A LIST OF SPECIALLY NOTEWORTHY MINERALS OF COLORADO.

PREPARED BY WHITMAN CROSS.

TELLURIUM. *Boulder county*, Magnolia, Gold Hill and other districts.

Crystals, prismatic and rhombohedral; formerly abundant. *Occurrence:* In veins in gneiss with tellurides. *Literature:* F. A. Genth, Am. Jr. Sc., 2nd Ser., XLV, 313, 1868; Proc. Am. Phil. Soc. Philad., 1874, Aug. 21 (analyses). Silliman, Am. Jr. Sc., 3d Ser., VIII, 27, 1874 (general occurrence). Other literature in Dana App. III. Specimens in collection of C. S. S.

SILVER. Found in many localities; especially noteworthy in *Boulder county*, Caribou mine; *Clear Creek county*, Georgetown; *Gunnison county*, Sylvanite mine.

GOLD.. Found in many localities; especially noteworthy in *Summit county*, Ontario mine, near Breckenridge (Remarks upon this occurrence, this vol. p. 67); *Rio Grande county*, Summit District (See "Ore Deposits of Summit District," this vol. p. 20); *Boulder county*, Golden Age mine, near Jamestown.

NICCOLITE. *Fremont county*, Gem mine, on Pine Creek. (Incorrectly given as in Grape Creek Cañon, Custer county). *Oc:* In an irregular vein in gneiss. In dolomitic gangue with bornite and pyritiferous minerals. Rarer associate native silver. Produces annabergite on alteration.

MELONITE. *Boulder county*, Forlorn Hope mine, with other tellurides; crystallized, but without recognizable forms. *Lit:* W. F. Hillebrand, this vol. p. 123 (qualitative determination). Specimens in collection of C. S. S.

LOLLINGITE. *Gunnison county*, in several mines on Teocalli and White Rock Mountains, at the head of Brush Creek. *Oc:* With smaltite, marcasite, galena, chalcopyrite, pyrargyrite, argentite, proustite, and native silver, in a gangue of calcite, siderite or barite. In small seggregated ore bodies in connection with masses of sedimentary rocks included in or penetrating an eruptive rock. *Char:* Usually in dense radiate masses; more rarely in simple trillings or single crystals. In latter case very minute. Cobaltiferous and nickeliferous. *Lit:* W. F. Hillebrand, Am. Jr. Sc., 3d Ser., XXVII, 349, 1884, also this vol., p. 46 (crystallographical and chemical determination of species). Original specimens in collection of C. S. S.

SMALTITE. *Gunnison county.* (See Lëllingite). Good crystals (O and ∞O∞) in barite. Produces erythrite on alteration. *Lit:* M. W. Iles. Am. Jr. Sc., 3d Ser., XXIII, 380, 1882.

ALTAITE. *Boulder county*, various mines on Gold Hill, and in other districts sparingly. *Oc:* In irregular veins in gneiss with other tellurides, pyrite and chalcopyrite *Cryst*; Occasionally found in fine crystals, usually O. *Lit:* F. A. Genth, Proc. Am. Phil. Soc. Phila., XIV, 225, 1874 (original determination; description, analysis.)

HESSITE. (Auriferous). *Boulder county*, Gold Hill District, and probably in others. *Oc:* In veins in gneiss with other tellurides, pyrite, chalcopyrite, galena, sphalerite. Has been called petzite on account of gold contents. *Lit;* B. Silliman, Am. Jr. Sc., 3d Ser., VIII, 27, 1874 (description of occurrence, analyses). F. A. Genth, Proc. Am. Phil Soc. Phila., XIV, 226, 1874 (analysis).

COLORADOITE. *Boulder county*, Magnolia District, Mountain Lion and Keystone mines (rare). Central District, Smuggler mine. *Oc:* Massive; associated with tellurium, sylvanite and other tellurides. Yields magnolite (Genth), Hg_2TeO_3 (?), on decomposition. Only known locality. Good specimens in coll. of C. S. S. *Lit:* F. A.

Genth, Proc. Am. Phil. Soc. Phila., XVII, 115, 1877 (original description of species).

SYLVANITE. *Boulder county*, Gold Hill, and probably in other districts. *Oc:* As with Hessite. *Lit;* B. Silliman, Am. Jr. Sc., 3d Ser., VIII, 28, 1874 F. A. Genth, Proc. Am. Phil. Soc. Phila., XIV, 228, 1874 (analysis).

ALASKAITE. *San Juan county*, Alaska mine, Poughkeepsie Gulch. Probably in many mines of the San Juan region. *Char:* Massive; whitish lead-gray, opaque, metallic lustre. *Oc:* In vein with tetrahedrite, chalcopyrite, barite and quartz. *Lit;* Original description by G. A. Koenig, Proc. Am. Phil. Soc. Phila., 1881, 472. In appendix III to Dana's System of Mineralogy, E. S. Dana proposes to extend the use of the name alaskaite and include under it Rammelsberg's *Silberwismuth-glanz.*

ZINCKENITE. *San Juan county*, Brobdignag mine on Red Mountain. *Char:* Massive, not crystallized, very brittle. Color grayish-white. Lustre metallic, somewhat greasy. *Lit:* W. F. Hillebrand, this vol., p. 121.

GUITERMANITE (new). *San Juan county*, Zuñi mine on Anvil Mountain. *Lit:* W. F. Hillebrand, this vol. p. 129.

SCHIRMERITE. *Boulder county*, Gold Hill District, Red Cloud mine. *Clear Creek county*, Geneva and Peru Districts. *San Miguel county*, Howard's Fork, Iron Springs District. *Char;* Massive, finely granular, disseminated through granular quartz gangue. Soft, brittle. G. 6.737, color lead-gray inclining to iron-black. Lustre metallic *Oc:* Associate of tellurium minerals in Boulder county. With small quantities of bismuthenite(?), chalcopyrite and galena, in San Miguel county. *Lit:* Original description by F. A. Genth, Proc. Am. Phil. Soc. Phila., XIV, 230, 1874.

COSALITE. *La Plata county*, Comstock mine, near Parrott City. *San Juan county*, Yankee Girl mine, Red Mountain. *Char:* massive; color grayish-white. *Oc:* La Plata, sparingly with pyrite

sphalerite, sylvanite (?) and gold in a quartz vein. San Juan, unknown. *Lit.:* La Plata, W. F. Hillebrand, Am. Jr. Sc., 3d Ser., XXVII, 354, 1884; also this vol., p. 52. San Juan, Richard Pearce, this vol., p. 111. Specimens in collection of C. S. S.

BEEGERITE. *Park county*, Baltic lode, near Grant P. O. *Char:* Isometric, in elongated crystals; also massive. Cleavage cubic, color light to dark-gray. Lustre brilliant metallic. Exceedingly rare. *Lit.:* Original description by G. A. König, Am. Chem. Jour., II, 379, 1881.

ENARGITE. *Gilpin county*, Powers and other mines near Black Hawk and Central City. *Park county*, Missouri mine, Hall Valley. *San Juan* and *Ouray counties*, Red Mountain. *Rio Grande county*, Summit District. *Oc*: Massive and in large, imperfect crystals in Gilpin county. In small blades in quartz gangue with tetrahedrite, chalcopyrite and a bismuth mineral at Missouri mine, Park county.

TELLURITE. *Boulder county*, Magnolia District, Mountain Lion, Keystone and other mines. *Oc.*: With native tellurium, in tufts of minute, pale yellow needles. In very small quantity. *Lit.*: F. A. Genth, Proc. Am. Phil. Soc. Phila., XVII, 118, 1877. Specimens in collection of C. S.S.

QUARTZ. *El Paso connty*, Pike's Peak Region. *Oc*: With amazon stone, albite, fluorite, zircon, goethite etc., in fine crystals, often very large and clear. One found here is six feet in length. Frequently doubly terminated. Small crystals have occasionally many rare planes never as yet determined. Cut for jewelry and sold as "smoky topaz," "cairngorm stone" etc.

ZIRCON. *El Paso county*, Pike's Peak Region. Especially abundant near St. Peter's Dome. *Oc.*: Very abundant as associate of the minerals found in the district. In drusy cavities, in veins and impregnating the country rock. *Char.*: In druses sometimes reaches a diameter of 3–4 Cm. Dull and partly altered. In a vein of quartz with cryolite etc., in small but transparent

crystals showing faces ∞P, ∞P∞, P, 3P, 3P3, oP and a questionable face near $\frac{1}{18}$P. *Lit.*: G. A. Koenig, Proc. Am. Phil. Soc., XVI, 518, 1877, or Zeitschrift fur Kryst. Groth, I, 432; Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIV, 284, 1882. Particularly fine specimens in coll. of U. S. Geol. Survey, Denver.

GOETHITE. *El Paso county*, Pike's Peak Region. *Oc*: Abundant as an associate of microcline, smoky quartz. Pseudomorph after siderite and in bundles of brilliant blades. Crystals rare. Particularly fine specimens in coll. of Whitman Cross, Denver.

EMBOLITE. *Lake county*, in many mines in and near Leadville. *Oc*: With cerussite and hydrous oxides of iron. Occasionally in good crystals. O and ∞O∞. Specimens in collection C. S. S.

TYSONITE. *El Paso county*, west of Cheyenne Mt. *Char.*: Hexagonal. In masses with occasional crystal planes and rare crystals. Faces observed: ∞P, ∞P2, oP., P, 2P, 2P2 (E. S. Dana). Cleavage basal, distinct, also parallel ∞P. Lustre vitreous to resinous, color pale wax-yellow. Streak nearly white. Much altered to bastnäsite. *Oc*: Not fully investigated. In small masses not directly connected, so far as known, with other mineral deposits of district. *Lit.*: Allen and Comstock, Am. Jr. Sc., 3d Ser., XIX, 390, 1880 (original description of species.) Dana, E. S. Am. Jr. Sc., 3d. Ser., XXVII, 481, 1884 (crystallographical.)

CRYOLITE. *El Paso county*, Pike's Peak Region. At St. Peter's Dome, west of Cheyenne Mt., near toll road. *Char.* Massive: no crystal faces observed. Shows complex twinning when examined microscopically. *Oc.*: In small masses in quartz and feldspar veins, with astrophyllite, zircon, columbite. By alteration produces large number of hydrous fluorides identical with those of Greenland. *Lit.*: Cross and Hillebrand, Am. Jr. Sc., 3d. Ser., XXVI, 271, 1883, (description of occurrence, analyses). A good suite of fluorides from St Peter's Dome in the collection of the C. S. S.

PACHNOLITE. *El Paso county*, same locality as cryolite. *Char*: Massive, with cavities containing small transparent crystals. Faces: ∞P, —P, —$3\bar{P}3$, oP. Twinned parallel $\infty \bar{P} \infty$. *Lit.*: See cryolite.

THOMSENOLITE. *El Paso county*, same locality as cryolite. Rare, in clearly distinguishable form. Usually mixed with pachnolite.

RALSTONITE. *El Paso county*, St. Peter's Dome. With other fluorides. *Char.* In minute crystals of regular system. O and ∞O∞. Identity not absolutely proven. *Lit.*: See cryolite.

PROSOPITE. *El Paso county*, St. Peter's dome. With other fluorides. *Char*: Massive, a few small crystals. Faces, ∞P, $\infty \bar{P} \infty$, P, —2P2. *Lit*: See cryolite.

GEARKSUTITE. *El Paso county*, St Peter's Dome. With other fluorides. *Char*: White, kaolin-like powder. *Lit*: See cryolite.

RHODOCROSITE. *Ouray county*, Royal Albert and Mountain Monarch veins, Uncompahgre District. *Hinsdale county*, Champion vein, Borrough's Park. *Oc*: Associated with galena, pyrite, sphalerite, chalcopyrite and tetrahedrite. *Char*: Beautiful isolated rose red crystals, translucent (Ouray), opaque, also in large clusters (Hinsdale.) Only form observed, R. *El Paso county*, Garden of the Gods. *Oc*: In small white radiate bunches upon blue celestite, in lenticular geodes contained in certain layers of red triassic sandstone (W. F. Hillebrand.)

BISMUTITE. *Lake county*, Florence mine. *Oc*: With argentiferous lead ores as an alteration product of the sulphide. Rare. Spec. in collection of U. S. Geological Survey, Denver. *Larimer county*, from a locality as yet not definitely known. Spec. in coll. C. S. S.

BASTNÄSITE. *El Paso county*, west of Cheyenne Mt. *Oc.* See Tysonite, of which the present mineral is an alteration product. Spec. in coll. of Whitman Cross, Denver. *Lit*: Allen and Comstock, Am. Jr. Sc., 3d Ser., XIX, 390, 1880.

BARITE. *El Paso* and *Fremont counties*, between Colorado Springs and Cañon City. *Oc*: In limestone nodules with calcite, from certain horizons of the Colorado Cretaceous. *Char*: Colorless or smoky transparent crystals of very perfect development. Spec. in coll. of Whitman Cross.

CELESTITE. *El Paso Connty*, Garden of the Gods. *Oc*: In lenticular masses, often geodes, contained in certain layers of Triassic red sandstones. *Char*: crystals very perfect, blue, transparent. Not yet studied crystallographically. More rarely in fibrous masses of bluish color, or in colorless transparent crystals. Spec. in coll. of Whitman Cross, Denver.

HÜBNERITE. *Ouray county*, Royal Albert vein, Uncompahgre District. *Oc*: Long flattened blades imbedded in quartz. *Lit*: W. F. Hillebrand, Am. Jr. Sc., 3d Ser., XXVII, 357, 1884, also this vol., p. 55. *San Juan county*, Adams mine, Red Mountain. *Boulder county*, near Jamestown. Specimens from the three localities in coll. of C. S. S.

URANINITE *Gilpin county*, Wood mine, near Central City. At one time mined, now exhausted. *Lit*: N. P. Hill, note in Am, Jr. Sc., 3d Ser., v, 386, 1873.

BROCHANTITE. *Chaffee couuty*, Monarch mine. *Oc*: In small crystals and crystal aggregates with oxidized iron compounds. *Lit*: This vol., pp. 108 and 119.

JAROSITE. *Chaffee county*, Iron Arrow claim, near Salida. Associate of turgite. *Lit*: G. A. Koenig. Am. Chem. Jr., II., 375, 1881 (analysis.)

ILESITE. *Fark county*, at head of Hall Valley in several mines. *Oc*: Incrustations and fillings in vein matter. Prismatic (Iles); so far as observed in nature, without crystalline form (Hillebrand). *Lit*: M. W. Iles., Am. Chem. Jour., III, 420. Mining Index, Leadville, Colo., Nov. 5, 1881. Dana, App. III, p. 62.

Remarks. Color, as given by M. W. Iles, *white*. W. F. Hillebrand, when in Hall Valley (Oct., 1884), observed the mineral, fresh from a mine, of a

clear green color, exactly like ordinary ferrous sulphate. In consequence of loss of water it becomes pure white and soft after a very few hours exposure to the air. Probably the formula of Iles requires correction, as regards the relative number of molecules of water, for the amount evidently lost before reaching his hands. Artificial crystals *appear* to belong to the monclinic system. (W. F. Hillebrand, personal communication.) Spec. of artificial crystals in coll. C. S. S.

COLUMBITE. *El Paso county*, Pike's Peak region. *Oc*: Associated with amazon stone, smoky quartz, etc., often penetrating the former, in brilliant black prisms. Is also found in small quantity with cryolite, etc. In some cases it occurs in masses of imperfect form weighing several pounds. *Lit*: J. L. Smith, Am. Jr. Sc., 3d Ser., XIII, 362, 1877 (analysis.)

TOPAZ. *El Paso county*, near Florissant; and in Crystal Park, south of Manitou. *Douglas county*, Devil's Head Mt. (Platte Mt.). *Oc*: In drusy cavities in Archæan. *Char*: Fine crystals. Faces; ∞P, $\infty \breve{P}2$, $4\breve{P}\infty$, $2\breve{P}\infty$, oP, P, $2P$, $2\bar{P}\infty$ most common; $\infty \breve{P}3$, $\infty \breve{P}\infty$, $\frac{1}{3}\breve{P}\infty$, $\frac{3}{4}P$, $\frac{3}{2}\bar{P}\infty$ not rare. Often doubly terminated more or less perfectly. Crystals with fine development and weighing 6¾ oz. have been found. Colorless or pale green. Faces often dull, rarely polished. Spec. in collections of C. S. S. and of Whitman Cross, Denver. *Lit*: Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIV, 282, 1882 (description of occurrence, crystal form etc.)

ZUNYITE (NEW). *San Juan county*, Zuñi mine on Anvil Mt., near Silverton. *Lit*: W. F. Hillebrand, this vol., p. 124 (description and analysis).

PHENACITE. *El Paso county*, Crystal Park; Florissant. *Oc*: Rare associate of topaz etc., in cavities in granite. At Crystal Park with topaz, zircon, microcline. albite, smoky quartz, limonite pseudomorphs after siderite. At Florissant in small, flat crystals upon amazon stone with topaz, albite, limonite pseudomorphs, smoky quartz

etc, *Char*: Colorless, transparent crystals of lenticular habit. Faces: R, —½R, ⅔P2, and much less prominent, —R. At Crystal Park crystals are large, and usually broken when found. Largest fragment measures 7 cm. in longest diameter. At Florissant very small and more perfect. *Lit*: Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIV, 282, 1882 (general description and figure of crystal). Specimens in coll. of Whitman Cross, Denver.

BIOTITE *El Paso county*, Pike's Peak region. *Oc*: Occasional associate of the minerals in veins and druses of the Archæan area. *Char*: Not especially investigated as yet, excepting the variety rich in iron (25.50 per cent FeO) called siderophyllite by Lewis. *Lit*: H. C. Lewis, Proc. Ac. Nat. Sc. of Phila., 1880; 254 (description of variety siderophyllite, analysis).

KAOLINITE. *El Paso county*, St. Peter's Dome, west of Cheyenne Mt., Eureka tunnel. *San Juan county*, National Belle mine, near Silverton. *Oc*: (El Paso) In coarse quartz and feldspar vein, as alteration product of red microcline. Intimately associated with greenish yellow mica (secondary), zircon, fluorite, cryolite etc. in same vein. (San Juan) With galena and its oxidation products, in chambers lined with ore distributed through huge quartz masses enclosed in a highly kaolinized eruptive rock. *Char*: (El Paso) Thin, transparent, hexagonal plates, usually compound; also in coarse or fine foliate masses. (San Juan) Microscopic hexagonal plates showing pyramidal faces. Very pure in both localities of occurrence. *Lit*: (El Paso) Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXVI, 290, 1883 (description and analysis). (San Juan) R. C. Hills, Am. Jr. Sc., 3d Ser., XXVII, 472, 1884. Spec. in collections of C. S. S. and U. S. Geological Survey, Denver.

ARFVEDSONITE. *El Paso county*, Pike's Peak region. *Oc*: In large, imperfect crystals in quartz masses in

granite body. Particularly associated with astrophyllite and zircon. *Lit:* G. A. Koenig, Proc. Am. Phil. Soc., Phila., XVII, 516, 1877 (analysis, original identification).

ASTROPHYLLITE. *El Paso county*, Pike's Peak region. *Oc:* In long narrow blades imbedded in quartz, feldspar, or rarely in cryolite. *Lit:* See arfvedsonite.

MICROCLINE. *El Paso* and *Douglas counties*, Pike's Peak region. Especially good near Florissant. *Oc:* In drusy cavities in Archæan granite. Associated minerals are: smoky quartz, albite, biotite, muscovite, topaz, phenacite, columbite, zircon. fluorite, hematite, goethite and other hydroxides of iron. *Char:* Green (as amazon stone), pink or gray in color. In fine crystals, single and in groups and often of great size. Twins frequent, after the Carlsbad, Baveno or Manebach laws. Most abundant mineral of region. *Lit: G. A. Koenig*, Proc. Ac. Nat. Sc. of Phila., 1876, 156 (in regard to color of amazon stone).

THOMSONITE. *Jefferson county*, Table Mountain near Golden. *Oc:* With following zeolites in cavities in basalt. *Lit:* Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIII, 455, 1882.

ANALCITE. *Jefferson county*, Table Mountain, Golden. *Lit:* C. and H., see thomsonite; C. Klein, Neues Jahrbuch etc., 1884, I, 250 (optical anomalies).

MESOLITE. *Jefferson county*, Table Mountain, near Golden. *Oc:* See thomsonite. *Char:* In bunches and tufts made up of very minute needles. *Lit:* Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIV, 133, 1882 (analysis).

APOPHYLLITE. *Jefferson county*, Table Mountain, near Golden. *Oc:* See thomsonite. *Char:* In good crystals, having in part a greenish tinge. Anomalous optical action in polarized light. *Lit:* Cross and Hillebrand, Am. Jr. Sc., 3d Ser., XXIV, 129, 1882 (analysis); C. Klein, neues Jahrbuch etc., 1884, I, 253.

CHABAZITE, STILBITE, LAUMONTITE, *Jefferson county*, Table Mountain, near Golden. *Lit:* Cross and Hillebrand, see thomsonite.

LEVYNITE. *Jefferson county*, Table Mountain, near Golden. *Lit:* Cross and Hillebrand, in a shortly forthcoming bulletin of the United States Geological Survey. Specimens of all the above zeolites in the collection of the United States Geological Survey, Denver.