

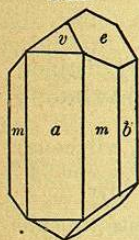
etc. They crystallize in the orthorhombic system with similar form. It is to be noted that this group corresponds in a measure to the monoclinic Wagnerite Group, p. 501, which also includes basic members.

**OLIVENITE.**

Orthorhombic. Axes  $\tilde{a} : \tilde{b} : \tilde{c} = 0.9396 : 1 : 0.6726$ .

942.

$mm''$ ,  $110 \wedge \bar{1}\bar{1}0 = 86^\circ 26'$ .  $ee'$ ,  $011 \wedge 0\bar{1}\bar{1} = 67^\circ 51'$ .  
 $vv'$ ,  $101 \wedge \bar{1}01 = 71^\circ 11\frac{1}{2}'$ .  $ve$ ,  $101 \wedge 011 = 47^\circ 34'$ .



Crystals prismatic, often acicular. Also globular and reniform, indistinctly fibrous, fibers straight and divergent, rarely irregular; also curved lamellar and granular.

Cleavage:  $m$ ,  $b$ ,  $e$  (011) in traces. Fracture conchoidal to uneven. Brittle.  $H. = 3$ .  $G. = 4.1-4.4$ . Luster adamantine to vitreous; of some fibrous varieties pearly. Color various shades of olive-green, passing into leek-, siskin-, pistachio-, and blackish green; also liver- and wood-brown; sometimes straw-yellow and grayish white. Streak olive-green to brown. Subtransparent to opaque.

**Var.**—(a) *Crystallized*. (b) *Fibrous*; finely and divergently fibrous, of green, yellow, brown and gray, to white colors, with the surface sometimes velvety or acicular; found investing the common variety or passing into it; called *wood-copper* or *wood arsenate*. (c) *Earthy*; nodular or massive; sometimes soft enough to soil the fingers.

**Comp.**— $Cu_3As_2O_8 \cdot Cu(OH)_2$  or  $4CuO \cdot As_2O_5 \cdot H_2O =$  Arsenic pentoxide 40.7, cupric oxide 56.1, water 3.2 = 100.

**Pyr., etc.**—In the closed tube gives water. B.B. fuses at 2, coloring the flame bluish green, and on cooling the fused mass appears crystalline. B.B. on charcoal fuses with deflagration, gives off arsenical fumes, and yields a metallic arsenide which with soda yields a globule of copper. With the fluxes reacts for copper. Soluble in nitric acid.

**Obs.**—The crystallized varieties occur in Cornwall, at various mines; Tavistock, in Devonshire; in Tyrol; the Banat; Nizhni Tagilsk in the Ural; Chili. In the U. S., in Utah, at the American Eagle and Mammoth mines. Tintic district, both in crystals and *wood-copper*. The name olivenite alludes to the olive-green color.

**LIBETHENITE.**

Orthorhombic. Axes  $\tilde{a} : \tilde{b} : \tilde{c} = 0.9601 : 1 : 0.7019$ .

$mm''$ ,  $110 \wedge \bar{1}\bar{1}0 = 87^\circ 40'$ .  $ss''$ ,  $111 \wedge \bar{1}\bar{1}\bar{1} = 59^\circ 4\frac{1}{2}'$ .  
 $ee'$ ,  $011 \wedge 0\bar{1}\bar{1} = 70^\circ 8'$ .  $ss'$ ,  $111 \wedge \bar{1}\bar{1}\bar{1} = 61^\circ 47\frac{1}{2}'$ .

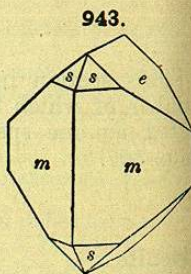
In crystals usually small, short prismatic in habit; often united in druses. Also globular or reniform and compact.

Cleavage:  $a$ ,  $b$  very indistinct. Fracture subconchoidal to uneven. Brittle.  $H. = 4$ .  $G. = 3.6-3.8$ . Luster resinous. Color olive-green, generally dark. Streak olive-green. Translucent to subtranslucent.

**Comp.**— $Cu_3P_2O_8 \cdot Cu(OH)_2$  or  $4CuO \cdot P_2O_5 \cdot H_2O =$  Phosphorus pentoxide 29.8, cupric oxide 66.4, water 3.8 = 100.

**Pyr., etc.**—In the closed tube yields water and turns black. B.B. fuses at 2 and colors the flame emerald-green. On charcoal with soda gives metallic copper, sometimes also an arsenical odor. Fused with metallic lead on charcoal is reduced to metallic copper, with the formation of lead phosphate, which treated in R.F. gives a crystalline polyhedral bead on cooling. With the fluxes reacts for copper. Soluble in nitric acid.

**Obs.**—Occurs with chalcopyrite at Libethen, near Neusohl, Hungary; at Rheinbreitenbach and Ehl on the Rhine; at Nizhni Tagilsk in the Ural; in small quantities in Cornwall.



**Adamite.**  $Zn_3As_2O_8 \cdot Zn(OH)_2$ . In small crystals, often grouped in crusts and granular aggregations.  $H. = 3.5$ .  $G. = 4.34-4.35$ . Color honey-yellow, violet, rose-red, green, colorless. From Chañarcillo, Chili; Cap Garonne, France; at the ancient zinc mines of Laurion, Greece.

**Descloizite.**  $R_2V_2O_8 \cdot R(OH)_2$  or  $4RO \cdot V_2O_5 \cdot H_2O$ ;  $R = Pb, Zn$  chiefly, and usually in the ratio 1:1 approx. In small crystals, often drusy; also massive, fibrous radiated with mammillary surface.  $H. = 3.5$ .  $G. = 5.9-6.2$ . Color cherry-red and brownish red, to light or dark brown, black. Streak orange to brownish red or yellowish gray.

From the Sierra de Córdoba, Argentina; Kappel in Carinthia. Abundant at Lake Valley, Sierra Co., New Mexico, also near Georgetown; in Arizona near Tombstone; in Yavapai Co.; at the Mammoth Gold mine, near Oracle, Pinal Co.

A massive variety, containing copper (6.5 to 9 p. c.), in crusts, and reniform masses with radiated structure, occurs in San Luis Potosi, also in a vein of argentiferous galena in Zacatecas, Mexico; it has been variously named *trilochorite*, *cuprodescloizite*, *ramirite*. A similar variety (11 p. c. CuO) occurs as an incrustation on quartz at the Lucky Cuss mine, Tombstone, Cochise Co., Arizona.

**EUSYNCHITE** may be identical with descloizite. Massive: in nodular, stalactitic forms.  $G. = 5.596$ . Color yellowish red, reddish brown, greenish. From Hofgrund near Freiburg in Baden. The same may be true of *araoxene* from Dahn near Nieder-Schlettenbach, Rhenish Bavaria.

**DECHENITE.** Composition usually accepted as  $PbV_2O_8$ . Massive, botryoidal, nodular.  $G. = 5.6-5.81$ . Color deep red to yellowish red and brownish red. From Nieder-Schlettenbach in the Lauterthal, Rhenish Bavaria.

**Calciovolborthite.** Probably  $(Cu, Ca)_3V_2O_8 \cdot (Cu, Ca)(OH)_2$ . In thin green tables; also gray, fine crystalline granular. From Friedrichsrode, Thuringia.

**Brackebuschite.** Near descloizite (monoclinic?). From the State of Córdoba, Argentina.

**Psittacinite.** A vanadate of lead and copper, from the Silver Star District, Montana. In thin coatings; also pulverulent. Color siskin- to olive-green.

**MOTTRAMITE.** A vanadate of lead and copper; possibly identical with psittacinite; in velvety black incrustations. From Mottram St. Andrew's, Cheshire, England.

**CLINOCCLASITE.** Klinoklas. Aphanèse.

Monoclinic. Axes  $\tilde{a} : \tilde{b} : \tilde{c} = 1.9069 : 1 : 3.8507$ ;  $\beta = 80^\circ 30'$ .

Crystals prismatic ( $m$ ); also elongated  $\parallel \tilde{b}$ ; often grouped in nearly spherical forms. Also massive, hemispherical or reniform; structure radiated fibrous.

Cleavage:  $c$  highly perfect. Brittle.  $H. = 2.5-3$ .  $G. = 4.19-4.37$ ; 4.37 Utah. Luster:  $c$  pearly; elsewhere vitreous to resinous. Color internally dark verdigris-green; externally blackish blue-green. Streak bluish green. Subtransparent to translucent.

**Comp.**— $Cu_3As_2O_8 \cdot 3Cu(OH)_2$  or  $6CuO \cdot As_2O_5 \cdot 3H_2O =$  Arsenic pentoxide 30.3, cupric oxide 62.6, water 7.1 = 100.

**Pyr., etc.**—Same as for olivenite.

**Obs.**—Occurs in Cornwall, with other ores of copper. In Utah, Tintic district, at the Mammoth mine. Named in allusion to the basal cleavage being oblique to the sides of the prism.

**Erinite.**  $Cu_3As_2O_8 \cdot 2Cu(OH)_2$ . In mammillated crystalline groups. Color fine emerald-green. From Cornwall; also the Tintic district, Utah.

**Dihydrite.**  $Cu_3P_2O_8 \cdot 2Cu(OH)_2$ . In dark emerald-green crystals (monoclinic).  $H. = 4.5-5$ .  $G. = 4.4-4.4$ . From Ehl near Linz on the Rhine; the Ural etc.

**Pseudomalachite.** In part  $Cu_3P_2O_8 \cdot 3Cu(OH)_2$ . Massive, resembling malachite in color and structure. From Rheinbreitenbach; Nizhni Tagilsk, etc. *Ehlite* is closely allied.

**Chondrarsenite.** Perhaps  $Mn_3As_2O_8 \cdot 3Mn(OH)_2$ . In small embedded grains. Color yellow to reddish yellow. From the Pajsberg mines, Sweden.

**XANTHARSENITE** Near chondrarsenite, but contains more water. In sulphur-yellow grains; massive. From the Sjö mine, parish of Grythytt, Sweden.



**DUFRENITE.** Kraurite.

Orthorhombic. Crystals rare, small and indistinct. Usually massive, in nodules; radiated fibrous with drusy surface.

Cleavage: *a*, probably also *b*, but indistinct. *H.* = 3.5-4. *G.* = 3.2-3.4. Luster silky, weak. Color dull leek-green, olive-green, or blackish green; alters on exposure to yellow and brown. Streak siskin-green. Subtranslucent to nearly opaque. Strongly pleochroic.

**Comp.**—Doubtful; in part  $\text{FePO}_4 \cdot \text{Fe}(\text{OH})_2 = 2\text{Fe}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$  = Phosphorus pentoxide 27.5, iron sesquioxide 62.0, water 10.5 = 100.

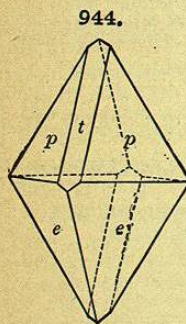
**Pyr., etc.**—Same as for vivianite, but less water is given out in the closed tube. B.B. fuses easily to a slag.

**Obs.**—Occurs near Anglar, Dept. of Haute Vienne, and at Hirschberg in Westphalia; from the Rothläufchen mine near Waldgirmes; St. Benigna, Bohemia; East Cornwall.

In the United States, at Allentown, N. J.; in Rockbridge Co., Va., in radiated coarsely fibrous masses.

**LAZULITE.**

Monoclinic: Axes  $a : b : c = 0.9750 : 1 : 1.6483$ ;  $\beta = 89^\circ 14'$ .



*at*,  $100 \wedge 101 = 30^\circ 24'$ . *ee'*,  $\bar{1}11 \wedge \bar{1}\bar{1}1 = 80^\circ 20'$ .  
*pp'*,  $111 \wedge 1\bar{1}1 = 79^\circ 40'$ . *pe*,  $111 \wedge \bar{1}\bar{1}1 = 82^\circ 30'$ .

Crystals usually acute pyramidal in habit. Also massive, granular to compact.

Cleavage: prismatic, indistinct. Fracture uneven. Brittle. *H.* = 5-6. *G.* = 3.057-3.122. Luster vitreous. Color azure-blue; commonly a fine deep blue viewed along one axis, and a pale greenish blue along another. Streak white. Subtranslucent to opaque.

**Comp.**— $\text{RAl}_2(\text{OH})_2\text{P}_2\text{O}_8$  or  $2\text{AlPO}_4 \cdot (\text{Fe}, \text{Mg})(\text{OH})_2$  with *Fe* : *Mg*(*Ca*) = 1 : 12, 1 : 6, 1 : 2, 2 : 3 (*Rg.*). For 1 : 2 the formula requires: Phosphorus pentoxide 45.4, alumina 32.6, iron protoxide 7.7, magnesia 8.5, water 5.8 = 100.

**Pyr., etc.**—In the closed tube whitens and yields water. B.B. with cobalt solution the blue color of the mineral is restored. In the forceps whitens, cracks open, swells up, and without fusion falls to pieces, coloring the flame bluish green. The green color is made more intense by moistening the assay with sulphuric acid. With the fluxes gives an iron glass; with soda on charcoal an infusible mass. Unacted upon by acids, retaining perfectly its blue color.

**Obs.**—Occurs near Werfen in Salzburg; Krieglach, in Styria; also Horrsjöberg, Sweden. Abundant with corundum at Crowder's Mt., Gaston Co., N. C.; and on Graves Mt., Lincoln Co., Ga., with cyanite, rutile, etc.

The name lazulite is derived from an Arabic word, *azul*, meaning *heaven*, and alludes to the color of the mineral.

**Tavistockite.**  $\text{Ca}_3\text{P}_2\text{O}_8 \cdot 2\text{Al}(\text{OH})_3$ . In microscopic acicular crystals, sometimes stellate groups. Color white. From Tavistock, Devonshire.

**Cirrolite.** Perhaps  $\text{Ca}_3\text{Al}(\text{PO}_4)_3 \cdot \text{Al}(\text{OH})_3$ . Compact. *G.* = 3.08. Color pale yellow. Occurs at the iron mine at Westana, in Scania, Sweden.

**Arsenosiderite.**  $\text{Ca}_3\text{Fe}(\text{AsO}_4)_3 \cdot 3\text{Fe}(\text{OH})_3$ . In yellowish brown fibrous concretions. *G.* = 3.520. From Romanèche, near Mâcon, France; also at Schneeberg, Saxony.

**Allactite.**  $\text{Mn}_3\text{As}_2\text{O}_8 \cdot 4\text{Mn}(\text{OH})_2$ . In small brownish-red prismatic crystals. From the Moss mine, Nordmark, and at Långban, Sweden.

**Synadelphite.**  $2(\text{Al}, \text{Mn})\text{AsO}_4 \cdot 5\text{Mn}(\text{OH})_2$ . In prismatic crystals; also in grains. *G.* = 3.45-3.50. Color brownish black to black. From the Moss mine, Nordmark, Sweden.

**Flinkite.**  $\text{MnAsO}_4 \cdot 2\text{Mn}(\text{OH})_2$ . In minute orthorhombic crystals, tabular | *c*; grouped

in feather-like aggregates. *G.* = 3.87. Color greenish brown. From the Harstig mine, Pajsberg, Sweden.

**Hematolite.** Perhaps  $(\text{Al}, \text{Mn})\text{AsO}_4 \cdot 4\text{Mn}(\text{OH})_2$ . In rhombohedral crystals. *G.* = 3.30-3.40. Color brownish red, black on the surface. From the Moss mine, Nordmark, Sweden.

**Retzian.** A basic arsenate of the yttrium earths, manganese and calcium. In orthorhombic crystals. *H.* = 4. *G.* = 4.15. Color chocolate- to chestnut-brown. From the Moss mine, Nordmark, Sweden.

**Arseniopleite.** Perhaps  $\text{R}_2\text{R}_2(\text{OH})_2(\text{AsO}_4)_2$ ;  $\text{R} = \text{Mn}, \text{Ca}$ , also *Pb*, *Mg*;  $\text{R} = \text{Mn}$ , also *Fe*. Massive, cleavable. Color brownish red. Occurs at the Sjö mine, Grythytte parish, Sweden, with rhodonite in crystalline limestone.

**Manganostibiite.** Hematostibiite. Highly basic manganese antimonates. In embedded grains. Color black. *Manganostibiite* occurs at Nordmark, Sweden; *hematostibiite* is from the Sjö mine, Grythytte parish.

**Atelestite.** Basic bismuth arsenate,  $\text{H}_2\text{Bi}_2\text{AsO}_8$ . In minute tabular crystals. *G.* = 6.4. Color sulphur-yellow. From Schneeberg, Saxony.

**C. Normal Hydrous Phosphates, etc.**

The only important group among the normal hydrous phosphates is the monoclinic VIVIANITE GROUP.

**Struvite.** Hydrous ammonium-magnesium phosphate. In orthorhombic-hemimorphic crystals (Fig. 307, p. 96); white or yellowish; slightly soluble. From guano deposits.

**Collophanite.**  $\text{Ca}_3\text{P}_2\text{O}_8 + \text{H}_2\text{O}$ . In layers resembling gymnite or opal. Colorless or snow-white. From the island of Sombbrero. *Monite* is similar, from the islands Mona and Moneta in the West Indies, where it is associated with *monetite*,  $\text{HCaPO}_4$ , occurring in yellowish-white triclinic crystals.

**Pyrophosphorite.**  $\text{Mg}_2\text{P}_2\text{O}_7 + 4(\text{Ca}_3\text{P}_2\text{O}_8 + \text{Ca}_2\text{P}_2\text{O}_7)$ . Massive, earthy. Color snow-white, dull. From the West Indies.

**Hopeite.** Probably hydrous zinc phosphate,  $\text{Zn}_3\text{P}_2\text{O}_8 + \text{H}_2\text{O}$ . In minute prismatic crystals. Also in reniform masses. *G.* = 2.76-2.85. Color grayish white. Found in cavities in calamine at the zinc mines of Altenberg, near Aix-la-Chapelle. The composition given is that of the artificial mineral.

**Dickinsonite.**  $3\text{R}_3\text{P}_2\text{O}_8 + \text{H}_2\text{O}$  with *R* = *Mn*, *Fe*, *Na*, chiefly, also *Ca*, *K*, *Li*. In tabular, pseudo-rhomboidal crystals; commonly foliated to micaceous. *G.* = 3.338-3.343. Color olive- to oil-green, grass-green. From Branchville, Fairfield Co., Conn.

**Filowite.** Formula as for dickinsonite and also from Branchville, but differing in angle. In granular crystalline masses. *G.* = 3.43. Color wax-yellow, yellowish to reddish brown, colorless.

The three following triclinic species are related in composition and may be in crystalline form.

**Roselite.**  $(\text{Ca}, \text{Co}, \text{Mg})_3\text{As}_2\text{O}_8 + 2\text{H}_2\text{O}$ . In small crystals; often in druses and spherical aggregates. *G.* = 3.5-3.6. Color light to dark rose-red. From Schneeberg, Saxony.

**Brandtite.**  $\text{Ca}_2\text{MnAs}_2\text{O}_8 + 2\text{H}_2\text{O}$ . In prismatic crystals; crystals often united in radiated groups. *G.* = 3.671-3.672. Colorless to white. From the Harstig mine, near Pajsberg, Sweden.

**Fairfieldite.** A hydrous phosphate of calcium and manganese,  $\text{Ca}_2\text{MnP}_2\text{O}_8 + 2\text{H}_2\text{O}$ . In prismatic crystals; usually in foliated or fibrous crystalline aggregates. *G.* = 3.07-3.15. Color white or greenish white to pale straw-yellow. From Branchville, Fairfield Co., Conn.; Rabenstein, Bavaria (*leucomanganite*).

**Messelite.**  $(\text{Ca}, \text{Fe})_3\text{P}_2\text{O}_8 + 2\frac{1}{2}\text{H}_2\text{O}$ . In minute tabular crystals. Colorless to brownish. From near Messel in Hesse.



**Reddingite.**  $Mn_3P_2O_8 + 3H_2O$ . In orthorhombic crystals near scorodite in angle; also granular.  $G. = 3.102$ . Color pinkish white to yellowish white. From Branchville, Conn.

**Picroparmacolite.**  $R_3As_2O_8 + 6H_2O$ , with  $R = Ca : Mg = 5 : 1$ . In small spherical forms. Color white. From Riechelsdorf; Freiberg; Joplin, Mo.

**Trichalcite.**  $Cu_3As_2O_8 + 5H_2O$ . In radiated groups, columnar; dendritic. Color verdigris-green. From the Turginsk copper mine.

#### Vivianite Group. Monoclinic.

Vivianite	$Fe_3P_2O_8 + 8H_2O$	$a : b : c = 0.7498 : 1 : 0.7015$	$\beta = 75^\circ 34'$
Symplesite	$Fe_3As_2O_8 + 8H_2O$	$0.7806 : 1 : 0.6812$	$72^\circ 43'$
Bobierrite	$Mg_3P_2O_8 + 8H_2O$		
Hørnesite	$Mg_3As_2O_8 + 8H_2O$		
Erythrite	$Co_3As_2O_8 + 8H_2O$	$0.75 : 1 : 0.70$	$75^\circ$
Annabergite	$Ni_3As_2O_8 + 8H_2O$		
Cabrerite	$(Ni, Mg)_3As_2O_8 + 8H_2O$		
Köttigite	$Zn_3As_2O_8 + 8H_2O$		

The VIVIANITE GROUP includes hydrous phosphates of iron, magnesium, cobalt, nickel and zinc, all with eight molecules of water. The crystallization is monoclinic, and the angles so far as known correspond closely.

#### VIVIANITE.

Monoclinic. Crystals prismatic ( $mm'' = 71^\circ 58'$ ); often in stellate groups. Also reniform and globular; structure divergent, fibrous, or earthy; also incrusting.

Cleavage:  $b$  highly perfect;  $a$  in traces; also fracture fibrous nearly  $\perp c$ . Flexible in thin laminae; sectile.  $H. = 1.5-2$ .  $G. = 2.58-2.68$ . Luster,  $b$  pearly or metallic pearly; other faces vitreous. Colorless when unaltered, blue to green, deepening on exposure. Streak colorless to bluish white, changing to indigo-blue and to liver-brown. Transparent to translucent; opaque after exposure. Pleochroism strong.

**Comp.**—Hydrous ferrous phosphate,  $Fe_3P_2O_8 + 8H_2O =$  Phosphorus pentoxide 28.3, iron protoxide 43.0, water 28.7 = 100.

Many analyses show the presence of iron sesquioxide due to alteration.

**Pyr., etc.**—In the closed tube yields neutral water, whitens, and exfoliates. B.B. fuses at 1.5, coloring the flame bluish green, to a grayish black magnetic globule. With the fluxes reacts for iron. Soluble in hydrochloric acid.

**Obs.**—Occurs associated with pyrrhotite and pyrite in copper and tin veins; sometimes in narrow veins with gold, traversing graywacke; both friable and crystallized in beds of clay, and sometimes associated with limonite, or bog iron ore; often in cavities of fossils or buried bones.

Occurs at St. Agnes and elsewhere in Cornwall; at Bodenmais; the gold mines of Verespatak in Transylvania. The earthy variety, sometimes called *blue iron-earth* or *native Prussian blue* (*Fer azuré*), occurs in Greenland, Carinthia, Cornwall, etc.

In N. America, in *New Jersey*, at Allentown, Monmouth Co., both crystallized, in nodules, and earthy; at Mullica Hill, Gloucester Co. (*mullicite*), in cylindrical masses. In *Virginia*, in Stafford Co. In *Kentucky*, near Eddyville. In *Canada*, with limonite at Vaudreuil.

**Symplesite.** Probably  $Fe_3As_2O_8 + 8H_2O$ . In small prismatic crystals and in radiated spherical aggregates.  $G. = 2.957$ . Color pale indigo, inclined to celandine-green. From Lobenstein in Voigtland; Hüttenberg, Carinthia.

**Bobierrite.**  $Mg_3P_2O_8 + 8H_2O$ . In aggregates of minute crystals; also massive. Colorless to white. From the guano of Mexillones, on the Chilean coast. *Hautefeuillite* is like bobierite, but contains calcium. From Bamle, Norway.

**Hørnesite.**  $Mg_3As_2O_8 + 8H_2O$ . In crystals resembling gypsum; also columnar; stellar-foliated. Color snow-white. From the Banat, Hungary.

#### ERYTHRITE. Cobalt Bloom. Kobaltblüthe *Germ.*

Monoclinic. Crystals prismatic and vertically striated. Also in globular and reniform shapes, having a drusy surface and a columnar structure; sometimes stellate. Also pulverulent and earthy, incrusting.

Cleavage:  $b$  highly perfect. Sectile.  $H. = 1.5-2.5$ ; least on  $b$ .  $G. = 2.948$ . Luster of  $b$  pearly; other faces adamantine to vitreous; also dull, earthy. Color crimson- and peach-red, sometimes gray. Streak a little paler than the color. Transparent to subtranslucent.

**Comp.**—Hydrous cobalt arsenate,  $Co_3As_2O_8 + 8H_2O =$  Arsenic pentoxide 38.4, cobalt protoxide 37.5, water 24.1 = 100. The cobalt is sometimes replaced by nickel, iron, and calcium.

**Pyr., etc.**—In the closed tube yields water at a gentle heat and turns bluish; at a higher heat gives off arsenic trioxide, which condenses in crystals on the cool glass, and the residue has a dark gray or black color. B.B. in the forceps fuses at 2 to a gray bead, and colors the flame light blue (arsenic). B.B. on charcoal gives an arsenical odor, and fuses to a dark gray arsenide, which with borax gives the deep blue color characteristic of cobalt. Soluble in hydrochloric acid, giving a rose-red solution.

**Obs.**—Occurs at Schneeberg in Saxony, in micaceous scales; Wolfach in Baden; Modum in Norway.

In the U. S., in Penn., sparingly near Philadelphia; in Nevada, at Lovelock's station. In California. Named from *έρυθρός*, red.

**Annabergite.**  $Ni_3As_2O_8 + 8H_2O$ . In capillary crystals; also massive and disseminated. Color fine apple-green. From Allemont in Dauphiné; Annaberg and Schneeberg; Riechelsdorf; in Colorado; Nevada.

**Cabrerite.**  $(Ni, Mg)_3As_2O_8 + 8H_2O$ . Like erythrite in habit. Also fibrous, radiated; reniform, granular. Color apple-green. From the Sierra Cabrera, Spain; at Laurion, Greece.

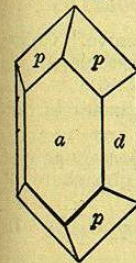
**Köttigite.** Hydrous zinc arsenate,  $Zn_3As_2O_8 + 8H_2O$ . Massive, or in crusts. Color light carmine- and peach-blossom-red. Occurs with smaltite at the cobalt mine Daniel, near Schneeberg.

**Rhabdophanite. Scovillite.** A hydrous phosphate of the cerium and yttrium metals. Massive, small mamillary; as an incrustation.  $G. = 3.94-4.01$ . Color brown, pinkish or yellowish white. *Rhabdophanite* is from Cornwall; *Scovillite* is from the Scoville (limonite) ore bed in Salisbury, Conn.

**Churchite.** A hydrous phosphate of cerium and calcium. As a thin coating of minute crystals.  $G. = 3.14$ . Color pale smoke-gray tinged with flesh-red. From Cornwall.

#### SCORODITE.

945.



Orthorhombic. Axes  $a : b : c = 0.8658 : 1 : 0.9541$ .

$dd', 120 \wedge \bar{1}20 = 60^\circ 1'$ .  $pp', 111 \wedge \bar{1}\bar{1}1 = 111^\circ 6'$ .  
 $pp', 111 \wedge \bar{1}\bar{1}1 = 77^\circ 8'$ .  $pp'', 111 \wedge \bar{1}\bar{1}1 = 65^\circ 20'$ .

Habit octahedral, also prismatic. Also earthy, amorphous. Cleavage:  $d$  imperfect;  $a, b$  in traces. Fracture uneven. Brittle.  $H. = 3.5-4$ .  $G. = 3.1-3.3$ . Luster vitreous to subadamantine and subresinous. Color pale leek-green or liver-brown. Streak white. Subtransparent to translucent.

**Comp.**—Hydrous ferric arsenate,  $FeAsO_4 + 2H_2O =$  Arsenic pentoxide 49.8, iron sesquioxide 34.6, water 15.6 = 100.

**Pyr., etc.**—In the closed tube yields neutral water and turns yellow. B.B. fuses easily, coloring the flame blue. B.B. on charcoal gives arsenical fumes, and with soda a black magnetic scoria. With the fluxes reacts for iron. Soluble in hydrochloric acid.

**Obs.**—Often associated with arsenopyrite. From Schwarzenberg, Saxony; Dernbach,