shikoku, Japan.

In the United States occurs as a vein of some extent in Sevier county, Ark.; in California at San Emigdio, Kern county, and near Alta, Benito Co.; in the Humboldt mining region in Nevada; in Iron county, Utah. In New Brunswick in Prince William, York county, 20 m. from Fredericton; in Rawdon township, Hants Co., N. S.

Metastibnite. An amorphous brick-red deposit of antimony trisulphide, Sb_2S_3, occurring with cinnabar and arsenic sulphide upon siliceous sinter at Steamboat Springs, Washoe Co., Nevada.

BISMUTHINITE. Bismuth Glance. Wismuthglanz *Germ.*

Orthorhombic. Rarely in acicular crystals. $mm''' = 88° 8'$. Usually massive, foliated or fibrous.

Cleavage: *b* perfect. Somewhat sectile. H. = 2. G. = 6·4–6·5. Luster metallic. Streak and color lead-gray, inclining to tin-white, with a yellowish or iridescent tarnish. Opaque.

Comp.—Bismuth trisulphide, Bi_2S_3 = Sulphur 18·8, bismuth 81·2 = 100. Sometimes contains a little copper and iron.

Pyr., etc.—Fusibility = 1. In the open tube sulphurous fumes, and a white sublimate which B.B. fuses into drops, brown while hot and opaque yellow on cooling. On charcoal at first gives sulphurous fumes; then fuses with spirting, and coats the coal with yellow bismuth oxide; with potassium iodide a bright red coating of bismuth iodide is obtained. Dissolves readily in hot nitric acid, and a white precipitate falls on diluting with water.

Obs.—Found at Brandy Gill, Carrock Fells, in Cumberland; near Redruth, etc. In France at Meymac, Corrèze; at Johanngeorgenstadt, Schneeberg; at Wittichen, Baden; at Riddarhyttan, Sweden; near Sorata, Bolivia.

In the U. S., occurs with gold in Rowan Co., N. C., at the Barnhardt vein; sparingly at Willimantic, Conn.; abundant in Beaver Co , Utah.

Guanajuatite. Frenzelite; Selenwismuthglanz *Germ.* Bismuth selenide, Bi_2Se_3, sometimes with a small amount of sulphur replacing selenium. In acicular crystals; also massive, granular, foliated or fibrous. Cleavage: *b* distinct. H. = 2·5–3·5. G. = 6·25–6·62. Luster metallic. Color bluish gray. From the Santa Catarina mine, near Guanajuato, Mexico.

TETRADYMITE. Tellurwismuth *Germ.*

Rhombohedral. Crystals small, indistinct. Commonly in bladed forms, foliated to granular massive.

Cleavage: basal, perfect. Laminæ flexible; not very sectile. H. = 1·5–2; soils paper. G. = 7·2–7·6. Luster metallic, splendent. Color pale steel-gray.

Comp., Var.—Consists of bismuth and tellurium, with sometimes sulphur and a trace of selenium; the analyses for the most part afford the general formula $Bi_2(Te,S)_3$.

Var.—1. *Free from sulphur.* Bi_2Te_3 = Tellurium 48·1, bismuth 51·9. G. = 7·642 from Dahlonega. Var. 2. *Sulphurous.* $2Bi_2Te_3.Bi_2S_3$ = Tellurium 36·4, sulphur 4·6, bismuth

59·0 = 100. This is the more common variety and includes the *tetradymite* of Haidinger in crystals from Schubkau.

Pyr.—In the open tube a white sublimate of tellurium dioxide, which B.B. fuses to colorless drops. On charcoal fuses, gives white fumes, and entirely volatilizes; tinges the R.F. bluish green; coats the coal at first white (TeO_2), and finally orange-yellow (Bi_2O_3); some varieties give sulphurous and selenous odors.

Obs.—Occurs at Schubkau near Schemnitz; Rezbanya; Orawitza in the Banat; Tellemark in Norway; Bastnaes mine, near Riddarhyttan, Sweden. In the U. S., in Virginia, at the Whitehall gold mines, Spottsylvania Co.; in Davidson Co., N. C., and in the gold washings of Burke and McDowell counties, etc.; similarly in Montana. At the Montgomery mine, Arizona. Named from τετράδυμος, *fourfold*, in allusion to complex twin crystals sometimes observed.

Joseite.—A bismuth telluride (Te 80 p. c., also S and Se). G. = 7·9. San José, Brazil.

Wehrlite. A foliated bismuth telluride (Te 30 p. c.) of doubtful formula. G. = 8·4. Deutsch-Pilsen, Hungary.

MOLYBDENITE. Molybdänglanz *Germ.*

Crystals hexagonal in form, tabular, or short prisms slightly tapering and horizontally striated. Commonly foliated, massive or in scales; also fine granular.

Cleavage: basal eminent. Laminæ very flexible, but not elastic. Sectile. H. = 1–1·5. G. = 4·7–4·8. Luster metallic. Color pure lead-gray; a bluish gray trace on paper. Opaque. Feel greasy.

Comp.—Molybdenum disulphide, MoS_2 = Sulphur 40·0, molybdenum 60·0 = 100.

Pyr., etc.—In the open tube sulphurous fumes and a pale yellow crystalline sublimate of molybdenum trioxide (MoO_3). B.B. in the forceps infusible, imparts a yellowish-green color to the flame; on charcoal the pulverized mineral gives in O.F. a strong odor of sulphur, and coats the coal with crystals of molybdic oxide, yellow while hot, white on cooling; near the assay the coating is copper-red, and if the white coating be touched with an intermittent R.F., it assumes a beautiful azure-blue color. Decomposed by nitric acid, leaving a white or grayish residue.

Diff.—Much resembles graphite in softness and structure (see p. 273), but has a bluer trace on paper and readily yields sulphur on charcoal.

Obs.—Generally occurs embedded in, or disseminated through, granite, gneiss, zircon-syenite, granular limestone, and other crystalline rocks. At Numedal, Sweden; Arendal and Laurvik in Norway; Altenberg, Saxony; Zinnwald, Bohemia; near Miask, Urals; Chessy in France; in Italy, at Traversella; Carrock Fells, in Cumberland; at several of the Cornish mines.

In *Maine*, at Blue Hill Bay; in *Conn.*, at Haddam, in gneiss; in *Vermont*, at Newport; in *N. Hampshire*, at Westmoreland; in *N. York*, two miles southeast of Warwick; in *Penn.*, in Chester, near Reading; near Concord, Cabarrus Co., N. C. In *Canada*, at St. Jérôme, Quebec; in large crystals in Renfrew county, Ontario; also in Aldfield township, Pontiac Co., Quebec.

Named from μολυβδος, *lead;* the name, first given to some substances containing lead, later included graphite and molybdenite, and even some compounds of antimony. The distinction between graphite and molybdenite was established by Scheele in 1778–79.

II. Sulphides, Selenides, Tellurides, Arsenides, Antimonides of the Metals.

The sulphides of this second section fall into four divisions depending upon the proportion of the negative element present. These divisions with the groups belonging to them are as follows:

A. Basic Division.

B. Monosulphides, Monotellurides, etc., $\overset{I}{R}_2S$, $\overset{II}{R}S$, etc.

1. Galena Group. Isometric, normal group.
2. Chalcocite Group. Orthorhombic.
3. Sphalerite Group. Isometric-tetrahedral.
4. Cinnabar—Wurtzite—Millerite Group. Hexagonal and rhombohedral.

C. Intermediate Division.

Embraces Melonite, Te_2S_3; also Bornite, $3Cu_2S.Fe_2S_3$; Linnæite, $CoS.Co_2S_3$; Chalcopyrite, $Cu_2S.Fe_2S_3$; etc.

D. Disulphides, Diarsenides, etc., RS_2, RAs_2, etc.

1. Pyrite Group. Isometric-pyritohedral.
2. Marcasite Group. Orthorhombic.

A. Basic Division.

The basic division embraces several rare basic compounds of silver or copper chiefly with antimony and arsenic. Of these the crystallization of dyscrasite only is known.

DYSCRASITE. Antimonsilber *Germ.*

Orthorhombic. Axes $\breve{a} : \bar{b} : \dot{c} = 0{\cdot}5775 : 1 : 0{\cdot}6718$. Crystals rare, pseudo-hexagonal in angles ($mm''' = 60° 1'$) and by twinning. Also massive. Fracture uneven. Sectile. H. = 3·5–4. G. = 9·44–9·85. Luster metallic. Color and streak silver-white, inclining to tin-white; sometimes tarnished yellow or blackish. Opaque.

Comp.—A silver antimonide, including Ag_3Sb = Antimony 27·1, silver 72·9 = 100, and Ag_6Sb = Antimony 15·7, silver 84·3 = 100, and perhaps other compounds.

Analyses vary widely, some conforming also to Ag_2S, $Ag_4(Sb,As)_2$, etc. By some authors classed with chalcocite.

Pyr., etc.—B.B. on charcoal fuses to a globule, coating the coal with white antimony trioxide and finally giving a globule of almost pure silver. Soluble in nitric acid, leaving antimony trioxide.

Obs.—Occurs near Wolfach, Baden; Wittichen; Andreasberg in the Harz; Allemont, France. Named from *δυσκρᾶσις, a bad alloy.*

Horsfordite. A silver-white, massive copper antimonide, probably Cu_6Sb (Sb 24 p. c.). G. = 8·8. Asia Minor, near Mytilene.

HUNTILITE, ANIMIKITE. The ores from Silver Islet, Lake Superior, apparently contain a silver arsenide (*huntilite*, Ag_3As?) and perhaps also a silver antimonide (*animikite*, Ag_9Sb?), the latter related to or identical with dyscrasite.

Domeykite.—Copper arsenide, Cu_3As. Reniform and botryoidal; also massive, disseminated. G. = 7·2–7·75. Luster metallic. Color tin-white to steel-gray, readily tarnished. From several Chilian mines; also Zwickau, Saxony. In N. America, with niccolite at Michipicoten Island, L. Superior.

Algodonite. Copper arsenide, Cu_6As (As 16·5 p. c.); G. = 7·62. Resembles domeykite. From Chili; also L. Superior.

Whitneyite. Copper arsenide, Cu_9As (As 11·6 p. c.). G. = 8·4–8·6. Color pale reddish white. From Houghton Co., Michigan; Sonora, L. California.

Chilenite. Perhaps Ag_6Bi. Copiapo, Chili.

Stützite. A rare silver telluride (Ag_4Te?). Probably from Nagyág.

B. Monosulphides, Monotellurides, etc., $\overset{I}{R}_2S$, $\overset{II}{R}S$, etc.

1. Galena Group. Isometric.

Galena	PbS	**Argentite**	Ag_2S
Also,	$(Pb,Cu_2)S$, $(Cu_2,Pb)S$	Jalpaite	$(Ag,Cu)_2S$
Altaite	PbTe	**Hessite**	Ag_2Te
Clausthalite	PbSe	**Aguilarite**	Ag_2Se
Naumannite	$(Ag_2,Pb)Se$		

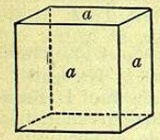
The following, known only in massive form, probably also belong here:

Berzelianite	Cu_2Se	**Zorgite**	$(Pb,Cu_2,Ag_2)Se$?
Lehrbachite	$(Pb,Hg_2)Se$	**Crookesite**	$(Cu,Tl,Ag)_2Se$
Eucairite	$Cu_2Se.Ag_2Se$		

The GALENA GROUP embraces a number of monosulphides, etc., of the related metals, silver, copper, lead, and mercury. These crystallize in the normal group of the isometric system, and several show perfect cubic cleavage. These characters are most distinctly exhibited in the type species, galena.

GALENA, or GALENITE. Lead glance. Bleiglanz *Germ.*

593.



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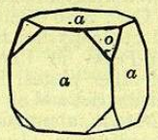

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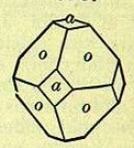

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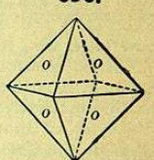
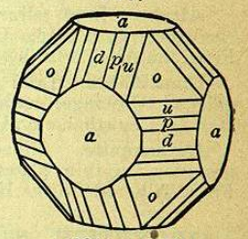


Isometric. Commonly in cubes, or cubo-octahedrons, less often octahedral. Also in skeleton crystals, reticulated, tabular. Twins: tw. pl. *o*, both contact- and penetration-twins (Figs. 363, 366, p. 123), sometimes repeated; twin crystals often tabular ‖ *o*. Also other tw. planes giving polysynthetic tw. lamellæ. Massive cleavable, coarse or fine granular, to impalpable; occasionally fibrous or plumose.

Cleavage: cubic, highly perfect; less often octahedral. Fracture flat subconchoidal or even. H. = 2·5–2·75. G. = 7·4–7·6. Luster metallic. Color and streak pure lead-gray. Opaque.

597.



p (221), *u* (554)

Comp., Var.—Lead sulphide, PbS = Sulphur 13·4, lead 86·6 = 100. Often contains silver, and occasionally selenium, zinc, cadmium, antimony, bismuth, copper, as sulphides; besides, also, sometimes native silver and gold.

Var.—1. *Ordinary.* (*a*) Crystallized; (*b*) somewhat fibrous and plumose; (*c*) cleavable, granular coarse or fine; (*d*) cryptocrystalline. The variety with octahedral cleavage is rare; the usual cubic cleavage is obtained readily after heating to 200° or 300°; the peculiar cleavage may be connected with the bismuth usually present.

2. *Argentiferous.* All galena is more or less argentiferous, and no external characters serve to distinguish the kinds that are much so from those that are not. The silver is detected by cupellation, and may amount from a few thousandths of one per cent to one per cent or more; when mined for silver it ranks as a *silver ore.*

3. Containing arsenic, or antimony, or a compound of these metals, as impurity. Here belong *bleischweif* from Clausthal with 0·22 Sb, and *steinmannite* from Přibram, with both arsenic and antimony.

Pyr.—In the open tube gives sulphurous fumes. B.B. on charcoal fuses, emits sulphurous fumes, coats the coal yellow near the assay (PbO) and white with a bluish border at a distance ($PbSO_3$, chiefly), and yields a globule of metallic lead. Decomposed by strong nitric acid with the separation of some sulphur and the formation of lead sulphate.

Diff.—Distinguished, except in very fine granular varieties, by its cubic cleavage; the color and the high specific gravity are characteristic; also the blowpipe reactions.

Obs.—One of the most widely distributed of the metallic sulphides. Occurs in beds and veins, both in crystalline and uncrystalline rocks. It is often associated with pyrite, marcasite, sphalerite, chalcopyrite, arsenopyrite, etc., in a gangue of quartz, calcite, barite or fluorite, etc.; also with cerussite, anglesite, and other salts of lead, which are frequent results of its alteration. It is also common with gold, and in veins of silver ores.

At Freiberg in Saxony it occupies veins in gneiss; in Spain, in granite at Linares, also in Catalonia, Grenada, and elsewhere; at Clausthal and Neudorf in the Harz, and at Přibram in Bohemia, it forms veins in clay slate; similarly in Styria; at Sala in Sweden in veins in granular limestone; through the graywacke of Leadhills and the killas of Cornwall, in veins; filling cavities in the Subcarboniferous limestone in Derbyshire, Cumberland, and the northern districts of England; also at Bleiberg, Carinthia. In the English mines it is associated with calcite, pearl spar, fluorite, barite, witherite, calamine, and sphalerite. Other localities are Joachimsthal, Bohemia; Poullaouen and Huelgoet, Brittany; Sardinia; Nerchinsk, East Siberia; Australia; Chili; Bolivia, etc.

Extensive deposits of this ore in the United States exist in Missouri, Illinois, Iowa, and Wisconsin. The ore occurs not in veins but filling cavities or chambers in stratified limestone, of different periods of the Lower Silurian, especially the Trenton, also in part Subcarboniferous. It is associated with sphalerite, smithsonite, calcite, pyrite. The Missouri mines are situated in the counties of Washington, Jefferson, Madison and others. Good crystals are obtained at Joplin, Jasper Co. Also occurs in *New York*, at Rossie, St. Lawrence Co., in crystals with calcite and chalcopyrite; in *Maine*, at Lubec, etc.; in *Mass.*, at Southampton, Newburyport, etc; in *Penn.*, at Phenixville and elsewhere; in *Virginia*, at Austin's mines in Wythe Co., and other places; in *Tenn.*, at Haysboro, near Nashville; in *Mich.*, in the Lake Superior copper district and on the N. shore of L. Superior; in *California*, at many of the gold mines; in *Nevada*, abundant in the Eureka district; in *Arizona*, in the Castle Dome, Eureka, and other districts. In *Colorado*, at Leadville there are productive mines of argentiferous galena, also at Georgetown, the San Juan district and elsewhere. Mined for silver in the Cœur d'Alêne region in Idaho; also at various points in Montana.

The name galena is from the Latin *galena* (γαλήνη), a name given to lead ore or the dross from melted lead.

CUPROPLUMBITE. A massive mineral, from Chili, varying in characters from galena to those of chalcocite and covellite; composition, $Cu_2S.2PbS$(?). *Alisonite* is massive, deep indigo-blue quickly tarnishing; corresponds to $3Cu_2S.PbS$. From Mina Grande, Chili. Whether these and similar minerals represent definite homogeneous compounds, or only ill-defined alteration-products, is uncertain, and if so it is not clear whether they should be classed with isometric galena or with orthorhombic chalcocite.

Altaite. Lead telluride, AgTe. Rarely in cubic crystals, usually massive with cubic cleavage. G. = 8·16. Color tin-white, with yellowish tinge tarnishing to bronze-yellow. From the Altai, with hessite; Coquimbo, Chili; California; Colorado.

Clausthalite. Lead selenide, PbSe. Commonly in fine granular masses resembling galena. Cleavage: cubic. G. = 7·6–8·8. Color lead-gray, somewhat bluish. From the Harz, at Clausthal, etc.; Cacheuta mine, Mendoza, S. A. *Tilkerodite* is a cobaltiferous variety.

Naumannite. Silver-lead telluride (Ag_2.Pb)Se. In cubic crystals; also massive, granular, in thin plates. Cleavage: cubic. G. = 8·0. Color and streak iron-black. From Tilkerode in the Harz.

ARGENTITE. Silver Glance. Silberglanz *Germ.*

Isometric. Crystals often octahedral, also *a*, *o*; often distorted, frequently grouped in reticulated or arborescent forms; also filiform. Massive; embedded; as a coating.

Cleavage: *a*, *d* in traces. Fracture small subconchoidal. Perfectly sectile.

H. = 2–2·5. G. = 7·20–7·36. Luster metallic. Color and streak blackish lead-gray; streak shining. Opaque.

Comp.—Silver sulphide, Ag_2S = Sulphur 12·9, silver 87·1 = 100.

Pyr., etc.—In the open tube gives off sulphurous fumes. B.B. on charcoal fuses with intumescence in O. F., emitting sulphurous fumes, and yielding a globule of silver.

Diff.—Distinguished from other sulphides by being readily cut with a knife; also by yielding metallic silver on charcoal.

Obs.—Found at Freiberg, Joachimsthal, etc.; Schemnitz, Hungary; in Norway near Kongsberg; in the Altai; in Cornwall; Peru; Chili; Mexico at Guanajuato, etc.

Occurs in Nevada, at the Comstock lode; at the Silver King mine, Arizona; at mines near Port Arthur on north shore of Lake Superior; with native silver and copper in northern Michigan.

JALPAITE is a cupriferous argentite from Jalpa, Mexico.

Hessite. Silver telluride, Ag_2Te. Isometric. Usually massive, compact or fine-grained. Cleavage indistinct. Somewhat sectile. H. = 2·5–3. G. = 8·31–8·45. Color between lead-gray and steel-gray. From the Altai; at Nagyág in Transylvania; Rezbanya, Hungary; Chili, near Arqueros, Coquimbo. In the U. S., Calaveras Co., Cal.; Boulder Co., Colorado; Utah. This species also often contains gold and thus graduates toward petzite.

Petzite. $(Ag,Au)_2Te$ with Ag : Au = 3 : 1. Massive; granular to compact. Slightly sectil to brittle. H. = 2·5–3. G. = 8·7–9·02. Color steel-gray to iron-black; tarnishing. From Nagyág, Transylvania; Colorado; California.

Aguilarite. Silver selenide, Ag_2S and $Ag_2(S,Se)$. In skeleton dodecahedral crystals. Sectile. G. = 7·586. Color iron-black. From Guanajuato, Mexico.

Berzelianite. Copper selenide, Cu_2Se. In thin dendritic crusts and disseminated. G. = 6·71. Color silver-white tarnishing. From Skrikerum, Sweden; Lehrbach, in the Harz.

Lehrbachite. Selenide of lead and mercury, PbSe with HgSe. Massive, granular. G. = 7·8. Color lead-gray to iron-black. From Lehrbach, in the Harz.

Eucairite. $Cu_2Se.Ag_2Se$. Massive, granular. G. = 7·50. Color between silver-white and lead-gray. From the Skrikerum copper mine, Sweden; also Chili.

Zorgite. Selenide of lead and copper in varying amounts. Massive, granular. G. = 7–7·5. Color dark or light lead-gray. From the Harz; Cacheuta, Argentina.

Crookesite. Selenide of copper and thallium, also silver (1–5 p. c.), $(Cu,Tl,Ag)_2Se$. Massive, compact. G. = 6·9. Luster metallic. Color lead-gray. From the mine of Skrikerum, Sweden.

Umangite. $CuSe\ Cu_2Se$. Massive, fine-granular to compact. H. = 3. G. = 5·620. Color dark cherry-red. From La Rioja, Argentina.

2. Chalcocite Group.

		$\breve{a} : \bar{b} : \dot{c}$
Chalcocite	Cu_2S	0·5822 : 1 : 0·9701
Stromeyerite	$Ag_2S.Cu_2S$	0·5822 : 1 : 0·9668
Sternbergite	$Ag_2S.Fe_4S_5$	0·5832 : 1 : 0·8391
Frieseite		0·5970 : 1 : 0·7352
Acanthite	Ag_2S	0·6886 : 1 : 0·9944

The species of the CHALCOCITE GROUP crystallize in the orthorhombic system with a prismatic angle approximating to 60°; they are hence pseudo-hexagonal in form especially when twinned. The group is parallel to the Galena Group, since Cu_2 appears in isometric form in cuproplumbite and Ag_2S also in argentite. Some authors include dyscrasite here (see p. 286).