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THIRD APPENDIX

TO THE

SIXTH EDITION

OF

DANA'S SYSTEM OF MINERALOGY

BY

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COMPLETING THE WORK TO 1915

NEW YORK

JOHN WILEY & SONS, INC.

LONDON: CHAPMAN & HALL, LIMITED

1915

THE SCIENTIFIC PRESS
ROBERT DRUMMOND AND COMPANY
BROOKLYN, N. Y.

PREFATORY NOTE.

THE Sixth Edition of the System of Mineralogy was published in 1892; the First Appendix appeared in 1899 and the Second Appendix in 1909. The present issue, which is the Third Appendix, covers as far as possible the period between Jan. 1, 1909, and Jan. 1, 1915, or six years in all. The fact that since August, 1914, the European war has materially affected the mail service from foreign countries, makes it probable that some publications appearing after that date have not been received. All of the important Journals, however, have been obtained for this period and their contents reviewed.

That investigators in mineralogy have been active during the last six years is evidenced by the size of this Appendix as well as by the fact that about one hundred and eighty new mineral names have been proposed. Of these minerals which have received new names about one-third are apparently well established species. The others are clearly to be considered as varieties of already well-known species or, because of their incomplete investigation, must for the present be considered of somewhat doubtful authenticity. The division of the new names into the three classes, (1) of varieties, (2) of doubtful species, (3) of established species, is indicated by the three kinds of type used in the Classified List to be found on pages ix–xiii.

In general the present Appendix follows closely in its character and arrangement the precedents established by the two previous issues. As in the Second Appendix, no attempt has been made to recalculate angles, ratios, etc.; the author's figures being accepted in each case as published. In order to limit the size of the volume as far as possible it has been found necessary to treat the material very briefly and concisely. With the increased activity in crystallographic investigations the number of new forms observed upon the crystals of established species has become very large. It was found impracticable to properly list all of these new forms and, after careful consideration of the matter, it was decided to omit them entirely whenever the mineral in question was one whose crystal character and habit were already well understood. In all cases, however, where an article described a new crystal form, that fact is noted in the reference to it.

The most important single new development in mineralogical investigation during the period covered by this Appendix has been the use of the X-Ray as a means of studying the molecular structure of crystals. The first paper on this new line of attack was published in 1912 and since then a number of investigators have been active in this field. While only a beginning has been made, the results already achieved have been of great interest and show that much may be expected in the future from this method of investigation. While the work, so far, has been largely physical in character, it has so large a bearing on future crystallographic work that it has seemed advisable to give a short bibliography of the more important papers that have appeared. This will be found at the end of the usual bibliography on p. vi. The list has been largely compiled from references given by W. H. Bragg and W. L. Bragg in "X-Rays and Crystal Structure", a book which summarizes the work already done in this field.

During the period covered by this Appendix the following new Journals have appeared; the abbreviations adopted in referring to them are indicated after the titles:

Fortschritte der Mineralogie, Kristallographie und Petrographie. G. Linck. Vol. 1. 1911. (Fortschr. Min.).

Beiträge zur Krystallographie und Mineralogie. Victor Goldschmidt. Vol. 1, 1914 (Beitr. Kr.).

Chemie der Erde. K. Linck. Vol. 1, 1914. (Chem. Erde.)

For the explanation of the other *Abbreviations* made use of in the case of periodicals, also of the crystallographical, optical and chemical symbols employed, reference is made to the Introduction to the System (1892), pp. xlv–li and pp. xiii–xl. General abbreviations are explained on pp. lxi–lxiii.

The bibliography, while not intended to be exhaustive, contains, it is thought, the titles of all important volumes published between 1909 and 1915.

YALE UNIVERSITY,
NEW HAVEN, CONN., June 1, 1915.

INTRODUCTION.

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BLAKE, W. P. Minerals of Arizona. 64 pp. Tucson, 1909.

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CLASSIFIED LIST OF NEW NAMES

I. NATIVE ELEMENTS, Min., pp. 2–32.

Tantalum (p. 76).

II. SULPHIDES, TELLURIDES, ARSENIDES, ETC., Min., pp. 33–108.

Rizopatronite (p. 68). Same as Patronite, App. II, p. 79.
TEMISKAMITE (p. 77), Ni_4As_3.
Maucherite (p. 48), Ni_3As_2.
MELNIKOVITE (p. 49), FeS_2.
Arsenoferrite (p. 8), $FeAs_2$. Pyrite Group.
Cobaltnickelpyrite (p. 21), $(Co,Ni,Fe)S_2$. Pyrite Group.
EMPRESSITE (p. 27), AgTe.
MUTHMANNITE (p. 53), (Ag,Au)Te.

III. SULPHO-SALTS, Min., pp. 109–151.

Vrbaite (p. 83), $TlAs_2SbS_5$.
EICHBERGITE (p. 26), $(Cu,Fe)_2S.3(Bi,Sb)_2S_3$.
Platynite (p. 61), $PbS.Bi_2S_3$.
WEIBULLITE (p. 84), $2PbS.Bi_4S_3Se_3$
Wiltshireite (p. 85). Same as Rathite, App. I, p. 58.
Samsonite (p. 69), $2Ag_2S.MnS.Sb_2S_3$.
GOLDFIELDITE (p. 34), $5Cu_2S.(Sb,Bi,As)_2(S,Te)_3$.

IV. CHLORIDES, BROMIDES, IODIDES, Min., pp. 152–182.

Mosesite (p. 53). A mercury, ammonium compound, containing chlorine, sulphuric oxide and water.
Mercur-ammonite (p. 49). Synonym for Kleinite, App. II, p. 59.
Baeumlerite (p. 10). Same as Hydrophilite, Min., p. 161.
Yttrofluorite (p. 86). Fluoride of calcium and yttrium.
Cerfluorite (p. 18). Fluoride of calcium and cerium.

OXYCHLORIDES.

Bromatacamite (p. 15). Var. of Atacamite, Min., p. 172.
HYDROMELANOTHALLITE (p. 40), $CuCl_2.CuO.2H_2O$.

V. OXIDES, Min., pp. 183–260.

Schaumopal (p. 70). Var. of Opal, Min., p. 194.
HEMATOGELITE (p. 37). Colloidal Fe_2O_3.
CHROMITITE (p. 20), $FeCrO_3$.
Guadarramite (p. 34). Var. of Ilmenite, Min., p. 217.
SITAPARITE (p. 72), $9Mn_2O_3.2Fe_2O_3.MnO_2.3CaO$.
Vredenburgite (p. 83), $3Mn_3O_4.2Fe_2O_3$.

Hydrous Oxides.

Alaite (p. 1), $V_2O_5.H_2O$.
Sporogelite, Cliachite, Kliachite, Kljakite, (p. 74). Colloidal form of $Al_2O_3.H_2O$.
Ehrenwerthite (p. 27). Colloidal form of $Fe_2O_3.H_2O$.
Ferrobrucite (p. 30), Metabrucite (p. 49). Var. of Brucite, Min., p. 252.
Shanyavskite (p. 72). $Al_2O_3.4H_2O$.
Skemmatite (p. 72), $3MnO_2.2Fe_2O_3.6H_2O$.
Beldongrite (p. 11), $6Mn_3O_5.Fe_2O_3.8H_2O$.
Wolftonite (p. 85). Same as Hetærolite, Min., p. 259.

VI. 1. CARBONATES.

A. Anhydrous Carbonates, Min., pp. 261–293.

Cobaltocalcite (p. 22), Lublinite (p. 46), Vaterite (p. 82). Var. of Calcite, Min., p. 262.
Ponite (p. 61), Zincorodochrosite (p. 87). Var. of Rhodochrosite, Min., p. 278.
Nicholsonite (p. 56). Var. of Aragonite, Min., p. 281.

B. Acid, Basic and Hydrous Carbonates, Min., pp. 293–309.

Trihydrocalcite (p. 79), $CaCO_3.3H_2O$.
Pentahydrocalcite (p. 59), $CaCO_3.5H_2O$.
Gajite (p. 32). Hydrous calcium, magnesium carbonate.
Stichtite (p. 75). A Chrom-brugnatellite, $2MgCO_3.5Mg(OH)_2.2Cr(OH)_3.4H_2O$.

VI. 2. SILICATES.

A. Anhydrous Silicates, Min., pp. 310-562.

Rivaite (p. 68), $(Ca,Na_2)Si_2O_5$.
Aglaurite (p. 1). Var. of Orthoclase, Min., p. 315.
Natronsanidine (p. 54), Barbierite (p. 10). Soda-orthoclase.
Isomicrocline (p. 42). Var. of Microcline, Min., p. 322.
Carnegieite (p. 18). Sodium-anorthite, $Na_2O.Al_2O_3.SiO_2$.
Anemousite (p. 5). A feldspar, $Na_2O.2CaO.3Al_2O_3.9SiO_2$.
Pseudojadeite (p. 62). Near Jadeite, Min., p. 369.
Pseudolåvenite (p. 62). Near Låvenite, Min., p. 375.
Pyroxmangite (p. 65). A manganese pyroxene.
Anophorite (p. 6), Bababudanite (p. 10), Imerinite (p. 41), Juddite (p. 42), Speziaite (p. 73). Var. of Amphibole, Min., p. 385.
Fasernephrite (p. 29), Nephritoid (p. 55). Var. of Nephrite, Min., p. 386.
Calciopaligorskite (p. 16). Near Paligorskite, Min., p. 398.
Ussingite (p. 81), $HNa_2Al(SiO_3)_3$.
Morganite (p. 53), Vorobyevite, Worobewite, Worobieffite (p. 83). Var. of Beryl, Min., p. 405.
Didymolite (p. 26), $2CaO.3Al_2O_3.9SiO_2$.
Belmontite (p. 12). A silicate of lead.
Losite (p. 46). Var. of Cancrinite?
Natrodavyne (p. 54). Var. of Davyne, Min., p. 428.
Molybdosodalite (p. 52). Var. of Sodalite, Min., p. 429.
Sylvialite (p. 76). The scapolite molecule containing sulphuric oxide.
Velardeñite (p. 82). Member of Melilite Group, $2CaO.Al_2O_3.SiO_2$.
Viridine (p. 83). Var. of Andalusite, Min., p. 496.
Thortveitite (p. 78), $(Sc,Y)_2Si_2O_7$.
Tawmawite (p. 76). A chromiferous epdiote.
Ferroprehnite (p. 30). Var. of Prehnite, Min., p. 530.

Custerite (p. 24), $Ca_2(OH,F)SiO_3$.
ANGARALITE (p. 5), $2(Ca,Mg)O \cdot 5(Al,Fe)_2O_3.6SiO_2$.
Cebollite (p. 18), $H_2Al_2Ca_5Si_3O_{16}$.
Bazzite (p. 12). A silicate of scandium, etc.
Grothine (p. 34). A silicate of calcium, aluminium and iron.
Manandonite (p. 47), $H_{24}Li_4Al_{14}B_4Si_6O_{53}$.

B. HYDROUS SILICATES, Min., pp. 563–711.

DEECKEITE (p. 25). A zeolite, $(H,K,Na)_2(Mg,Ca)(Al,Fe)_2(Si_2O_5)_5.9H_2O$.
Epidesmine (p. 27). Same as for Stilbite.
Epinatrolite (p. 28), Metanatrolite (p. 49). **Var. of Natrolite, Min., p. 600.**
Stellerite (p. 74), $CaAl_2Si_7O_{18}.7H_2O$.
HYDROTHOMSONITE (p. 40), $(H_2,Na_2,Ca)Al_2Si_2O_8.5H_2O$.
Achiardite (p. 1). Synonym for Dachiardite, App. II, p. 113.
ARDUINITE (p. 8). A zeolite.
HALLERITE (p. 35). A lithium paragonite.
Bauerite (p. 12). Alteration of biotite, $SiO_2.xH_2O$.
α-Chloritite (p. 2), Minguétite (p. 52), Tolypite (p. 78), Sheridanite (p. 72). In Chlorite Group, Min., pp. 643–664.
Lefkasbestos (p. 45). Var. of Serpentine, Min., p. 669.
Pseudodeweylite (p. 62). Near Deweylite, Min., p. 676.
Parasepiolite (p. 58), $H_8Mg_2Si_3O_{12}$.
Faratsihite (p. 28), $(Al,Fe)_2O_3.2SiO_2.2H_2O$. Intermediate between Kaolinite, Min., p. 685, and Chloropal, Min., p. 701.
Paramontmorillonite (p. 58), $H_2Al_2Si_4O_{12}.5H_2O$.
BATCHELORITE (p. 11), $Al_2O_3.2SiO_2.H_2O$.
Shattuckite (p. 72), $2CuSiO_3.H_2O$.
Bisbeeite (p. 14), $CuSiO_3.H_2O$.
Zamboninite (p. 87). Synonym for Müllerite, App. II, p. 72.
Gageite (p. 31), $8(Mn,Mg,Zn)O.3SiO_2.2H_2O$.
Hodgkinsonite (p. 38), $3(Sn,Mn)O.SiO_2.H_2O$.
TARTARKAITE (p. 76). Hydrous silicate of aluminium and magnesium.
Luigite (p. 47). Synonym for Aloisite, App. II, p. 3.
Searlesite (p. 71), $NaB(SiO_3)_2.H_2O$.
PÖCHITE (p. 61), $H_{16}Fe_8Mn_2Si_3O_{29}$.
PILBARITE (p. 60). Hydrous silicate of thorium, uranium and lead.

TITANO-SILICATES, TITANATES, Min., pp. 711–724.

Uhligite (p. 81). A member of Zirkelite-Keilhauite Group, $Ca(Ti,Zr)O_5.Al(Ti,Al)O_5$.
JOAQUINITE (p. 42). A titano-silicate of calcium and iron.
Molengraafite (p. 52). A titano-silicate of calcium and sodium.
Arizonite (p. 8), $Fe_2Ti_3O_9$.

VI. 3. NIOBATES, TANTALATES, Min., pp. 725–746.

Samirésite (p. 69). A niobate of uranium.
RISÖRITE (p. 68). A niobate of the yttrium metals.
Stibiocolumbite (p. 74). A synonym for Stibiotantalite, App. I, p. 64.
PLUMBONIOBITE (p. 61). A niobate of yttrium, uranium and lead.
Wiikite (p. 84). A niobate, titanate and silicate of iron and the rare earths.
Ampangabéite (p. 3). A niobate of uranium, etc.
Betafite (p. 13). A niobate and titanate of uranium, etc.

VI. 4. PHOSPHATES, ARSENATES, ETC., Min., pp. 747–870.

PSEUDOHETEROSITE (p. 62). Intermediate between tryphylite and heterosite.

Hydroxyapatite (p. 40), $Ca_4(Ca.OH)(PO_4)_3$. Vœlckerite (p. 83), $Ca_4(CaO)(PO_4)_3$. **Fermorite** (p. 29), $(Ca,Sr)_4Ca(OH,F)(P,As)O_4]_3$. **Wilkeite** (p. 85), $3Ca_3(PO_4)_2.CaCO_3.3Ca_3[(SiO_4)(SO_4)].CaO$. All members of the Apatite Group, Min., pp. 762–775.

Fremontite (p. 31), Natramblygonite (p. 54), $(Na,Li)Al(OH,F)PO_4$.

Ježekite (p. 42), $Na_4CaAl(AlO)(F,OH)_4(PO_4)_2$.

Lacroixite (p. 44), $Na_4(Ca,Mn)_4Al_3(F,OH)_4P_3O_{16}.2H_2O$.

Soumansite (p. 73). A hydrous fluo-phosphate of aluminium and sodium.

FLAJOLOTITE (p. 30), $4FeSbO_4.3H_2O$.

NAURUITE (p. 54). Colloidal form of $(3Ca_3P_2O_8)+(Ca(OH)_2.CaF_2)$.

Cobaltoadamite (p. 22). Cuproadamite (p. 23). Var. of Adamite, Min., p. 786.

Fluocollophanite (p. 30). Var. of Collophanite, Min., p. 808.

Quercyite (p. 66). A mixture of calcium phosphates.

Sicklerite (p. 72), $Fe_2O_3.6MnO.4P_2O_5.3(Li,H)_2O$.

Palaite (p. 57), $5MnO.2P_2O_5.4H_2O$.

STEWARTITE (p. 74). Hydrous manganese phosphate.

α-KERTSCHENITE (p. 2), $5RO.2Fe_2O_3.3P_2O_5.23H_2O$, β-KERTSCHENITE (p. 14), $RO.Fe_2O_3.P_2O_5.7H_2O$, OXYKERTSCHENITE (p. 57), $RO.4Fe_2O_3.3P_2O_5.21H_2O$. **Alteration** products of Vivianite, Min., p. 814.

Vilateite (p. 82). Hydrous iron manganese phosphate. Near Strengite, Min., p. 822.

Lucinite (p. 46). Same composition as Variscite, Min., p. 824.

Hewettite (p. 38), **Metahewettite** (p. 49), $CaO.3V_2O_5.9H_2O$.

Pascoite (p. 58), $2CaO.3V_2O_5.11H_2O$.

PINTADOITE (p. 60), $2CaO.V_2O_5.9H_2O$.

Hügelite (p. 39). Hydrous lead-zinc vanadate.

Salmonsite (p. 69), $Fe_2O_3.9MnO.4P_2O_5.14H_2O$.

Tsumebite (p. 80), Preslite (p. 62). Basic lead-copper phosphate.

TURANITE (p. 80), $5CuO.V_2O_5.2H_2O$.

Barthite (p. 11), $3Zn(AsO_3)_2.Cu(OH)_2.H_2O$.

VASHEGYITE (p. 82), $4Al_2O_3.3P_2O_5.30H_2O$.

PARAVIVIANITE (p. 58), $(Fe,Mn,Mg)_3P_2O_8.8H_2O$.

ROSCHÉRITE (p. 68), $(Mn,Fe,Ca)_2Al(OH)(PO_4)_2.2H_2O$.

YUKONITE (p. 86). Hydrous arsenate of iron and calcium.

EGUEÏITE (p. 27). Hydrous basic phosphate of ferric iron, calcium and aluminium. Near Borickite, Min., p. 852.

Fouchérite (p. 31). Same as fucherite, which is near Borickite, Min., p. 852.

ROSIÉRÉSITE (p. 68). Hydrous phosphate of aluminium, lead and copper.

TYUYAMUNITE (p. 81). Hydrous urano-vanadate of calcium.

Uvanite (p. 81). $2UO_3.3V_2O_5.15H_2O$.

Fernandinite (p. 29), $CaO.V_2O_4.5V_2O_5.14H_2O$.

FERGANITE (p. 29), $U_3(VO_4)_2.6H_2O$.

Hinsdalite (p. 38), $2PbO.3Fe_2O_3.2SO_3.P_2O_5.6H_2O$. In group with Svanbergite, Corkite, and Beudantite.

VI. 5. BORATES, URANATES, Min., pp. 874–893.

Neocolemanite (p. 54). Same as Colemanite, Min., p. 882.

Inyoite (p. 41), $2CaO.3B_2O_3.13H_2O$.

Meyerhofferite (p. 50), $2CaO.3B_2O_3.7H_2O$.

VI. 6. SULPHATES, CHROMATES, Min., pp. 894–981.

BASSANITE (p. 11), $CaSO_4$.

HOKUTOLITE (p. 39), Angleso-barite (p. 6). Sulphate of lead and barium.

MILLOSEVICHITE (p. 51). Ferric aluminium sulphate.

SZOMOLNOKITE (p. 76), $FeSO_4.H_2O$. Same as Ferropallidite, (p. 30). App. II, p. 42.
Hexahydrite (p. 38), $MgSO_4.6H_2O$.
VERNADSKITE (p. 82), $3CuSO_4.Cu(OH)_2.4H_2O$.
Beaverite (p. 11), $CuO.PbO.Fe_2O_3.2SO_3.4H_2O$.
RHOMBOCLASE (p. 67), $Fe_2O_3.4SO_3.9H_2O$.
Calafatite (p. 15), Galafatite (p. 32). Near Alunite.
ALMERIITE (p. 2), $Al_2(SO_4)_3.Na_2SO_4.5Al(OH)_3.H_2O$.
Minasragrite (p. 51), $V_2O_4.3SO_3.16H_2O$.

VI. 7. TUNGSTATES, MOLYBDATES, Min., pp. 982–992.

Ferritungstite (p. 30), $Fe_2O_3.WO_3.6H_2O$.
Koechlinite (p. 43), $Bi_2O_3.MoO_3$.

VIII. HYDROCARBON COMPOUNDS, Min., pp. 996–1024.

DELATYNITE (p. 25). Related to Succinite, Min., p. 1002.

APPENDIX III.

Achiardite. *R. Koechlin,* Min. Mitt., **31**, 94, 1912.
Used as synonym for *dachiardite.* See *zeolite mimetica,* App. II., p. **113.**

Achlusite. *W. F. Petterd,* [Papers, Roy. Soc. Tasmania, 191, 1910]; Min. Mag., **16**, 352, 1913.
A green alteration product of topaz resembling steatite in appearance but near soda-mica in composition.

ACMITE, Ægirite, Min., p. 364; App. I, p. 1; II, p. 1.—Relations to *enstatite, diopside, hedenbergite* and *spodumene* discussed with list of known crystal forms and combinations; Zambonini, Zs. Kr., **46**, 1, 1909. From granite pegmatite, Quincy, Mass., with crystallographic and optical description and anal.; new axial ratio given; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Zs. Kr., **49**, 332, 1911. Anal. of material from the Ilmen Mts., Russia; Baljankin, [Ber. Polytech. Inst. St. Pet., **12**, 135, 1909], Zs. Kr., **51**, 283, 1912. Anal. and optical study of two vanadium-bearing *ægirites* from Libby, Mont.; Larsen and Hunt, Am. J. Sc., **36**, 289, 1913; Zs. Kr., **53**, 209, 1913. Discussion of composition with new anal. of material from Brevik, Norway; Hillebrand, Min. Mitt., **32**, 247, 1913.

ADAMITE, Min., p. 786; App. II, p. 1.—Crystals from Island of Thasos, Turkey, with new forms, axial ratio, optical characters and anal. given; Rosicky, Bull. Ac. Sc. Bohême, **13**, 1908. Crystals from Mte. Valerio, Campiglia Marittima, Italy; Aloisi, Riv. Min., **39**, 58, 1909. Pleochroism on specimen from Chañarcillo, Chile, described; Spencer, Min. Mag., **17**, 114, 1914. Anal. of material from Reichenbach near Lahr, Baden; Dürrfeld, Zs. Kr., **51**, 279, 1912.

ÆNIGMATITE, Min., p. 403; App. I, p. 2; II, p. 1.—Crystals of *cossyrite* from the Island of Pantelleria, Italy, with derivation of axial ratio. Optical characters and anal. given. Chem. constitution and relations to other amphiboles discussed. Soellner, Zs. Kr., **46**, 518, 1909.

ÆSCHYNITE, Min., p. 742. — Anal. of material from Norway, probably Hitterö; Tschernik, Bull. Ac. St. Pet., **2**, 389, 1908; Zs. Kr., **50**, 66, 1911.

AINALITE. — See under *Cassiterite.*

Aglaurite. *R. Handman,* [Zs. Min. Geol., Stuttgart, **1**, 78, 1907], Min. Mag., **15**, 415, 1910. A variety of *orthoclase,* which see.

ÅKERMANITE, Min., p. 476; App. II, p. 1. — Relations to melilite group, see under *Melilite.*

Alaïte. *K. Nenadkewitsch,* Bull. Ac. St. Pet., **3**, 185, 1909; Zs. Kr., **51**, 91, 1912.
In soft, compact, moss-like masses. Color dark bluish red with silky luster. Rare. Comp.—$V_2O_5.H_2O$. Occ. at Tjuja-Majun, south of Andidjan in the foot hills of the Alai Mts., Turkestan.

ALAMOSITE, App. II, p. 1. — Description; Palache and Merwin, Zs. Kr., **46**, 513, 1909; see App. II. Optical study gave the following new facts: for Na-light, $\alpha = 1{\cdot}947$, $\beta = 1{\cdot}961$, $\gamma = 1{\cdot}968$. Strong dispersion of optic axes. 2V for Na-light $= 65°$. Optically −. Merwin, J. Wash. Ac. Sc., **4**, 253, 1914. Artif. formation and optical study; Kraus, Cooper, and Klein, Centralbl. Min., 289, 1912.

ALBITE, Min., pp. 327, 1025; App. I, p. 2; II, p. 2. — **Cryst.** — From Beaume, near Oulx, Piedmont, with anal.; Colomba, Riv. Min., **38**, 35, 1909; from *benitoite* locality, San Benito Co. Cal., Louderback, Bull. Uni. Cal. Geol. Dept., **5**, 331, 1909; Dreyer and Goldschmidt, N. Jb. Min., Beil.-Bd. **29**, 537, 1910, on albite crystals from Greenland see ref. in App. II to Medd. om Grönland, **34**, 1907. The new elements as printed in App. II contained misprints. The correct values are as follows: $a : b : c = 0{\cdot}6367 : 1 : 0{\cdot}5593$; $\alpha = 94°\ 15'$, $\beta = 116°\ 37'$, $\gamma = 87°\ 41'$. From glacial gravels found in the government of Moscow, Russia;

Fersman, Bull. Ac. St. Pet., **4**, 733, 1910; from lawsonite schists, Marin County, Cal.; Schaller, Zs. Kr., **48**, 550, 1910; U. S. G. S., Bull., **490**, 48, 1911; from Alpe Veglia, near Varzo, Piedmont; Lincio, Att. Acc. Torino, **45**, 728, 1910. Twin from Four-la-Brouque, Puy-de-Dôme; Gonnard, Bull. Soc. Min., **34**, 48, 1911.

Anal. — From Epprechtstein and Grossen Waldstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; from near Povienetz, Olonetz, Russia; Borisov, Trav. Soc. Nat. St. Pet., **40**, 23, 1909; Zs. Kr., **51**, 286, 1912; from a Norwegian locality, probably Langesundfjord; Tschernik, Bull. Ac. St. Pet., **3**, 903, 1909; Zs. Kr., **51**, 97, 1912; from Sajóháza, Comitat Gömör, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from Mont de la Saxe, near Courmayeur, Valle d'Aosta, Italy, with description of crystals containing 1·84% BaO; Colomba, Att. Acc. Torino, **45**, 399, 1910; from Mt. Ruwenzori, Congo Free State; Colomba, Sep. Pub., "Il Ruwenzori", **2**, 281; Zs. Kr., **50**, 511, 1911; from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913; of oligoclase-albite from Kulachtinsky Otrjad in southern Urals; Arschinov, Sep. Pub., Moscow, 1911; Zs. Kr. **53**, 603, 1914.

A new anal. of albite from the nephelite-corundum-bearing syenite from Brudenell, Renfrew Co., Canada, compared with analyses of albite from the quartz-bearing pegmatite at Amelia Court House, Va., showed closely agreeing ratios, proving that an excess of neither Al_2O_3 nor SiO_2 may exist in albite in the form of solid solution; Foote and Bradley, Am. J. Sc., **36**, 47, 1913.

Occ. — In ophite (diabase) from San-Bartholomew near Alcobaça, Portugal; Souza-Brandao, [Com. Serv. Geol. Portugal, **7**, 85, 1908; **8**, 12, 1908], Zs. Kr., **49**, 295, 296, 1911; from Zöptau, Moravia; Kretschmer, Min. Mitt., **30**, 104, 1911.

Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of plagioclase group; Rinne, Centralbl. Min., **705, 1914.** Change on heating; Merwin, J. Wash. Ac. Sc., **1**, 59, 1911.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

ALLANITE, Min., p. 522; App. I, p. 2; II, p. 2. — Crystals with anal. from the Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 420, 1911. Chem. comp.: Tschernik, Vh. Min. Ges., **45**, 285, 1907. Two anal. of material from Ytterby and Falun, Sweden; Tschernik, Vh. Min. Ges., **45**, 265, 285, 1907; Zs. Kr., **47**, 292, 293, 1909; anal. of material containing scandium from Impilaks, Finland; Meyer, Ber. Ak. Wiss., 379, 1911; anal. from Ambatofotsikely, Madagascar; Lacroix, Bull. Soc. Min., **35**, 231, 1912. Isomorphous mixtures with epidote from near Kristiania, Norway; Goldschmidt, Centralbl. Min., 4, 1911. Occ. at Hohenstein in Kremstal, Lower Austria; Reinhold, Min. Mitt., **28**, 376, 1909.

Allcharite. *B. Ježek*, Zs. Kr., **51**, 275, 1912.

Orthorhombic. Axes, $a:b:c = 0 \cdot 9284 : 1 : 0 \cdot 6080$. Observed forms: $b(010)$, $m(110)$, $n(210)$, $u(011)$, $z(101)$, $p(111)$. In small crystals with habit and appearance of stibnite. $110 \wedge 1\bar{1}0 = 95° \, 45'$, $210 \wedge 010 = 65° \, 6'$, $011 \wedge 0\bar{1}1 = 62° \, 36'$, $101 \wedge \bar{1}01 = 66° \, 27'$, $111 \wedge 1\bar{1}1 = 53° \, 55'$.

Comp. — Not determined.

Obs. — Only three small crystals were observed associated with *realgar* and *vrbaite*. From Allchar, Macedonia.

ALLOPHANE, Min., p. 693. — **Anal.** of material from Abbey Wood, Plumstead; Chandler, Geol. Mag., **6**, 222, 1909; from Mte. Civillina, Venetia; Billows, Riv. Min., **41**, 1912. Chem. constitution; Thugutt, Centralbl. Min., 97, 276, 1911; 35, 1912; Stremme, *ibid.*, 205, 1912.

Effects of acetic acid upon *allophane* and *kaolin* compared; van der Leeden, Centralbl. Min., 289, 1910. Iron-bearing *allophanes* from near Moscow, Russia; Nikolavskij, Bull. Ac. Sc. St. Pet., **8**, 147, 1914.

Almeriite. *S. Calderón*, [Los Minerales de España, **2**, 206, 1910], Min. Mag., **16**, 353, 1913.

Compact. White. Resembles *halloysite* in appearance. A hydrous basic sulphate of aluminium and sodium, $Al_2(SO_4)_3.Na_2SO_4.5Al(OH)_3.H_2O$. From Almeria, Spain.

α-Chloritite. *J. Samojlov*, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909. A scaly variety of *chlorite*. G. = 2·63. Comp. = $7H_2O.4Al_2O_3.5SiO_2$. Anal. = H_2O, 14·01; SiO_2, 35·12; Al_2O_3, 48·16; CaO, 0·61; MgO, *tr.*; Na_2O, 1·98; Total, 99·88. Occ. at Nagolnij Krjasch, Province of Don Cossacks, Russia.

α-Kertschenite. See under *Vivianite.*

ALSTONITE. See under *Bromlite.*

ALUNITE, Min., p. 974; App. I, p. 2.; II, p. 3.

Chem. comp. and relations of the minerals of the *Alunite-Beudantite Group* discussed with suggestion of the following series of formulas; Schaller, J. Wash. Ac. Sc., **1**, 112, 1911; Am. J. Sc., **32**, 359, 1911; Zs. Kr., **50**, 106, 1911; U. S. G. S., Bull., **509**, 70, 1912.

Sulphates. — Type formula,	$[R'''(OH)_2]_6.R'_2$ or $R''.[SO_4]_2.[SO_4]_2$.
Alunite,	$[Al(OH)_2]_6.K_2.[SO_4]_2.[SO_4]_2$.
Natroalunite,	$[Al(OH)_2]_6.Na_2.[SO_4]_2.[SO_4]_2$.
Jarosite,	$[Fe(OH)_2]_6.K_2.[SO_4]_2.[SO_4]_2$.
Natrojarosite,	$[Fe(OH)_2]_6.Na_2.[SO_4]_2.[SO_4]_2$.
Plumbojarosite,	$[Fe(OH)_2]_6.Pb.[SO_4]_2.[SO_4]_2$.
Carphosiderite,	$[Fe(OH)_2]_6.H_2.[SO_4]_2.[SO_4]_2$.
Phosphates. — Type formula,	$[R'''(OH)_2]_6.R''.[R'PO_4]_2.[R''(PO_4)_2]$.
Hamlinite,	$[Al(OH)_2]_6.Sr.[HPO_4]_2.[Sr(PO_4)_2]$.
Plumbogummite,	$[Al(OH)_2]_6.Pb.[HPO_4]_2.[Pb(PO_4)_2]$.
Gorceixite,	$[Al(OH)_2]_6.Ba.[HPO_4]_2.[Ba(PO_4)_2]$.
Florencite,	$[Al(OH)_2]_6.Ce_{\frac{1}{3}}.[Ce_{\frac{2}{3}}PO_4]_2.[Ce_{\frac{1}{3}}(PO_4)_2]$.
Sulphate-Phosphates. — Type formula,	$[R'''(OH)_2]_6.R''.[SO_4]_2.[R''(PO_4)_2]$.
Beudantite,	$[Fe(OH)_2]_6.Pb.[SO_4]_2.[Pb(AsO_4)_2]$.
Corkite,	$[Fe(OH)_2]_6.Pb.[SO_4]_2.[Pb(PO_4)_2]$.
Svanbergite,	$[Al(OH)_2]_6.Sr.[SO_4]_2.[Sr(PO_4)_2]$.
Hinsdalite,	$[Al(OH)_2]_6.Pb.[SO_4]_2.[Pb(PO_4)_2]$.
Harttite,	$[Al(OH)_2]_6.Sr.[SO_4]_2.[SO_4]_2$. $2[Al(OH)_2]_6.Sr.[HPO_4]_2.[Sr(PO_4)_2]$.

Anal. of mineral from Torniella, Grosseto, Tuscany; Panichi, Rend. Acc. Linc., **19**, (2), 656, 1910; from Eritrea; Manasse [Sep. Pub. "Contributions to the Petrographical Study of the Colony of Eritrea,"], Zs. Kr., **50**, 510, 1911; from Kinkwaseki, Formosa; Okamoto, Beitr. Min. Japan, No. **4**, 185, 1912.

Occ. with anal. from near Marysvale, Utah; Butler and Gale, U. S. G. S., Bull., **511**, 1912; from Goldfield district, Nev.; Ransome, U. S. G. S., Prof. Paper, **66**, 1909.

Material near *alunite* in composition but described as new and named *calafatite* or *galafatite*, occurs near Benahabux, Almeria, Spain. It is said to contain a little more water than *alunite*. Comp. — $Al_2(SO_4)_3.K_2SO_4.5Al(OH)_3.H_2O$. In white, compact masses. S. Calderón, Los Minerales de España, **2**, 205, 1910; Preus, Eng. Min. J., **91**, 261, 1911.

ALUNOGEN, Min., p. 958; App. II, p. 3. — Chem. composition discussed; formula given as $Al_2(SO_4)_3.16H_2O$; association with *halotrichite*; Uhlig, Centralbl. Min., 723, 766, 1912. Anal. of *alunogen* and related minerals from Vigneria, Elba; Manasse, Mem. Soc. Tosc., **27** 1911. From Vesuvius; Zambonini, [Rend. Acc. Napoli, 156, 1908], Zs. Kr., **49**, 106, 1910.

ALURGITE. — See under *Mariposite*.

Ampangabéite. *A. Lacroix*, Bull. Soc. Min., **35**, 180, 1912; C. R., **154**, 1040, 1912.

Orthorhombic? In rectangular prisms in nearly parallel groups. Faces curved. Fracture conchoidal and uneven. Color, brownish red. Luster greasy. H. = 4. G. = 3·97 – 4·29.

Comp. — A niobate of uranium, etc.

Anal. — Nb_2O_5, 34·80; Ta_2O_5, 8·90; TiO_2, 4·90; UO_3, 19·40; ThO_2, 2·50; $(Y,Er)_2O_3$, 4·00; $(Ce,La,Di)_2O_3$, 0·60; Fe_2O_3, 8·60; Al_2O_3, 2·10; CaO, 1·50; Ign., 12·40; Total, 99·70.

Pyr. — Fuses to a black slag. Easily sol. in hydrochloric acid, giving a dark golden-yellow solution. Reacts with fluxes for uranium. Distinctly radioactive.

Obs. — Found in parallel growth with columbite in pegmatite at Ampangabé, Madagascar. Occ. at Ambatofotsikely, Madagascar, with anal.; Duparc, Sabot, and Wunder, Bull. Soc. Min., **36**, 5, 1913.

AMPHIBOLE, Min., pp. 385, 1026; App. I, p. 3; II, p. 3. — **Opt.** — Detailed optical study of the following occurrences of different members of the *Amphibole Group* with new anal. as indicated; *grünerite* from La Mallière, near Collobrières, Var, France (anal.); *tremolite* from Campo Longo, Tessin, Switzerland, (anal.); from Albrechtsberg, lower Austria; from Gouverneur, Pierrepont, and Edenville, N. Y.; *actinolite* from Pierrepont, N. Y.; from Greiner, Zillertal, Tyrol, (anal.); *richterite* from Långban, Sweden, (anal.); *hornblende* from Snarum, Norway; from Russell, (anal.) and Edenville, N. Y., from Grenville, Ontario, from Pargas, Finland, from Vesuvius, from Lukow, Poland, (anal.), from Island of Jan Mayen; *pargasite* from Pargas, (anal.); *gastaldite* from Val Ivres, (anal.); *karinthin* from the Sau Alp, Carinthia; *barkevikite* from Frederiksvärn, Norway. The following general conclusions were made: The high refractive indices and birefringence of *grünerite* are due to its content of ferrous oxide; in the *tremolite-actinolite* series the refractive indices, extinction angles and specific gravities increase with increase in amount of FeO with a corresponding decrease in birefringence; in the *tremolite-pargasite* series the extinction angles, axial angles and specific gravities increase with increase of the *pargasite* molecule while the birefringence decreases; in the *glaucophane* series the extinction angles and axial angles decrease with increase of Al_2O_3;

in the *pargasite-common hornblende* series the refractive indices increase with the rise of iron content while the birefringence and optical angles decrease; the *basaltic hornblendes* are distinguished by their strong birefringence, dispersion and small extinction angles. Kreutz, Ber. Ak. Wien, **117**, (1), 875, 1908.

Study of the refractive indices, etc., of the amphiboles analyzed by Penfield and Stanley (see App. II) in relation to their variation in composition and comparison with recent work of others. Conclusion reached that for normal and typical amphiboles the chemical composition varies directly with the mean refractive index. Silica, lime and magnesia show quite definitely a linear variation; alumina varies more widely and does not seem to have much influence upon the refractive index; total iron shows a quite definite relationship. The variation in extinction angles with change in composition also studied. Ford, Am. J. Sc., **37**, 179, 1914; Zs. Kr., **54**, 1, 1914.

Optical description and anal. of *hornblende* from andesite, Wadi Abu Mâammel, Egypt; Couyat, C. R., **147**, 988, 1908; of *hastingsite* from Dungannon, Hastings Co., Ontario; Graham, Am. J. Sc., **28**, 540, 1909; chemical and optical study of the *hornblendes* of the diorite-gabbro of the upper Valtellina, Italy; Küchler, Chem. Erde, **1**, 58, 1914; optical description of amphiboles from three islands of the Dutch East Indies which are intermediate between *glaucophane* and *crossite* and which have the plane of the optical axes perpendicular to the crystallographic symmetry plane. Brouwer, Centralbl. Min., 675, 1914.

Anal. — Of *tremolite* from Mte. Perone, Elba; Aloisi, Proc. Soc. Tosc., Nov., 1912; from Valle Pellice, Province of Turin; Roccati, Riv. Min., **42**, 65, 1914; of *tremolite* from Kenneth Square, Chester Co., and altered from Oakford, Bucks Co., *actinolite* from Mineral Hill, Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914; *hornblende* from the volcanic region of the Central Plateau, France; Gonnard and Barbier, Bull. Soc. Min., **34**, 228, 1911; from lavas of Mt. Etna, Sicily, with description of crystals; di Franco [Att. Acc. Sc. Catania, **4**, No. 3, 1911], Zs. Kr., **54**, 204, 1914; from Hongkeirai and Sanjūkyō, Formosa; Okamoto, Beitr. Min. Japan, No. 4, 157, 1912; from a pegmatite vein in the granite at Stockholm, Sweden; Geijer, G. För. Förh., **35**, 123, 1913; from inclusions in the basalt tuffs of southern Styria; Schadler, Min. Mitt., **32**, 485, 1914; of *hornblende*, near *hastingsite* in composition from the umptekite rock found near Alunge, Sweden; Quensel, Bull. Geol. Inst. Upsala, **12**, 145, 1914; of *winchite*, with description; Fermor [Trans. Geol. Sur. India, **37**, 1909]; Zs. Kr., **50**, 269, 1911; of a "*nephritoid*" with description and occurrence from Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; of *cummingtonite* from Homestake mine, Lead, South Dakota; Sharwood, Econ. Geol., **6**, 729, 1911; of *amphibole* from hornblende gneiss at Markirch, Alsace; Rhein, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 132], Zs. Kr., **47**, 308, 1909; occurring with benitoite, San Benito Co., Cal.; Louderback, Bull. Uni. Cal. Geol. Dept., **5**, 331, 1909; from basalts occurring at various places in the Rhön district, Germany, with discussion of chemical constitution; Galkin, N. Jb. Min., Beil.-Bd., **29**, 681, 1910; from nepheline syenite from Ditró, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from Mte. Plebi near Terranova, Sardinia; Lovisato, Rend. Acc. Linc., **21**, (1), 109, 1912; from andesite found on Commander Island, Behring Sea; Starzyński, Bull. Ac. Sc. Cracovie, 657, July, 1912; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912; from Aïn-el-Ouarka, Algeria, with anal.; Azéma, Bull. Soc. Min., **37**, 124, 1914.

Hornblende in dike rocks from Espichel, Portugal; Souza-Brandão, [Ann. Polytech. Ak. Porto, **2**, 1, 1907], Zs. Kr., **49**, 292, 1911. Experiments to determine the rôle of water in *tremolite* and *kupfferite*; Allen and Clement, Zs. Anorg. Chem., **68**, 317, 1910; see App. II, p. 4. Pneumatolytic *hornblende* from Mont Dore, Puy-de-Dôme, France; Guild, Zs. Kr., **48**, 449, 1910. Pleochroic halos in *hornblende* and their connection with α-rays from radioactive elements; Hovermann, N. Jb. Min., Beil.-Bd., **34**, 321, 1912. Discussion of various forms of $MgSiO_3$ obtained in silicate melts; Doelter, Ber. Ak. Wien, **122**, (1), 1, 1913.

Nephrite. — Anal. of material from various localities in New Zealand; Finlayson, Quart. J. Geol. Soc. London, **65**, 351, 1909; from near Harzburg, Radautal, Harz Mts.; Uhlig, N. Jb. Min., **2**, 80, 1910; from Syenite Ridge, Easton, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914; geological occurrence at Salux and near Mühlen, Val da Faller, Grisons, Switzerland, and in the Frankenwald, Bavaria, with new analyses; Welter, N. Jb. Min., **2**, 86, 163, 1911. Occ. at Reichenstein, Silesia; Beutell and Heinze, Centralbl. Min., 553, 1914.

Nephrite from the Radautal, Harz Mts., showing in part fibrous structure has been called *nephritoid;* Fromme, Min. Mitt., **28**, 306, 1909 and *fasernephrite*; Uhlig, N. Jb. Min., **2**, 91, 1910.

Anophorite. — *W. Freudenberg*, [Mitt. Bad. Geol. Landesanst., **6**, 45, 1908], Min. Mag., **15**, 416, 1910. An alkali-hornblende from the shonkinite of the Katzenbuckel, Baden, near *cataphorite*, but containing more magnesia and less ferrous oxide and with different optical orientation.

Bababudanite. — *W. F. Smeeth*, [Rec. Mysore Geol. Dept., **9**, 85, 1907–8], Min. Mag., **16**, 354, 1913. A soda amphibole, allied to *riebeckite* from Bababudan Hills, Kadur District, Mysore, India.

Imerinite. — *A. Lacroix*, Min. de la France, **4**, 787, 1910. A var. of soda-amphibole allied to *soda-richterite* from the province Imerina, Madagascar.

Juddite. — *L. L. Fermor*, Rec. Geol. Sur. India, **37**, 199, 1908; Mem. Geol. Sur. India, **37**, 1909. A manganese amphibole found at Kácharwáhi, India, associated with *blanfordite*.

Speziaite. — *L. Colomba*, Att. Acc. Torino, **49**, 625, 1914. A variety of amphibole found at Traversella, Italy. Occurs in fibrous form or slender prismatic crystals in pyroxenite. Color, an intense dark green. Pleochroism: $\mathfrak{a}$ = emerald-green to yellowish green; $\mathfrak{b}$ = yellowish brown; $\mathfrak{c}$ = azure-blue. Absorption $\mathfrak{b} > \mathfrak{c} > \mathfrak{a}$. Extinction angle on (010), $\mathfrak{c} \wedge c = +23° - +24°$. G. = 3·362. Anal. — SiO_2, 36·21; Al_2O_3, 0·79; Fe_2O_3, 34·57; CaO, 10·53; MgO, 7·87; FeO, 3·56; MnO, 0·67; Na_2O, 4·08; K_2O, 0·93; H_2O, 0·50; Total, 99·71. Named after the late Prof. G. Spezia.

ANALCITE, Min., p. 595; App. I, p. 3; II, p. 5. — **Anal.**— From Maze, Echigo, Japan; Jimbō, Beitr. Min. Japan, No. 3, 115, 1907; from Brödtorp; Borgström, G. För. Förh., **30** 331, 1908; from the Seiseralpe, Tyrol, with discussion of chem. constitution; Baschieri, Mem. Soc. Tosc., **24**, 133, 1908; from Hamasat, Massaua, Eritrea; Manasse [Sep. Pub. "Contributions to the Petrographical Study of the Colony of Eritrea], Zs. Kr., **50**, 510, 1911; from Val dei Zuccanti, Venetia; Billows, Riv. Min., **41**, 1912. New anal. of material from Two Islands, Nova Scotia: Cyclopean Islands; Kerguelen Island; Victoria, Australia; Michigan; Montreal, Canada; with study of previous analyses show that there is always a varying excess of silica and water above the amounts required for the formula, $Na_2Al_2(SiO_3)_4.2H_2O$. It was found that the extra silica and water were always in such proportions as to make the acid $H_2Si_2O_5$. The variation in composition of the mineral is therefore explained as being due to solid solution in which varying amounts of a molecule containing this acid are present. Foote and Bradley, Am. J. Sc., **33**, 439, 1912. Anal. from Princeton, N. J.; Hawkins, Am. J. Sc., **35**, 446, 1913.

Origin in volcanic rocks; Thugutt, C. R. Soc. Sc. Varsovie, **5**, 103, 107, 1912.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

ANAPAÏTE, App. II, p. 5. — Description of crystals with different orientation than that given in App. II. New anal.; Popov, Trav. Mus. Geol. Ac. Sc. St. Pet., **4**, 99, 1910; Zs, Kr., **52**, 606, 1913.

ANDALUSITE, Min., p. 496; App. I, p. 4; II, p. 6. — In the crystalline schists from Laacher See, Prussia; Brauns, N. Jb. Min., **2**, 1, 1911; from Muso, Lake Como; Repossi, Rend. Acc. Linc., **19**, (1), 291, 1910.

Absorption of light; Lewitskaja, Nachr. Ges. Wiss., Göttingen, 504, 1912.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

A green var. containing some iron and manganese from a quartzite near Darmstadt, Germany, has been called *viridine*; Klemm, Notizbl. Ver. Erdkunde, Darmstadt, 4, 1911.

ANDESINE, Min., p. 333; App. I, p. 4; II, p. 6. — Crystals and anal. from Mte. Palmas Sardinia; Millosevich, Rend. Acc. Linc., **18**, (1), 22, 1909; Riv. Min., **37**, 123, 1909. Anal. of material from Dungannon Township, Ontario, Canada; Adams and Barlow, Trans. Roy. Soc. Canada, **2**, Sect. IV, 3, 1908; anal. from gabbro from Spitzberg, near Deschnei, northern Adler Mts., Bohemia; Petrascheck, [Jb. G. Reichs., 427, 1909]; Zs. Kr., **50**, 629, 1912.

Anemousite. *H. S. Washington* and *F. E. Wright*, Am. J. Sc., **29**, 52, 1910.

A feldspar. Found as loose crystals assoc. with *kaersutite* on the volcano of Mte. Rosso, Island of Linosa. Angle, (001) : (010) = 85° 59′. G. = 2·684. Refractive indices, Na-light; $\alpha = 1·5549$, $\beta = 1·5587$, $\gamma = 1·5634$. 2V = 82° 48′ (calc.).

Anal. — By Washington, after deducting for small amounts of magnetite, magnesia, and water.

SiO_2	Al_2O_3	CaO	Na_2O	K_2O	Total
53·26	29·78	10·76	5·45	0·75	100·00

This anal. yields the formula, $Na_2O.2CaO.3Al_2O_3.9SiO_2$, which does not agree with any possible member of the albite-anorthite series. This is explained by assuming the presence, in small amount, besides the albite and anorthite molecules, of a third, called the sodium-anorthite molecule, $Na_2O.Al_2O_3.SiO_2$, to which the name *carnegieite* has been given.

Names. — *Anemousite*, from the ancient Greek name for the Island of Linosa; *Carnegieite* in honor of Andrew Carnegie.

Angaralite. *A. Meister*, [Geol. Untersuch. in goldführenden Gebieten Sibiriens, Yenisei-Dist., IX, **34**, 668, 1910; résumé in French], Zs. Kr., **53**, 596, 1914.

Hexagonal? Crystals thin tabular. G. = 2·619. Color black from carbonaceous impurities. After heating becomes dark bronze. Uniaxial, +. Birefringence lower than that of quartz.

Comp. — $2(Ca,Mg)O·5(Al,Fe)_2O_3.6SiO_2$.

Anal. — SiO_2, 37·96; Al_2O_3, 44·68; Fe_2O_3, 9·52; MgO, 6·89; CaO, 0·46; Total, 99·51.
Obs. — In limestone in contact with nepheline syenite in the southern part of the Yenisei District, Siberia.
Name. — From the Angara River.

Angelardite. Given as the correct form for *anglarite*, a variety name of *vivianite*; A. Lacroix, Min. de la France, **4**, 524, 1910.

ANGLESITE, Min., p. 907; App. I, p. 4; II, p. 6. — **Cryst.** — From various localities in Siegerland, Germany, with new forms. Also optical study of mineral with determination of indices of refraction for various wave lengths of light and at various temperatures. Kruse, N. Jb. Min., Beil.-Bd., **27**, 541, 1909; from Cerro Gordo, Mexico, with new form; Krizsó, [Földt., Közl., **39**, 388, 497, 1909], Zs. Kr., **50**, 633, 1912; from same locality; Guild, Zs. Kr., **49**, 321, 1911; from Adamuša, near Stari Majdan, Bosnia; Kišpatić, Min. Mitt., **28**, 297, 1909; from Mt. Albion, Walsh District and Tinaroo, Queensland, and from Proprietary mine, Broken Hill, N. S. W.; Anderson, Rec. Austral. Mus., **7**, 274, 1909; from Mte. Scorra, Masua and S. Giovanni d'Iglesias, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 149, 1911; from Rosseto, Elba; Aloisi, Proc. Soc. Tosc., **21**, 43, 1912; from the Gabriel mine, in Einbachtal, Schwartzwald, with new form; Dürrfeld, Zs. Kr., **50**, 582, 1912; from Nebida and Mte. Poni (with new form), Sardinia; Tacconi, Rend. Ist. Lombardo, **44**, 986, 1911.
Thermal study, optical changes with rise of temperature and description of a dimorphous modification; Grahmann, Inaug. Diss., Leipzig, 1912; Zs. Anorg. Chem., **81**, 257, 1913. Geometrical and optical changes of anglesite and other members of *barite group* with rise of temperature; Kolb, Zs. Kr., **49**, 14, 1910.
Artif. formation; Piolti, Att. Acc. Torino, **45**, 227, 1910; **46**, 783, 1911; Gaubert, Bull. Soc. Min., **32**, 139, 1909; artif. formation and isomorphous mixtures with *celestite* and *barite*; Gaubert, C. R., **145**, 877, 1907.

Angleso-barite. See under *Hokutolite*.

ANHYDRITE, Min., p. 910; App. I, p. 4; II, p. 6. — Etching figures and solution forms; Burkhardt, Inaug. Diss., Leipzig, 1911; Zs. Kr., **50**, 209, 1911.
Thermal study; optical changes, etc., produced by heating and description of a dimorphous modification; Grahmann, Inaug. Diss., Leipzig, 1912; Zs. Anorg. Chem., **81**, 257, 1913. Geometrical and optical changes of *anhydrite* and other members of *barite group* with rise in temperature; Kolb, Zs. Kr., **49**, 14, 1910.
Occ. in the salt beds of central Kansas; Rogers, Am. J. Sc., **29**, 258, 1910; in limestones of northern Tyrol; Haas, N. Jb. Min., **1**, 1, 1912.
Artif. formation; Gaubert, Bull. Soc. Min., **32**, 139, 1909.

ANKERITE, Min., p. 274; App. II, p. 7. — Anal. of material from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Knolle mine; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1910; of varying composition from Traversella, Italy, with discussion of composition; Delgrosso, Att. Acc. Torino, **49**, 1106, 1914.
See also under *Calcite*.

Anophorite. Variety of *amphibole*, which see.

ANORTHITE, Min., pp. 337, 391, 1027; App. I, p. 5; II, p. 7. — Cryst. and optical description with anal. of phenocrysts from lava of Tarumai volcano, Japan; Kôzu, J. Geol., **19**, 633, 1911; crystals from Mitaki near Sendai, Rikuzen, Japan; Nakashima, Beitr. Min. Japan, No. 4, 202, 1912.
Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of *plagioclase group;* Rinne, Centralbl. Min., 705, 1914.
Artif. formation; Ginsberg, [Ann. Inst. Polytech. St. Pet., **16**, 1, 1911], Zs. Kr., **53**, 617, 1914; Zs. Anorg. Chem., **73**, 277, 1912. Experiments with melts containing various mixtures of anorthite and wollastonite; Lebedew, Ann. Inst. Polytech. St. Pet., **15**, 691, 1911.

ANORTHOCLASE, Min., p. 324; App. I, p. 5; II, p. 7. — Anal. of mineral and its alteration products from augite-andesite found at Tschakwa near Batum on Black Sea; Glinka, Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906; Zs. Kr., **46**, 283, 1909. Occ. in cordierite gneiss of the southern section of the Oberpfalzer Wald, Bavaria; Sokol, Centralbl. Min., 560, 1914.

ANTHOPHYLLITE, Min., p. 384; App. I, p. 5; II, p. 7. — Occ. with anal. from Podoli, near Bobrau, Moravia; Schirmeisen, Min. Mitt., **32**, 512, 1914; from S. Piero in Campo, Elba; D'Achiardi, Proc. Soc. Tosc., **21**, 48, 1912.

ANTLERITE, Min., p. 928. — Identity of *stelznerite* with *antlerite*; the so-called artificial *brochantite*, Sys., p. 926, corresponds to *antlerite*; Schaller, Am. J. Sc., **30**, 311, 1910; Zs. Kr., **49**, 9, 1910.

APATELITE, Min., p. 969. — See under *Carphosiderite*.

APATITE, Min., pp. 762, 1027; App. I, p. 5; II, p. 7. — **Cryst.** — Violet crystals from Elba so developed that they appear to have monoclinic symmetry; Görgey, Centralbl. Min., 337, 1909. Crystals from the Waldstein granite, Fichtelgebirge, Bavaria; Dürrfeld, Zs, Kr., **46**, 563, 1909; **47**, 242, 1909; from Tonkerhoek, German S. W. Africa; Thiene, N. Jb. Min., **1**, 97, 1909; from *benitoite* locality, San Benito Co., Cal.; Fedorov, [Ann. Inst. Mines, St. Pet., **2**, 253, 1910], Zs. Kr., **52**, 626, 1913; from Sasso di Chiesa, Val Malenco, Lombardy, Italy; Magistretti, Rend. Acc. Linc., **19**, (1), 758, 1910; from Göschenen Alp, Uri, Switzerland, with study of artificial etching figures; Dürrfeld, Zs. Kr., **50**, 590, 1912; with optical determinations from Katzenbuckel, Baden; Seebach, Vh. Nat.-Med. Ver. Heidelberg, **11**, 452, 1912; from Maddalena archipelago, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 273, 1912; from boulder of gabbro found in Waimea Canyon, Hawaii; Schaller, U. S. G. S., Bull., **509**, 85, 1912; from Val Giuf, Isvizzera; Raufaldi, Mem. Acc. Linc., **9**, 438, 1913; from Epprechtstein, Fichtelgebirge, Bavaria; Laubmann and Steinmetz, Zs. Kr., **54**, 168, 1914.

Determination of crystallographic constants of series of artificial apatite compounds; de Schulten, C. R., **152**, 1404, 1911.

Refractive indices of material from Knappenwand, Sulzbachtal, Tyrol; Weber, Centralbl. Min., 594, 1909. Optical studies of the phosphorites occurring in Russia show that they fall into five different classes with different phosphate mineral materials acting as cement; Tschirwinsky, N. Jb. Min., **2**, 51, 1911.

Anal. — From Renfrew County, Ontario; Jaunasch, Ber. Chem. Ges., **43**, 3135, 1910; from Germantown, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914; of phosphorite from Quercy, France; Lacroix, C. R., **150**, 1213, 1910; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912; of phosphates from Palestine; Danelli, Rend. Ist. Lombardo, **45**, 617, 1912; various phosphorites from Gouv. Kostroma and Simbirsk, Russia; Samojlov, *ref.* Zs. Kr., **52**, 616, 1913; from Carrock Fell, Cumberland, England; Finlayson, Geol. Mag., **7**, 19, 1910.

Chemical nature of phosphorite from Podolia, Russia; Tschirwinsky, Mem. Soc. Nat. Kief, **20**, 743, 1907; Zs. Kr., **50**, 63, 1911. Comp. of Russian phosphorites; Samojlov, *ref.* Zs. Kr., **53**, 618, 1914.

Determination by grinding methods of the hardness of apatite in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911. Deformation under pressure; Adams, J. Geol., **18**, 489, 1910.

Artif. formation; Nacken, Centralbl. Min., 545, 1912; Cameron and McCaughey, [J. Phys. Chem., **15**, 463, 1911], Zs. Kr., **54**, 79, 1914.

Manganapatite from various localities in India; Fermor, Mem. Geol. Sur. India, **37**, 1909. Dark blue manganiferous apatite from pegmatites of Vakinankaratra, Madagascar; Lacroix, Bull. Soc. Min., **35**, 76, 1912.

Shown that $Ca_4(CaO)(PO_4)_3$ may be isomorphous with usual molecules and name *vœlckerite* proposed for this compound. General discussion of relations of group given; Rogers, Am. J. Sc., **33**, 475, 1912; Zs. Kr., **52**, 209, 1913. Anal. of apatites from Zillertal, Tyrol and Santa Clara County, Cal., given which are thought to contain this molecule; *idem.* Min. Mag., **17**, 155, 1914.

The possible apatite molecule, $Ca_4(Ca.OH)(PO_4)_3$, called *hydroxyapatite*; Schaller, U. S. G. S. Bull., **509**, 100, 1912.

The variety *frankolite* has the following formula assigned to it by Schaller: $9CaO. 3P_2O_5.CaF_2.CO_2.H_2O$; J. Wash. Ac. Sc., **1**, 151, 1911; Bull. U. S. G. S., **509**, 89, 98, 1912.

APRITE.—See under *Aragonite*.

APHTHITALITE, Min., p. 897; App. I, p. 5; II, p. 8. — Occ., assoc., and genesis, etc. of *glaserite* as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

APOPHYLLITE, Min., p. 566; App. I, p. 5; II, p. 8. — **Cryst.** — With anal. from lower Tersja river, a branch of the Tomj; Pilipenko, [Ann. Geol. Min. Russ., **10**, 200, 1908], Zs. Kr., **50**, 71, 1911; from Erie R. R. cut, Bergen Hill, N. J., with new form; Whitlock, School of Mines Quart., **31**, 225, 1910; unusual crystals from Teigarhorn, Iceland, with calculation of new axial ratio; Böggild, Zs. Kr., **49**, 239, 1911; from Kaiserstuhl, Oberschaffhausen, Baden; Jahn, Zs. Kr., **50**, 133, 1911; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 469, 1911. Pseudomorph of opal; Scheit, Min. Mitt., **29**, 263, 1910.

Anal. — From Maze, Echigo, Japan; Jimbō, Beitr. Min. Japan, **3**, 115, 1907; from the Seiseralpe, Tyrol, with discussion of chem. constitution; Baschieri, Mem. Soc. Tosc., **24**, 133, 1908; from Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; from Guanajuato, Mexico; Thugutt, Centralbl. Min., 677, 1909; from near Reading, Pa.; Smith, [Proc. Ac. Nat. Sc., **62**, 538, 1910], Zs. Kr., **52**, 79, 1912; from various localities, in Pa.; Eyerman [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from volcanic bomb from Vesuvius; Thugutt, Centralbl. Min., 761, 1911.

ARAGONITE, Min., pp. 281, 1027; App. I, p. 5; II, p. 8. — **Cryst.** — From Rohitsch, Styria, with determination of new axial ratio; Hlawatsch, Zs. Kr., **47**, 22, 1909; Min. Mitt., **28**, 293, 1909; from druses in basalt from Korlát, Comitat Nógrád, Hungary, with new forms; Liffa, Zs. Kr., **47**, 249, 1909; from Pelew Islands of the Caroline group, with derivation of axial ratio; Dürrfeld, Zs. Kr., **47**, 373, 1909; from Sicily; di Franco, [Att. Acc. Sc. Catania, **1**, No. 4, 1, 1908], Zs. Kr., **49**, 110, 1910; from Somoskö, Hungary; Jugovics, Ann. Mus. Nat. Hung., **10**, 301, 311, 1912; from Karlsbad, Bohemia; Slavík, Bull. Ac. Sc. Bohême, **17**, May, 1912; from the bituminous limestones of the Siebenbürgen district, Hungary; Balogh, Mitt. Min.-Geol. Sammlung Siebenbürgischen Nat. Mus., **1**, 51, 1912.

Anal. from Molina de Aragon, Spain; Llord y Gamboa [Boll. Soc. Esp. Hist. Nat., **9**, 110, 1909], Zs. Kr., **50**, 473, 1911. Chem. constitution of *calcite* and *aragonite*; Vaubel, J. prakt. Chem., **86**, 366, 1912.

Color reactions upon *aragonite* and *calcite*; Thugutt, Centralbl. Min., 786, 1910.

Constants of elasticity; Voigt, Nachr. Ges. Wiss., Göttingen, 145, 1907.

Recent formation in spring at Rohitsch-Sauerbrunn, Styria; Dreger, Min. Mitt., **28**, 284, 1909.

Origin of the twelve dimples on the *aragonite* balls from Taira, Shinano, Japan; Fukuchi, Beitr. Min. Japan, No. 4, 133, 1912.

Experiments with artificial formation in solutions at varying temperatures and with varying amounts of other salts in solution; Leitmeier, N. Jb. Min., **1**, 49, 1910.

Aphrite or "*schaumspath*" is said to be a pseudomorph of *aragonite* after *gypsum* in which the face (100) of the *aragonite* is parallel to (010) of the *gypsum* and the vertical axes of the two are parallel. Wetzel, N. Jb. Min., **2**, 63, 1910.

A variety containing up to 10% of zinc from Leadville, Col., has been called *nicholsonite*, after Mr. S. D. Nicholson of the Western Mining Co.; G. M. Butler, Econ. Geol., **8**, 8, 1913; also similar material reported from the Tintic District, Utah; Loughlin, *ibid.*, **9**, **6**, 1914.

Arduinite. *E. Billows.* (In a separate pamphlet, stated to be an extract from Riv. Min., **41**, 1912, but the paper does not appear in that vol.) In radiating fibrous aggregates. G. = 2·26. Color various shades of red. Extinction parallel to length of fibers. Optically −.

Comp. — A zeolite.

Anal. — ½ SiO_2, 49·40; Al_2O_3, 14·57; Fe_2O_3,Mn_2O_3, 2·43; CaO, 6·57; Na_2O, 11·77; K_2O, 1·54; H_2O, 13·85; Total, 100·13.

Pyr. — A splinter infus. in candle flame. Partially decomposed by hydrochloric acid; does not gelatinize. Yields water in C. T.

Obs. — In cavities in an altered augite porphyry from Val dei Zuccanti, Venetia, Italy, assoc. with *calcite*, *analcite*, and *heulandite*. Variously described by previous writers as *natrolite* and *stilbite*.

Name. — In honor of the geologist, Giovanni Arduino (1714–1795).

Arizonite. *Chase Palmer*, Am. J. Sc., **28**, 353, 1909.

Monoclinic? $a : b : c = 1·88 : 1 : 2·3$; $\beta = 55°$. Forms: (001), (100), ($\bar{1}01$), (110), ($\bar{1}12$). Crystal faces rough.

Fracture somewhat conchoidal. Brittle. H. = 5·5. G. = 4·25. Color on fresh surface dark steel-gray with metallic to sub-metallic luster. In thin section transparent with deep red color. Streak brown. Refractive index > 1·84. Weak pleochroism in deep red colors; absorption $\mathfrak{c} > \mathfrak{a}$.

Comp. — Metatitanate of ferric iron, $Fe_2O_3.3TiO_2$ or $Fe_2Ti_3O_9$.

Anal. —

Insol.	FeO	Fe_2O_3	TiO_2	H_2O	Total
1·58*	0·70	38·38	58·26	1·20	100·12

* TiO_2, 0·56; SiO_2, 1·02.

Pyr. — Decomposed completely by hot concentrated sulphuric acid.

Obs. — Found associated with *gadolinite* on a mining claim, 25 miles southeast of Hackberry, Arizona.

Arsenoferrite. *H. Baumhauer*, Zs. Kr., **51**, 143, 1912.

Isometric; pyritohedral. A member of the pyrite group. Observed forms: *a*(100), *d*(110), *o*(111), *f*(310). In small crystals. Mineral has undergone alteration. Color dark brown. Fine splinters are transparent with a ruby-red color.

Comp. — Probably $FeAs_2$. Determination of amounts of arsenic and iron present give the correct proportions for this formula.

Obs. — Found on gneiss associated with *feldspar* and *quartz* from the Binnental. (This is the mineral briefly referred to by Groth, Zs. Kr., **5**, 253, 1881.)

Arsenopyrite, Min., p. 97; App. I, p. 6; II, p. 9. — Crystals from Swedish localities. New axial ratio calculated from measurement of crystals from Högberg. Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908; Twinning laws; Goldschmidt, Beitr. Krys. Min., **1**, 79, 1914.

Anal. by Sullivan of material from Franklin Furnace, N. J.; Palache, Zs. Kr., **37**, 576, 1909; Am. J. Sc., **29**, 177, 1910; from Homestake mine, Lead, South Dakota; Sharwood, Econ. Geol., **6**, 729, 1911; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912; chem. constitution and relation to other members of group; Beutell, Centralbl. Min., 316, 1911; *ibid.*, 225, 271, 299, 1912.

From London mine, Ducktown District, Tenn.; Van Horn, Am. J. Sc., **38**, 45, 1914.

Ascharite, App. I, p. 6; II, p. 10. — From Neustassfurt gave; n(D-line) = 1·54. G. = 2·69. Boeke, Centralbl. Min., 531, 1910.

Atacamite, Min., p. 172; App. I, p. 6; II, p. 10. — Twin crystals from Collahurasi, Tarapacá, Chile. Twinning law is unusual; one of the e(011) faces of individual II is parallel to an e face of individual I, while second e face of II falls in prism zone of individual I. Anal. given. Ford, Am. J. Sc., **30**, 16, 1910; Zs. Kr., **48**, 452, 1910. A detailed description of the crystallography of the mineral with many new forms and a review of all known forms. Twins from Boleo, Lower California, Mexico, show same law of twinning as described by Ford (see above). It is shown that the crystals of *paratacamite* can be explained as crystals of *atacamite* twinned according to this law. Ungemach, Bull. Soc. Min., **34**, 148, 1911. Discussion of these twins with rejection of law proposed by Ford and the suggestion of several twinning axes and planes with complicated indices which might serve to explain them according to the usual laws of twinning; Friedel, Bull. Soc. Min., **35**, 45, 1912. Crystals from El Toro, Lower California, Mexico; Guild, Zs. Kr., **49**, 321, 1911.

Artif. formation; Skinder, Bull. Ac. St. Pet., **2**, 381, 1908; including *bromatacamite*; Tschirwinsky, [Bull. Uni. Kief, **1**, 1903–1906], Zs. Kr., **46**, 293, 1909.

Atopite, Min., p. 861; App. II, p. 10. — From Brazil shown by Schaller to be identical with *romeine*, (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**).

Aurichalcite, Min., p. 298; App. I, p. 7. — Crystals from Ondárroa, Vizcaya, Spain, thought to be triclinic; Navarro, [Boll. Soc. Esp. Hist. Nat., 117, 1908], Zs. Kr., **49**, 297, 1911. Proved to be optically negative on specimen from Kelly, New Mexico; Buttgenbach, Ann. Soc. Geol. Belgique, B119, 1913. Occ. from Chihuahua, Mexico; Wittich, Boll. Soc. Geol. Mex., **8**, 47, 1913.

Autunite, Min., p. 857; App. II, p. 10. — Description of occurrence at Lurisia, Province of Cuneo, Italy, with anal.; Lincio, Att. Acc. Torino, **48**, 959, 1913.

Awaruite, Min., pp. 29, 1043; App. II, p. 11. — Anal. from Hoole Canyon, Pelly River, Yukon; Johnston, [Summary Rep. Geol. Sur. Canada, Dept. Mines for 1910, 257, 1911], Zs. Kr., **54**, 79, 1914.

Axinite, Min., p. 527; App. I, p. 7; II, p. 11. — Crystals from Pic d'Arbizon, Pyrénées Mts., France, with new forms; Ungemach, Bull. Soc. Min., **35**, 526, 1912. Crystals with anal. and optical study from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 448, 1911. Relation between the directions of absorption and of optical elasticity; Lang, Ber. Ak. Wien, **119**, (2*a*), 949, 1910.

Anal. from Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; from California; Schaller, Zs. Kr., **48**, 158, 1910; U. S. G. S., Bull., **490**, 37, 1911; see App. II, p. 11; from Nickel Plate Mt., Yale District, B. C.; Johnston [Summary Rep. Geol. Sur. Canada, Dept. Mines for 1910, 257, 1911]; Zs. Kr., **54**, 79, 1914. Occ. near Avondale, Delaware Co., Pa. with anal.; Wherry, Proc. U. S. Nat. Mus., **47**, 501, 1914.

Azurite, Min., pp. 381, 1027; App. I, p. 7; II, p. 11. — **Cryst.** — From Broken Hill, N. S. W., showing new forms, from Moonta, S. Australia with new form, and from Damara-Land, German S. W. Africa; table of known forms with calculated angles given; Steiner, [Ann. Mus. Nat. Hung., **4**, 293 and 310, 1906], Zs. Kr., **46**, 304, 1909; from Muldiva, Walsh District, Tinaroo and Girofla Mine, Chillagoe, Queensland; Anderson, Rec. Austral. Mus., **7**, 274, 1909; from El Carmen, Durango, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Agua Caliente, Peru, with new form; Hunek, Zs. Kr., **49**, 11, 1910; from Chessy, Rhône, France, with discussion of axial constants of the mineral; Gonnard, Bull. Soc. Min., **33**, 241, 1910; from Broken Hill, N. S. W.; Cohen, [J. Roy. Soc. N. S. W., **44**, 577, 1910], Zs. Kr., **52**, 419, 1913; from Kelly, New Mexico; Paul, Zs. Kr., **50**, 600, 1912. Five types of crystals from Tsumeb, German S. W. Africa, described, showing new forms; Toborffy, Zs. Kr., **52**, 225, 1913; from Calabona near Alghero, Sardinia, with discussion of axial ratio; Manasse, Mem. Soc. Tosc., **29**, 196, 1913.

Optical study of crystals from Broken Hill, N. S. W. and from Butte, Mont., gave the following; for Na-light, $\alpha = 1 \cdot 730$, $\beta = 1 \cdot 758$, $\gamma = 1 \cdot 838$. 2V = 62°–70°. Merwin, J. Wash. Ac. Sc., **4**, 253, 1914.

Bababudanite. — See under *Amphibole*.

BABINGTONITE, Min., pp. 381, 1027; App. I, p. 7; II, p. 11. — Discussion of chem. comp. with new anal. of material from Arendal, Norway. Similarity of crystal angles with those of *anorthite* pointed out. Hillebrand, Min. Mitt., **32**, 253, 1913; chem. comp.; Zambonini, Mem. Acc. Sc., Napoli, **16**, 1914.

Occurrence in the zeolite deposits in Passaic County, N. J. In large measure the original material has disappeared and it is thought that many of the rectangular cavities existing in the present minerals were originally filled with *babingtonite*. Fenner, J. Wash. Ac. Sc., **4**, 552, 598, 1914.

BADDELEYITE, App. I, p. 8; II, p. 11. — From Mte. Somma, Vesuvius; Zambonini, Rend. Acc. Linc., **20**, (2), 129, 1911. Occ. with *corundum* from mine of Bozeman Corundum Co., south of Bozeman, Mont.; Rogers, Am. J. Sc., **33**, 54, 1912.

Baeumlerite. *O. Renner*, Centralbl. Min., 106, 1912.

Shown by Zambonini, Centralbl. Min., 270, 1912, to be identical with *hydrophilite*, (*chlorocalcite*), which see.

Barbierite. *W. T. Schaller*, Bull. Soc. Min., **33**, 320, 1910; Zs. Kr., **50**, 347, 1911; J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 40, 1912.

Name proposed for the *sodium orthoclase*, the existence of which has been shown by the following; by anal. of feldspars from various localities; Barbier and Prost, Bull. Soc. Chim. France, **3**, 894, 1908; Barbier and Gonnard, Bull. Soc. Min., **33**, 81, 1910; anal. of a *sodium sanidine* from Mitrowitza; Angel, N. Jb. Min., Beil.-Bd., **30**, 254, 1910.

BARITE, Min., pp. 889, 1027; App. I, p. 8; II, p. 12. — **Cryst.** — From Tschiaturi, Caucasus, Russia; Surgunov, Bull. Soc. Imp. Nat. Moscou, Nos. 1 and 2, 153, 1906; from near Simferopol, Crimea, Russia; Fersmann, *ibid.*, 201, 1906; Zs. Kr., **46**, 220, 1909; from various Norwegian localities: new forms from Fehn, Telemarken, and from Kongsberg. The axial ratios derived from measurements of crystals from various localities are compared. Vogt, [Norsk. Geol. Tidsskrift, **1**, No. 9, 1, 1908], Zs. Kr., **48**, 536, 1910; from Kabolyapolyána, Comitat Máramaros, Hungary; Krizsó, [Földt. Közl., **39**, 388, 497, 1909], Zs. Kr., **50**, 633, 1912; showing parallel growth from Karl mine at Sajóháza, Comitat Gömör, Hungary; Zimányi, Földt. Közl., **39**, 12, 104, 1909; from Bonvei, near Mara, Sassari, Sardinia; Serra, Rend. Acc. Linc., **18**, (2), 80, 1909; from following localities near Kladno, Bohemia, Theodor mine near Pcher, with new form, Libušin, Ronna mine near Hnidous; Slavík, Bull. Ac. Sc. Bohême, **14**, 1908, ["Rozpravy" Böhm. Ak., **18**, No. 29, 1909], Zs. Kr., **50**, 640, 1912; from Epprechtstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; from Mte. Poni, Sardinia; Lincio, Att. Acc. Torino, **44**, 747, 1909; from Boccheggiano, Grosseto, Tuscany; Viola, Riv. Min., **39**, 65, 1909; with anal. from Mont de la Saxe, near Courmayeur, Valle d'Aosta; Colomba, Att. Acc. Torino, **45**, 617, 1910; from various localities in the eastern part of Gouv. Kostroma, Russia; Samojlov, Bull. Ac. St. Pet., **4**, 857, 1910; Zs. Kr., **52**, 526, 1913; from New Brancepeth Colliery near Durham, England; Spencer, Min. Mag., **15**, 302, 1910; from the various mines in the Freiberg, Saxony, district, with general discussion of the forms of *barite* with a table of angles after Goldschmidt; Henglein, N. Jb. Min., Beil.-Bd., **32**, 71, 1911; from Oberstein, Germany; Seebach, Vh. Natur.-Med. Ver. Heidelberg, **11**, 1910; Seebach and Görgey, Centralbl. Min., 161, 1911; from Birkenau, Odenwald, Germany; Henglein, Centralbl. Min., 580, 1911; from Rokahegy, Comitat Pest, Hungary; Jugovics, Ann. Mus. Nat. Hung., **10**, 593, 597, 1912; from Mt. Bokovka; Popov, Bull. Ac. St. Pet., **7**, 1103, 1913; with new forms from Ronna mine near Kladno, Bohemia; Ježek, Zs. Kr., **53**, 540, 1914; from Nürschan, Bohemia; Angel, Zs. Kr., **54**, 166, 1914.

Inclusions in crystals from Brosso and Traversella, Italy; Colomba, Rend. Acc. Linc., **18**, (1), 530, 1909. Pseudomorphs after, found in Cambrian alum schists from Bornholm Island, Denmark. These had been previously described as pseudomorphs after *gay-lussite* and *pirsonite*. Callisen, Medd. Dansk Geol. For., **4**, 245, 1914. Sand barite crystals from Kharga, Egypt; Pogue, Zs. Kr., **49**, 226, 1911.

Anal. from Kertch, Crimea; Kaschinsky, [Ann. Inst. Mines, St. Pet., **2**, 251, 1910], Zs. Kr., **52**, 624, 1913.

Occ. at Brosso and Traversella, Italy; Colomba, Riv. Min., **39**, 51, 1909.

Geometrical and optical changes of *barite* and other members of *barite group* with rise of temperature; Kolb, Zs. Kr., **49**, 14, 1910. Study of optical changes, etc., produced by heating and description of a dimorphous modification; Grahmann, Inaug. Diss., Leipzig, 1913; Zs. Anorg. Chem., **81**, 257, 1913.

Artif. formation and isomorphous mixtures with *celestite* and *anglesite*; Gaubert, C. R., **145**, 877, 1907; Bull. Soc. Min., **32**, 139, 1909; artificial crystals; Gerhart, Min. Mitt., **29**, 185, 1910; Cooper and Fuller, J. Am. Chem. Soc., **33**, 845, 1911.

Barytocelestite. Occ. at Imfeld in the Binnental, Switzerland, disproved by critical study of crystal measurements of Neminar and by anal. which proves mineral to have been *barite.* Variation in crystal constants of the minerals of the *barite group* is shown to be independent of variation in composition. Rosický, Bull. Ac. Sc. Bohême, **13**, 1908. Concerning its crystal identity; Samojlov, Bull. Ac. St. Pet., **2**, 727, 1908; Zs. Kr., **50**, 69, 1911.

Barkevikite, Min., p. 405; App. I, p. 8. — Occ. in large crystals as phenocrysts in a rock found at Lugar, Ayrshire, which contains also phenocrysts of *titanaugite* and *labradorite* in a ground mass of *analcite* and *nephelite.* Cleavage angle = 55° 36′. Extinction on (010), $\mathfrak{c} : c = 11\frac{1}{2}°$. Mean refractive index = 1·69. Birefringence about 0·02. Optically negative. 2V = 52°. Strongly pleochroic, $\mathfrak{a}$ = light yellow, $\mathfrak{b}$ = reddish brown, $\mathfrak{c}$ = very dark brown. G. = 3·298. Anal., SiO_2, 42·48; TiO_2, 2·90; Al_2O_3, 8·58; Fe_2O_3, 6·81; FeO, 15·62; MnO, 0·39; MgO, 2·78; CaO, 13·45; Na_2O, 6·32; K_2O, 0·60; H_2O, 0·25; Total, 100·18. Scott, Min. Mag., **17**, 138, 1914.

Barthite. *M. Henglein* and *W. Meigen*, Centralbl. Min., 353, 1914.

Monoclinic? Crystals small with few faces.

Fracture uneven. H. = 3. G. = 4·19. Luster, vitreous to greasy. Color grass-green. Streak greenish white to gray. Optically biaxial.

Comp. — A hydrous zinc-copper arsenate,

$$3ZnO.CuO.3As_2O_5.2H_2O, \quad \text{or} \quad 3Zn(AsO_3)_2.Cu(OH)_2.H_2O.$$

Anal. — As_2O_5, 64·0; P_2O_5, 1·0; ZnO, 23·3; CuO, 8·5; H_2O, 3·2; Insol., 1·1; Total, 101·1.

Obs. — Found in druses of a dolomite at Guchab, Otavi, German Southwest Africa.

Name. — After Mr. Barth, a mining engineer, who collected the material.

Barysilite, Min., p. 421; App. II, p. 13. — Artif. formation and opt. study; Kraus, Cooper and Klein, Am. Chem. J., **47**, 273, 1912; Centralbl. Min., 289, 1912.

Barytocalcite, Min., p. 289; App. I, p. 8. — Crystals from Alston Moor, Cumberland, and a *barite* pseuodmorph after *barytocalcite* from Hexham, Northumberland; Federov, [Ann. Inst. Mines, St. Pet., **1**, 182, 1908], Zs. Kr., **51**, 197, 1912.

Barytocelestite. See under *Barite*.

Bastnäsite, Min., p. 291; App. I, p. 9. — Found to the east of Ambositra, Madagascar. Shows a perfect cleavage. Color clear yellow on cleavage surface with pearly luster; elsewhere dark reddish yellow with greasy luster. Uniaxial, +; with high birefringence. Minimum refractive index = 1·7145. G. = 4·948. H. = 4·5. Anal. — CO_2, 20·20; F, 6·23; Ce_2O_3, 40·50; $(La,Di)_2O_3$, 36·30; P_2O_5, 0·60; O = F, 2·61; Total, 101·22. Specimen of *bastnäsite* assoc. with *tysonite* from Colorado described with discussion of relations of the two minerals. Relations between *parisite* and *bastnäsite.* Lacroix, Bull. Soc. Min., **35**, 108, 1912. Description of specimen from Madagascar with study of a specimen from Pike's Peak, Col. Conclusion is reached that the *bastnäsite* from Colorado occurs in parallel growth with *tysonite* and not pseudomorphous after it. Some small separate crystals of *bastnäsite* lining a cavity in the *tysonite* were observed. Measurement of one of these crystals showed the following forms, $c(0001)$, $m(10\bar{1}0)$, $a(11\bar{2}0)$, $p(10\bar{1}1)$, $q(20\bar{2}1)$, $s(11\bar{2}1)$, $t(20\bar{2}3)$. $c(0001) : p(10\bar{1}1) = 38° 8'$. c = 0·67986. The basal cleavage described by Lacroix on the Madasgacar material is shown to be a lamellar structure. Koechlin, Min. Mitt., **31**, 525, 1912; Centralbl. Min., 353, 1912.

X **Bassanite.** *F. Zambonini*, Min. Vesuviana; Mem. Acc. Sc. Napoli, **14**, 327, 1910. In white opaque crystals with form of gypsum. Under microscope they are seen to be composed of slender needles in parallel arrangement. These show parallel extinction and positive elongation. Weak birefringence. G. = 2·69–2·76.

Comp. — Calcium sulphate, $CaSO_4$.

At red heat is transformed into anhydrite.

Found in blocks ejected from Vesuvius in 1906. Named in honor of Prof. Bassani, of the University of Naples.

Batchelorite. *W. F. Petterd*, [Papers Roy. Soc. Tasmania, 22, 1910], Min. Mag., **16**, 354, 1913.

A green foliated mineral having approx. the comp., $Al_2O_3.2SiO_2.H_2O$ from Mt. Lyell mine, Tasmania. Named in memory of Mr. W. T. Batchelor, formerly manager of the mine.

Bauerite. *F. Rinne*, [Vers. Ges. deutsch. Naturforscher u. Ärzte, Karlsruhe, 1911]; Ber. Ges. Wiss. Leipzig, **63**, 443, 1911.

Name given to the end product of the bleaching of micas. The final composition is $SiO_2.xH_2O$. This material behaves optically like the original mica.

BAUXITE, Min., p. 251; App. I, p. 9; II, p. 13. — The chem. constitution of bauxite has been discussed by Tućan, Centralbl. Min., 65, 387, 495, 768, 1913; Doelter and Dittler, *ibid.*, 19, 1912; 193, 1913; Lazarević, *ibid.*, 258, 600, 1913. Tućan suggests that *bauxite* is really a rock type composed of various minerals, including a large proportion of an aluminium hydroxide, either *diaspore* or a new substance to which the name *sporogelite* (which see) has been given.

Relation to similar minerals; Dittler and Doelter, Centralbl. Min., 104, 1912.

Anal. and discussion of chem. comp. of material from various French localities; Arsandaux, C. R., **148**, 936, 1115, 1909; Bull. Soc. Min., **36**, 70, 1913; anal. from Comitat Bihar, Hungary; Horváth, [Földt. Közl., **41**, 254, 341, 1911], Zs. Kr., **54**, 182, 1914.

Occ. and origin in the Karst district, Croatia; Tućan, N. Jb. Min., Beil.-Bd., **34**, 401, 1912; Kišpatić, *ibid.*, 513.

Bazzite. *E. Artini*, Rend. Acc. Linc., **24**, (1), 313, 1915.

Hexagonal. In minute prisms, often tapering at the ends, giving barrel shapes. Terminated by base. H. = 6·5. G. = 2·8. Luster vitreous. Color bright azure-blue. Almost perfectly transparent in small individuals. Uniaxial. Optically −. Refractive indices vary somewhat in different portions of the crystals; in interior ω = 1·626, ϵ = 1·608; in outer zone ω = 1·626, ϵ = 1·602. Strongly dichroic, ω = pale greenish yellow, almost colorless ϵ = intense azure-blue.

Comp. — A silicate of scandium with other rare earth metals, iron, and a little soda.

Pyr. — On heating becomes dark and opaque but does not fuse. Insoluble in acids with exception of hydrofluoric. Decomposed by fusion with sodium carbonate.

Obs. — Found in small amount on crystals of *quartz* and pink *orthoclase* with *muscovite*, *laumontite* and *albite* from Baveno, Italy.

Name. — After E. Bazzi, who collected the mineral.

Beaverite. *B. S. Butler* and *W. T. Schaller*, J. Wash. Ac. Sc., **1**, 26, 1911; Am. J. Sc., **32**, 418, 1911; Zs. Kr., **50**, 114, 1911; U. S. G. S., Bull., **509**, 77, 1912.

Hexagonal? In microscopic hexagonal plates.

Color canary-yellow. Earthy and friable. Refractive index > 1·74.

Comp. — Hydrous sulphate of copper, lead and ferric iron; $CuO.PbO.Fe_2O_3.2SO_3.4H_2O$; small amounts of alumina replace the ferric oxide.

Anal. — 1. After deduction of 10·05% insoluble material. 2. Theory calculated for $Fe_2O_3 : Al_2O_3$ = 3 : 1.

	CuO	PbO	Fe_2O_3	Al_2O_3	SO_3	H_2O	Total
1.	10·74	32·50	19·13	4·03	23·60	10·00	100·00
2.	11·70	32·80	17·61	3·75	23·54	10·60	100·00

Pyr. — Soluble in hot hydrochloric acid separating lead chloride on cooling. Tests for copper and ferric iron.

Obs. — Found in secondary mineral zone at Horn Silver mine near Frisco, Beaver Co., Utah.

Beldongrite. *L. L. Fermor*, Mem. Geol. Sur. India, **37**, 1909.

Luster pitchy. Color black.

Comp. — $6Mn_3O_5.Fe_2O_3.8H_2O$.

Anal. — Includes 17·7% *quartz* and 3·7% *spessartite.*

	MnO_2	MnO	Fe_2O_3	Al_2O_3	BaO	CaO	MgO	SiO_2	P_2O_5	H_2O	CO_2	Total
G. = 3·22	36·96	22·00	7·49	0·40	0·78	2·31	0·15	19·13	0·05	10·37	0·11	99·75

Obs. — Found associated with *spessartite* at Beldongri, District Nágpur, India.

Belmontite. *R. Koechlin*, [Min. Taschenbuch der Wiener Min. Ges., 16, 1911], Min. Mag., **16**, 355, 1913.

A yellow mineral said to be a silicate of lead. Occurred with *stetefeldtite* at Belmont, Nev.

BELONESITE. See under *Sellaite.*

BEMENTITE, Min., p. 704. — Following new facts have been ascertained. Orthorhombic. Three cleavages of varying character parallel to three pinacoids. Axial angle small. Acute bisectrix perpendicular to best cleavage. Anal. by Steiger gave: SiO_2, 38·36; MnO, 39·22; FeO, 4·94; ZnO, 2·93; MgO, 3·35; CaO, 0·62; H_2O+, 8·01; H_2O-, 0·60; Al_2O_3, 0·96; Fe_2O_3, 0·71; Total, 99·70. This leads to formula $H_6Mn_5(SiO_4)_4$. Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

BENITOITE, App. II, p. 14. — Crystal form; Palache, Zs. Kr., **46**, 379, 1909; see App. II, p. 14; description of crystals; ditrigonal-bipyramidal class confirmed by etching figures; Hlawatsch, Min. Mitt., **28**, 179, 1909; Zs. Kr., **46**, 602, 1909; Centralbl. Min., 293, 1909; new value of $c = 0{\cdot}75315$; Baumhauer, *ibid.*, 592; new forms, (11$\bar{2}$0), (22$\bar{4}$1); Ježek, Bull. Ac. Sc. Bohême, **14**, 1909.

Paragenesis and character of occ.; Louderback, Bull. Uni. Cal. Geol. Dept., **5**, No. 23, 331, 1909.

BENTONITE, App. II, p. 15. — Occ. in Laramie Basin, Wyo. with anal.; Darton and Siebenthal, U. S. G. S., Bull., **364**, 1909.

BERAUNITE, Min., p. 848. — Occ. near Hellertown, Pa. with anal.; Wherry, Proc. U. S. Nat. Mus., **47**, 501, 1914.

BERTRANDITE, Min., pp. 545, 1028; App. I, p. 9; II, p. 15. — Crystals with anal. from Irkutka Mt., Altai Mts., Russia; Pilipenko, Bull. Ac. St. Pet., **3**, 1116, 1909; Zs. Kr., **51**, 105, 1912; from Iveland, southern Norway, with new form. The three cleavages, parallel to *c*, *b* and *m* were observed. Refractive indices, Na-light; $\alpha = 1{\cdot}5914$, $\beta = 1{\cdot}6053$, $\gamma = 1{\cdot}6145$. $2V = 74° 41'$. Anal. confirming the accepted formula. Vogt, Zs. Kr., **50**, 6, 1911. Crystals from the following new localities in Cornwall: St. Cleer, Stokeclimsland, Breage, and Constantine; Russell, Min. Mag., **17**, 15, 1913.

Occ. and description at Cheesewring quarry, Liskeard, Cornwall; Bowman, Min. Mag., **16**, 47, 1911.

BERYL, Min., pp. 405, 1028; App. I, p. 9; II, p. 15. — **Cryst.** — From Tonkerhoek, German S. W. Africa; Thiene, N. Jb. Min., **1**, 97, 1909; from Elba with new forms; Millosevich, Rend. Acc. Linc., **20**, (2), 138, 1911; from Lundy Island, England; McLintock and Hall, Min. Mag., **16**, 294, 1912. Distortion of crystals from Madagascar; Lacroix, Bull. Soc. Min., **37**, 101, 1914.

Optical. — Refractive index and specific gravity rise in value with presence of alkalies; anal. of rose beryl from Mesa Grande, Cal., and from Madagascar; Ford, Am. J. Sc., **30**, 128, 1910; Zs. Kr., **48**, 462, 1910. Optical properties vary with content of alkalies as shown in beryls from Madagascar; Lacroix, Bull. Soc. Min., **34**, 123, 1911; **35**, 200, 1912. Anal. of mineral from Tsilaisina with optical study of this and other beryls from various localities near Antsirabé, Madagascar; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 283, 1910; Bull. Soc. Min., **33**, 53, 1910; **34**, 131, 239, 1911. Rose-colored beryl rich in alkalies, (*worobewite*, *vorobyevite*) from Madagascar with determination of refractive indices; Lacroix, Bull. Soc. Min., **33**, 37, 1910. Study of origin of circle of light seen on sphere of aquamarine from Brazil; Goldschmidt and Brauns, N. Jb. Min., Beil.-Bd., **31**, 220, 1911.

Anal. — From near Olliergues, Puy-de-Dôme and Montjeu, Saône-et-Loire; Barbier and Gonnard, Bull. Soc. Min., **33**, 74, 78, 1910; from various localities in Pa.; Eyerman [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914; of a green beryl found to the east of Miandrarivo, Madagascar; Lacroix, Bull. Soc. Min., **35**, 180, 1912.

Rôle of water in; Allen and Clement, Zs. Anorg. Chem., **68**, 317, 1910.

Large aquamarine crystal, weight 110·5 kg. found at Marambaya, Minas Geraes, Brazil; Kunz, Am. J. Sc., **31**, 463, 1911; Dreher, Centralbl. Min., 338, 1912. Aquamarine from near Rössing, German S. W. Africa; Kaiser, Centralbl. Min., 385, 1912.

Vorobyevite, Worobieffite, Worobewite. W. J. Vernadsky, [Trav. Mus. Geol. Ac. Sc. St. Pet., **2**, 81, 1908], Zs. Kr., **50**, 73, 1911. Name given to cæsium beryl because of the description of such a beryl from Lipowka, Ural Mts., by Vorobyev. Description of crystals and anal. of this beryl given. Discussion of chem. comp. of beryl.

Morganite. Rose-colored beryls named *morganite* in honor of J. P. Morgan; Kunz, Am. J. Sc., **31**, 81, 1911.

Betafite. *A. Lacroix*, Bull. Soc. Min., **35**, 84, 233, 1912; **37**, 101, 914; C. R., **154**, 1040, 1912.

Isometric. Observed forms; octahedron and dodecahedron, rarely cube. Habit octahedral. G. = 3·75–4·17. Color, a greenish black. Opaque. Luster greasy.

Comp. — A niobate and titanate of uranium, etc.

Anal. — By Pisani; (1) Ambolotora, (2) Ambalahazo.

	Nb_2O_5	Ta_2O_5	TiO_2	SnO_2	ThO_2	UO_3	$(Ce,La,Di)_2O_3$	$(Y,Er)_2O_3$
1.	34·80	*tr.*	18·30	0·30	1·30	26·60	0·60	0·90
2.	34·80	1·00	16·20	0·37	1·12	27·15	1·00	....

	Al_2O_3	Fe_2O_3	MgO	CaO	PbO	H_2O	Total
1.	2·10	2·87	0·40	3·45	....	7·60	99·22
2.	1·50	0·50	*tr.*	3·12	0·38	12·50	99·64

Obs. — Found in pegmatities in Madagascar at following localities: Ambolotora, near Betafo, Andibakely near Sama, Ambalahazo, east of Ampangabé.

β-**Kertschenite.** See under *Vivianite.*

BEUDANTITE, Min., p. 868; App. II, p. 15. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. — See under *Alunite.*
Occurrence of *corkite* noted from the Harrington-Hickory and the Wild Bull mines, Beaver Co., Utah; Butler and Schaller, Am. J. Sc., **32**, 418, 1911; Zs. Kr., **50**, 114, 1911; U. S. G. S., Bull., **509**, 82, 1912.

Bisbeeite. *W. T. Schaller*, J. Wash. Ac. Sc., **5**, 7, 1915, and priv. contr.
Orthorhombic. Fibrous. Color pale blue to nearly white. Elongation of fibers positive. Refractive indices, α or β = 1.59 (perpendicular to elongation of fibers); γ = 1·65. Ax. pl. parallel to elongation of fibers. Pleochroic; colorless to very pale green parallel to elongation of fibers, pale olive-brown perpendicular to fibers.
Comp. — $CuSiO_3.H_2O$.
Anal. — On minute quantity containing about 5% of *shattuckite*.
SiO_2, 36·0; CuO, 52·1; FeO, 0·9; H_2O, 10·3; Total, 99·3.
Obs. — Found at Shattuck Arizona Copper Company's mine at Bisbee, Arizona, resulting from the alteration (hydration) of *shattuckite*.

BIOTITE, Min., p. 627; App. I, p. 10; II, p. 15. — Pleochroic halos and their connection with α-rays from radio-active elements; Hövermann, N. Jb. Min., Beil.-Bd., **34**, 321, 1912.
Anal. of fresh and altered material from pegmatite at Ytterby, Sweden; Nordenskjöld, [Bull. Geol. Inst. Upsala, **9**, 183, 1910], Zs. Kr., **53**, 406, 1914; from various localities in Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 99, 1914.
Alteration products with analyses from Bjelaja Tzerkow, Kief, Russia; Glinka, Trav. Soc. Nat. St. Pet., **34**, No. 5, 1, 1906.
Parallel growth with *phlogopite* with inclusions of *rutile* needles from Ottawa, Canada; Pogue, Zs. Kr., **49**, 455, 1911.
BISCHOFITE, Min., p. 176; App. II, p. 15. — Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

BISMITE, Min., p. 200; App. II, p. 16. — Description of crystals, etc., from Goldfield. Nev., given in App. II, has been published by Ransome, U. S. G. S., Prof. Paper, **66**, 1909; and by Schaller and Ransome, Am. J. Sc., **30**, 173, 1910; Zs. Kr., **48**, 16, 1910; Schaller, U. S. G. S., Bull., **490**, 33, 1911; crystals from Rincon, San Diego Co., Cal.; Rogers, School of Mines Quart., **31**, 208, 1910.
Anal. of various bismuth ochers from the tourmaline mines in San Diego Co., Cal., show them to be either a bismuth hydroxide, $Bi(OH)_3$ or *pucherite*, $BiVO_4$, or mixtures of the two. Doubt is expressed as to the occurrence of the pure oxide, *bismite*, Bi_2O_3, in nature. Schaller, J. Am. Chem. Soc., **33**, 162, 1911; Zs. Kr., **49**, 229, 1911.

BISMUTHINITE, Min., pp. 38, 1028; App. I, p. 10; II, p. 16. — Anal. from sands of the Amunnaja River, a branch of the Amasar River, Transbaikalia, Siberia; Kusnetzov, Bull. Ac. St. Pet., **4**, 711, 1910; Zs. Kr., **52**, 518, 1913; occ. with anal. from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, **23**, 242, 1911.

BISMUTOSPHÄRITE, Min., p. 290. — Anal. from sands of Iwanowka River, branch of the Kara River, Transbaikalia, Siberia; Kusnetzov, Bull. Ac. St. Pet., **5**, 897, 1911; Zs. Kr., **53**, 601, 1914. Occurs at Stewart mine, Pala, Cal.; Schaller (priv. contr.; to be published in U. S. G. S., Prof. Paper, **94**).

BITYITE, App. II, p. 16. — Formula proposed as $21SiO_2.16Al_2O_3.14(Ca,Be,Mg)O.4(Li,Na,K)_2O.14H_2O$; Lacroix, Bull. Min. Soc., **33**, 37, 1910.

BLOEDITE, Min., p. 946; App. I, p. 11; II, p. 16. — Large crystals with anal. from Soda Lake, San Luis Obispo Co., Cal.; Schaller, J. Wash. Ac. Sc., **3**, 75, 1913.

BLOMSTRANDINE, App. II, p. 17. — Anal. of crystal from Miask, Ilmen Mts., Russia; Hauser and Herzfeld, Centralbl. Min., 756, 1910; from Ural Mts., Tschernik, Bull. Ac. St. Pet., **6**, 949, 1912.

BLOMSTRANDITE, Min., p. 746. — Anal. from Ambolotara near Betafo, Madagascar; Lacroix, Bull. Min. Soc., **33**, 321, 1910; C. R., **152**, 559, 1911; from Tongafeno, south of Betafo, *idem*, C. R., **154**, 1040, 1912; Bull. Soc. Min., **35**, 84, 1912.

BORACITE, Min., p. 879; App. I, p. 11; II, p. 18. — Study of *stassfurtite* shows its identity with *boracite;* Boeke, Centralbl. Min., 531, 1910.
Study of structure, crystal character and relation of twinning laws to those of *cryolite* and *perovskite*; Böggild, Zs. Kr., **50**, 349, 1911.

BORNITE, Min., p. 77; App. I, p. 11; II, p. 18. — Crystals from Bristol, Conn., with new anal. Discussion of chem. comp. of mineral leads to the general formula $Cu_xFe_2S_y$, where $y = \frac{x}{2}+3$; with discussion of relation to the group of sulpho-minerals. Kraus and Goldberry, Am. J. Sc., **37**, 539, 1914; N. Jb. Min., **2**, 127, 1914.

BOTRYOGEN, Min., p. 972; App. II, p. 18. — Discussion of chem. comp. together with its chemical and crystallographic relations to *römerite*. By a change in the customary orientation it is shown that the forms and angles of the crystals of the two minerals are closely similar. Scharizer, Zs. Kr., **52**, 372, 1913.

BOULANGERITE, Min., p. 129; App. I, p. 11; II, p. 19. — Crystal from Sala, Sweden, showed (100), a new form; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

BOURNONITE, Min., p. 129; App. I, p. 11; II, p. 19. — Crystals (with anal.) from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Val di Castello, Pietrasanta, Tuscany; Panichi, Rend. Acc. Linc., **19**, (1), 690, 1910; from Óradna; Löw, Földt. Közl., **41**, 67, 192, 1911; from St. Kreuz, Lebertal, Alsace (with anal.); Bücking, Mitt. Geol. Landesanst. Elsass-Lothringen, **8** 201, 1913.

BRAUNITE, Min., pp. 232, 1029; App. I, p. 11; II, p. 19. — Crystals from various localities in India with new forms. Anal. with discussion of comp.; Fermor, Mem. Geol. Sur. India, **37**, 1909; Rec. Geol. Sur. India, **41**, 43, 1911. Crystals from Minas Geraes, Brazil, with new forms. Anal. given. Ježek, Bull. Ac. Sc. Bohême, **13**, 1908; ["Rozpravy," Böhm. Ak., **13**, No. 7, 1908], Zs. Kr., **48**, 543, 1910; from Brazil with new forms. Discussion of orientations and of letters assigned to different forms; Koechlin, Ann. Mus. Wien, **27**, 159, 1913. Crystals from Långban, Sweden, described. In the Spexeryd mines, where *manganite* has weathered, the so-called "*mangankiesel*" may be braunite (anal. given). Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

BRAVOITE, App. II, p. 19. — Occ. etc. at Minasragra, Peru; Hewett, Trans. Am. Inst. Min. Eng., 291, 1909.

BREUNERITE, Min., p. 274; App. II, p. 19. — Occ. in an amphibole andesite near Castelnuovo di Teolo, Euganei Monti, Italy; Panebianco, Riv. Min., **40**, 78, 1911.

BRITHOLITE, App. II, p. 19. — Crystallographic and optical study of a series of minute crystals showed that britholite is hexagonal with at times optical anomalies and not orthorhombic, pseudohexagonal, as originally described. Value of $c = 0{\cdot}7247$. Forms present, $m(10\bar{1}0)$, $a(11\bar{2}0)$, and $p(10\bar{1}1)$. Further new facts are: easily soluble in hot hydrochloric acid; before blowpipe turns light brown and opaque. Böggild, Zs. Kr., **50**, 430, 1911.

BROCHANTITE, Min., p. 925; App. II, p. 20. — Crystals from Vaskö, Comitat Krassószörény, Hungary; Löw, Földt. Közl., **41**, 811, 1911.
Anal. from Collahurasi, Tarapacá, Chile; Ford, Am. J. Sc., **30**, 16, 1910; Zs. Kr., **48**, 452, 1910.

BRÖGGERITE. See under *Uraninite*.

Bromatacamite. See under *Atacamite*.

BROMLITE, Min., p. 283; App. I, p. 12. — General relations to the series of isomorphous molecules; discussion of crystals; determination of refractive indices and anal. on material from Alston Moor, Cumberland; Kreutz, Bull. Ac. Sc. Cracovie, 771, Nov., 1909.
Occ. at New Brancepeth Colliery near Durham, England, with anal.; Spencer, Min. Mag., **15**, 302, 1910.

BROOKITE, Min., pp. 243, 1029; App. I, p. 12; II, p. 20. — Crystals from Meadowdale, Albany Co., N. Y.; Whitlock, Bull. N. Y. State Mus., **140**, 197, 1910; from Companhia, Lençoes, Bahia, Brazil; Ford and Ward, Am. J. Sc., **32**, 287, 1911; from Princeton, N. J., with new forms; Hawkins, Am. J. Sc., **35**, 446, 1913.

BRUCITE, Min., p. 252; App. I, p. 12. — Detailed study of physical properties of brucite together with those of the artificially dehydrated mineral called *metabrucite*; Westphal, Inaug. Diss., Leipzig, 1913.
Occ. of variety *nemalite* in Russia; Fersmann, Bull. Ac. St. Pet., **5**, 539, 1911; Zs. Kr., **53**, 599, 1914.
Varieties containing iron or manganese called respectively *ferrobrucite* and *manganobrucite*. A. Lacroix, Min. de la France, **3**, 402, 1909.

Calafatite. See under *Alunite*.

CALAMINE, Min., p. 546, App. I, p. 12; II, p. 21. — **Cryst.** — From Joplin, Mo.; Rogers, [Uni. Geol. Sur. Kansas, **8**, 445, 1904], Zs. Kr., **49**, 370, 1911; from Herkules mine and Olkusz, Poland; Revutzky, Bull. Soc. Imp. Nat. Moscou, Nos. 1 and 2, 213, 1906; Zs. Kr., **46**, 297, 1909; from Ghergur, Algeria with new forms and many vicinal forms; refractive indices determined; Billows, Riv. Min., **34**, 47, 1908; from the Organ Mts., Donna Anna Co., New Mexico, with new form; Ford and Ward, Am. J. Sc., **28**, 185, 1909; from Altenberg, Belgium; Goldschmidt and Schroeder, Zs. Kr., **49**, 135, 1910; with anal. of material from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 399, 1911; from Leadville, Col.; Paul, Zs. Kr., **50**, 600, 1912.

Crystals from Santa Eulalia, Chihuahua, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; Pogue, Proc. U. S. Nat. Mus., **39**, 571, 1911; Zs. Kr., **49**, 455, 1911; with new forms and several uncertain or vicinal forms with a critical discussion of all known forms, references to literature, tables of angles and combinations, etc.; Seebach and Paul, Zs. Kr., **51**, 149, 1912.

Anal. from Friedensville and Phoenixville, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914.

Calciopalygorskite. *A. Fersmann*, Bull. Ac. Sc. St. Pet., **2**, 274, 1908.

A "*mountain leather*" from Strontian, Argyllshire, containing much calcium. See under *Palygorskite*.

CALCIOVOLBORTHITE, Min., p. 790; App. II, p. 22. — Two analyses are given by Hillebrand and Merwin, J. Wash. Ac. Sc., **3**, 138, 1913; Am. J. Sc., **35**, 441, 1913; Zs. Kr., **53**, 4, 1913, of minerals which are tentatively referred to this species. They were found near Richardson, in the canyon of the Grand River, southeastern Utah, and occurred as rosettes and patches of minute reticulated scales on surfaces of sandstone. The yellow-green variety showed triangular and hexagonal-shaped scales, but from optical properties is probably monoclinic. Shows strong inclined dispersion. The axial angle 2V is approximately, 68° for Li-light and 83° for Na-light. The mineral is therefore optically positive for red and negative for violet light. The indices of refraction are, $\alpha = 2{\cdot}01$, $\beta = 2{\cdot}05$, $\gamma = 2{\cdot}10$. Greenish yellow variety occurs in thin crusts of doubly refracting crystals with index of refraction about 1·92. It is pseudomorphic after the yellow-green variety. The analyses follow: from No. 1, 30·6 per cent and from No. 2, 13·5 per cent of insoluble material has been deducted.

	V_2O_5	As_2O_5	P_2O_5	CuO	CaO	BaO	MgO	Alk.	$H_2O-105°$
Yellow-Green	30·6	1·1	0·3	48·4	3·9	2·7	0·3	0·7	1·8
Green-Yellow	16·0	17·2	0·8	37·1	15·3	2·3	0·5	0·2	1·0

	$H_2O+105°$	CO_2	SiO_2	Fe_2O_3	Mn_3O_4,Co_3O_4,Al_2O_3	Total
Yellow-Green	6·4	2·4	0·6	0·8	...	100·0
Green-Yellow	4·3	0·9	0·7	0·5	3·2	100·0

CALCITE, Min., pp. 262, 1029; App. I, p. 13; II, p. 22. — **Cryst.** — From Joplin, Mo.; Rogers, [Uni. Geol. Sur. Kansas, **8**, 445, 1904], Zs. Kr., **49**, 370, 1911; from various Hungarian localities; Franzenau, Zs. Kr., **46**, 454, 1909; from Joplin, Mo., Guanajuato, Mexico, and Virgilina, Va.; Pogue, Smithsonian Misc. Coll., **52**, 465, 1909; from Plainfield and Jersey City, N. J., showing parallel growths and new forms; Whitlock, Bull. N. Y. State Mus., **133**, 217, 1909; from Kelly's Island, Lake Erie, showing pyramid; Ford and Pogue, Am. J. Sc., **28**, 185, 1909; also Whitlock, School of Mines Quart., **31**, 225, 1910; showing pyramid from Hörsne, Gotland and from Dannemora, Sweden; Tenow, [Bull. Geol. Inst. Upsala, **9**, 1, 1910], Zs. Kr., **53**, 406, 1914; from Markirch, Alsace; Dürr, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 183], Zs. Kr., **47**, 303, 1909; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, No. 3, 293], Zs. Kr., **53**, 569, 1914; from Terlingua, Texas, with new form; Hillebrand and Schaller, U. S. G. S., Bull., **405**, 15, 1909; from various Swedish localities with new forms; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; from Fiesch and Reckingen, Rhone valley, Switzerland, and Egremont, Cumberland, showing twins; Goldschmidt and Schroeder, Zs. Kr., **49**, 133, 1910; from Oberscheld near Dillenburg, Prussia, with new forms. Article concludes with a list of all the previously determined forms on the mineral. Bumüller, N. Jb. Min., Beil.-Bd., **28**, 233, 1909; from the neighborhood of Limburg a. L., Prussia, with new forms; Danckers, N. Jb. Min., Beil.-Bd., **31**, 55, 1911; from Stromberg, Soonwald, Germany, with new forms; Jahn, Zs. Kr., **50**, 133, 1911; **52**, 399, 1913; from Val Lanterna, Veltlin, Italy; Tacconi, Mem. Acc. Linc., **8**, 736, 1911; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 282, 1911; from Kosd and Rókahegy, Hungary; Jugovics, Ann. Mus. Nat. Hung., **10**, 301, 311, 1912; from the chalk at Corfe Castle, Dorsetshire, England; Bowman, Min. Mag., **17**, 135, 1914.

Historical discussion of the crystallization of calcite with list of new forms described since the appearance of Goldschmidt's *Index der Krystallformen*. Also description of calcite crystals with new forms from various localities in New York State. Whitlock, Mem. N. Y. State Mus., **13**, 1910.

Deformed calcites in the Devonian limestone from near Letmathe, Westphalia; Mügge, N. Jb. Min., **1**, 1, 1913.

Study of the growth of twin crystals; Kreutz, Min. Mitt., **28**, 490, 1909. New twinning law; Lincio, Att. Acc. Torino, **42**, 212, 1911.

Space-lattice; Johnsen, Zs. Kr., **54**, 148, 1914.

Change in crystal angles with lowering of temperature; Goldschmidt, Zs. Kr., **51**, 1, 1912. Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of calcite group; Rinne, Centralbl. Min., 705, 1914.

Determination by grinding methods of the hardness of calcite in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911.

With abnormal cleavage angle (72°); Ferrando [Boll. Soc. Esp. Hist. Nat., **7**, 95, 1907], Zs. Kr., **49**, 620, 1911.

New analyses with view to determination of the limits of the amount of magnesium carbonate that may be present; Foote and Bradley, Am. J. Sc., **37**, 339, 1914.

Chem. constitution of *calcite* and *aragonite*; Vaubel, J. prakt. Chem., **86**, 366, 1912.

Deformation under pressure; Adams, J. Geol., **18**, 489, 1910. Effect of high temperatures at high pressures; Boeke, N. Jb. Min., **1**, 91, 1912.

Study of the behavior of the different members of the *calcite group*, especially *dolomite* and *ankerite*, when heated in current of air free from carbon dioxide and when treated with hydrochloric acid and a solution of copper nitrate. Grünberg, Zs. Anorg. Chem., **80**, 337, 1913.

Influence of the speed of the chemical action of solvents upon the etching figures produced; Gaubert, C. R., **155**, 547, 1912.

Phosphorescent calcites; Pisani, C. R., **158**, 1121, 1914.

Color reactions upon *calcite* and *aragonite*; Thugutt, Centralbl. Min., 786, 1910. Microchemical reactions; Thugutt, [Ber. Ges. Wiss. Warsaw, 38, 1911], Zs. Kr., **54**, 197, 1914.

Experiments with artificial formation in solutions at varying temperatures and with varying amounts of other salts in solution; Leitmeier, N. Jb. Min., **1**, 49, 1910.

Variety from Capo Calamita, Elba, containing cobalt called *cobalto-calcite*; Millosevich, Rend. Acc. Linc., **19**, (1), 92, 1910.

A fibrous crystalline variety has been called *lublinite*. It was originally described from Wysokie, Gouv. Lublin, Poland; Morozewicz, [Cosmos, **32**, 487, 1907], Zs. Kr., **48**, 522, 1910; also Centralbl. Min., 229, 1911; see also Watitsch, [Ann. Geol. Min. Russ., **9**, 241, 1908] and for a description of the material from a new locality, near Horb am Neckar, Wurtemberg, together with a complete discussion of the various forms of calcium carbonate that have been described, see Lang, N. Jb. Min., Beil.-Bd., **38**, 121, 1914. The properties of the mineral as given by Lang are as follows: Occurs in very fine glass-clear needles without cleavage or twinning. Monoclinic. High birefringence. Optically −. Approx. refractive indices, $\alpha = 1{\cdot}48$, $\beta = 1{\cdot}54$, $\gamma = 1{\cdot}66$. G. = 2·65, approx. When boiled with a solution of cobalt nitrate becomes colored much more slowly than either calcite or aragonite. Often alters to calcite and becomes material known as *bergmilch*. Mügge, Centralbl. Min., 673, 1914, concludes that it is calcite pseudomorphous after some organic material.

An artif. calcium carbonate occurring in minute spherules with G. = 2·6 and less stable than calcite or aragonite has been called *vaterite*, after Prof. H. Vater, of Tharandt, Saxony. W. Meigen, [Vh. Ges. Deutsch. Naturfors. u. Ärzte, **2**, (1), 124, 1911]. See also Diesel, Zs. Kr., **49**, 272, 1911.

Caledonite, Min., p. 924; App. I, p. 13; II, p. 23. — Study of crystals from a new locality in New Caledonia with further study of crystals from old localities leads to the conclusion that the symmetry is orthorhombic. New axial ratio and description of forms given. Ungemach, Bull. Soc. Min., **35**, 553, 1912. Crystals from Cero Gordo, Cal.; Guild, Zs. Kr., **49**, 321, 1911.

Calomel, Min., p. 153; App. I, p. 13; II, p. 24. — Detailed description of material from Terlingua, Texas; Hillebrand and Schaller, Zs. Kr., **47**, 433, 1909; U. S. G. S., Bull., **405**, 1911; see App. II.

Occ. in crystals from Nikitowka, Ekaterinoslaf, Russia; Fedorov, [Ann. Inst. Mines, St. Pet., **1**, 81, 1908], Zs. Kr., **51**, 295, 1912.

Cancrinite, Min., pp. 427, 1029; App. II, p. 24. — Discussion of chemical composition with review of older analyses and with new analyses of material from Brevik, Norway (both rose-red and yellow) and from Särna, Sweden. Discussion of origin. Thugutt, N. Jb. Min., **1**, 25, 1911. Analyses from extrusive rocks in the Laacher See district, Prussia, with discussion of chem. comp.; Brauns and Uhlig, N. Jb. Min., Beil.-Bd., **35**, 723, 1913.

Regular inclusions of hematite from Miask, Ilmen Mts., Russia; Johnsen, Centralbl. Min., 369, 1911.

A mineral detected in thin sections of a nepheline syenite from the Los Islands resembling cancrinite, but showing a lower birefringence has been called *losite*; Lacroix, Arch. Mus., Paris, **3**, 37, 1911; Bull. Soc. Min., **35**, 5, 1912.

CARMINITE, Min., p. 755. — Occ. at Calstock, Cornwall; Russel, Min. Mag., **15**, 285, 1910.

CARNALLITE, Min., p. 177; App. I, p. 13; II, p. 24. — Regular intergrowth with *hematite* from near Stassfurt; Johnsen, Centralbl. Min., 168, 1909. Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

Carnegieite. See under *Anemousite.*

CARNOTITE, App. I, p. 3; II, p. 24. — Analysis from Radium Hill, near Olary, S. Australia; Crook and Blake, Min. Mag., **15**, 271, 1910. Occ. with analysis from near Mauch Chunk, Pa.; Wherry, U. S. G. S., Bull., **580**, 147, 1914.

Origin of the deposits in Colorado and Utah; Hess, Econ. Geol., **9**, 675, 1914.

CARPHOSIDERITE, Min., p. 969. — Probable identity of *utahite, apatelite, raimondite,* and *cyprusite* with *carphosiderite*, with the suggested formula, $H_2O.3Fe_2O_3.4SO_3.6H_2O$; Schaller, Am. J. Sc., **32**, 359, 1911; Zs. Kr., **50**, 106, 1911. See also under *Alunite.*

Anal. from Chihuahua, Mexico; Wittich, Boll. Soc. Geol. Mex., **8**, 47, 1913.

CASSITERITE, Min., pp. 234, 1030, 1037; App. I, p. 14; II, p. 24. — **Cryst.** — From Epprechtstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; from S. Piero in Campo, Elba, showing new form; Aloisi, Proc. Soc. Tosc., **19**, 78, 1910. General study of crystallization; Tertsch, [Denkschr. Ac. Wien, **84**, 563, 1908], Zs. Kr., **49**, 221, 1910. Critical review of all crystal forms with table of angles; Borgström, [Öfvers Finska Vetenskaps-Soc. Förh., **51A**, No. 3, 1, 1909], Zs. Kr., **50**, 284, 1911.

Refractive indices on artificial crystals; Baumhauer, Zs. Kr., **47**, 1, 1909.

Its zonal structure, electric properties and the presence of rare elements as determined by spectrum anal.; Liebisch, Ber. Ak. Wiss., 414, 1911.

Study of the genesis of tin deposits with especial description of the tin mines of the Villeder District, France; Tronquoy, Bull. Soc. Min., **35**, 238, 1912.

Discussion of composition of var. *ainalite* and relation to members of *rutile group.* Suggested that it be called a *tantalum cassiterite.* Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

Cebollite. *E. S. Larsen* and *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 480, 1914.

Orthorhombic (?). In fibrous aggregates. H. = 5. G. = 2·96. Color white to greenish-gray. Refractive indices, $\alpha = 1 \cdot 595$, $\beta = 1 \cdot 60$, $\gamma = 1 \cdot 628$. Extinction parallel to length of fibers. Optically +. 2V = 58°, approx.

Comp. — $5CaO.Al_2O_3.3SiO_2.2H_2O$ or $H_4Al_2Ca_5Si_3O_{16}$. MgO, Na_2O and FeO replace in small amounts the CaO.

Anal. — By Schaller after correction for insol. material; SiO_2, 33·02; Al_2O_3, 14·02; Fe_2O_3, 3·43; FeO, 0·21; MgO, 4·69; Na_2O, 2·57; K_2O, *tr.*; CaO, 35·72; H_2O, 6·26; Total, 99·92.

Pyr. — Fusible at 5 to a clear glass. Yields water in C. T. Soluble in acids with gelatinization.

Obs. — Found as an alteration product of *melilite*, southeast of the forks of Beaver Creek, Gunnison County, Col.

Name. — Derived from Cebolla Creek, in whose drainage the mineral was collected. Name pronounced *cĕ-vōi'-īte.*

Cerfluorite. — Name proposed for possible mixtures of the fluorite molecule with CeF_3. See under *Fluorite.*

CELESTITE, Min., p. 905; App. I, p. 14; II, p. 25. — **Cryst.** — From Lyssaja Mt., near Feodosia, Crimea, Russia; Popov, Bull. Soc. Imp. Nat. Moscou, Nos. 1 and 2, 180, **1906**; Zs. Kr., **46**, 221, 1909. From various Sicilian localities with new forms; Traina, Mem. Acc. Linc., **6**, 544, 1908; from Petschischtschi near Kazan, Russia; Samojlov, Bull. Ac. St. Pet., **3**, 485, 1909; Zs. Kr., **51**, 94, 1912; from Scharfenberg, near Meissen, Germany, with a discussion of the known forms and a table of angles after Goldschmidt of forms established since 1897; Henglein, Centralbl. Min., 692, 1911.

Study of optical changes, etc., produced by heating and description of a dimorphous modification; Grahmann, Inaug. Diss., Leipzig, 1913; Zs. Anorg. Chem., **81**, 257, 1913; geometrical and optical changes of celestite and other members of *barite group* with rise of temperature; Kolb, Zs. Kr., **49**, 14, 1910.

Analysis from limestones of northern Tyrol; Haas, N. Jb. Min., **1**, 1, 1912.

Artificial formation and isomorphous mixtures with *barite* and *anglesite*; Gaubert, C. R., **145**, 877, 1907; Bull. Soc. Min., **32**, 139, 1909.

General discussion of occ. in sedimentary rocks with description of occ. in the Mokattam limestone, Egypt; Andrée, N. Jb. Min., Beil.-Bd., **37**, 343, 1914.

CELSIAN, App. I, p. 15; II, p. 25. — Measurement of crystal of *paracelsian* found in the calciphyr at Candoglia, Toce valley, Italy, shows it to be identical with *celsian*; Tacconi, [Att. Soc. Ital. Sc. Milano, **50**, 55, 1911], Zs. Kr., **54**, 388, 1914.

CERARGYRITE, Min., p. 158; App. II, p. 25. — Study of the thermal relations of the ternary system of AgCl, AgBr and AgI; Matthes, N. Jb. Min., Beil.-Bd., **31**, 342, 1911.
Occ. at Tonopah, Nev.; Burgess, Econ. Geol., **6**, 13, 1911.

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Effect upon optical properties of saturation by various compounds; Grandjean, C. R., **149**, 866, 1909.
Anal. — From near Reading, Pa.; Smith, [Proc. Ac. Nat. Sc., **62**, 538, 1910], Zs. Kr., **52**, 79, 1912; from Frankford and from Lenni, Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from near Somosújfalu, Comitat Nógrád, Hungary; Vendl, [Földt. Közl., **41**, 70, 195, 1911], Zs. Kr., **54**, 181, 1914.
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Occ. at Wolftone mine, Leadville, Col., together with *hetærolite*; Ford, Am. J. Sc., **38**, 502, 1914.

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CHALCOPYRITE, Min., pp. 80, 1030; App. I, p. 15; II, p. 27. — **Cryst.** — From Swedish localities; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908; from Markirch, Alsace, with new form; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, No. 3, 293], Zs. Kr., **53**, 569, 1914; from La Primavera mine, Canelas, Durango, Mexico, with new forms; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 264, 1911; from the Virtuous Lady mine, near Tavistock; Russell, Min. Mag., **17**, 1, 1913.

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CHALMERSITE, App. II, p. 27. — Crystals from Brazil with suggestion of change in the orientation of Palache by interchanging the a and b axes and making the form (133) of Palache the unit pyramid. The axial ratio then becomes, $a : b : c = 0{\cdot}5822 : 1 : 0{\cdot}5611$. A table of angles after Goldschmidt of the known forms with this new orientation is given; Hlawatsch, Zs. Kr., **48**, 205, 1910.

CHIOLITE, Min., p. 168. — General description of Greenland occurrence. Shows cleavges, (001) perfect, (111) distinct. Refractive indices, $\omega = 1{\cdot}3486$, $\epsilon = 1{\cdot}3424$. Artif. crystals. Bøggild, Zs. Kr., **51**, 591, 1912.

CHLOANTHITE, Min., p. 88; App. II, p. 28. — Anal. of material from Markirch, Alsace; Dürr, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 183], Zs. Kr., **47**, 303, 1909.

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Chem. constitution; Vernadsky, Bull. Ac. St. Pet., 3, 1183, 1909; Zs. Kr., 51, 108, 1912; Clarke, U. S. G. S., Bull., 588, 1914.

Synthesis by action of alkaline solutions at high pressures upon *pyroxene*; Friedel and Grandjean; Bull. Soc. Min., 32, 150, 1909. Artif. formation; Doelter and Dittler, Ber. Ak. Wien, 121, (1), 897, 1912.

Variety from Sheridan Co., Wyoming, containing only small amount of iron given name *sheridanite*. Optical description and analysis; Wolff, Am. J. Sc., 34, 475, 1912.

Variety occurring in small balls made up of irregularly arranged fibres called *tolypite*; Uhlemann, Min. Mitt., 28, 461, 1909.

CHLORITOID, Min., pp. 640, 1031; App. I, p. 16; II, p. 28. — Analyses of the so-called *ottrelite* from the Apuan Alps, Italy, proves it to be identical with *chloritoid*; Manasse, Mem. Soc. Tosc., 26, 121, 1910. Study of chem. comp. of the *chloritoid group*; *idem*, Proc. Soc. Tosc., 20, 29, 1911.

CHLOROPAL, Min., p. 701; App. II, p. 28. — *Nontronite* as alteration product of *wollastonite* with anal. from near Concepción del Oro, Mexico; Bergeat, Centralbl. Min., 161, 1909. Anal. of material from Silver Peak Quadrangle, Nev.; Turner, Bull. Geol. Soc. Am., 20, 223, 1909.

Chrom-brugnatellite. See under *Stichite*.

CHROMITE, Min., pp. 228, 1031; App. I, p. 17; II, p. 28. — Crystals from the Marjalahti meteorite with new form; anal. given; Borgström, G. För. Förh., 30, 331, 1908; anal. from Cedar Mt., Alameda Co., Cal.; Kramm, [Proc. Am. Phil. Soc., 49, 315, 1910], Zs. Kr., 52, 78, 1912; from northern Caucasus; Besborodko, N. Jb. Min., Beil.-Bd., 34, 783, 1912; from the platiniferous dunites, Ural Mts.; Duparc and Pinã y Rubies, Bull. Soc. Min., 36, 20, 1913.

Discussion of possible variation in chem. comp. by the inclusion of iron and chromium occurring in both bivalent and trivalent states; Jovitschitsch, Bull. Soc Min., 35, 511, 1912.

Chromitite. *M. Z. Jovitschitsch*, Ber. Ak. Wien, 117, (2*b*), 813, 1908; Monatshefte Chem., 30, 39, 1909.

Isometric. Octahedral habit. In small crystals as sand. G. = 3·1.

Comp. — $FeCrO_3$.

Anal. — Fe_2O_3, 30·59; Al_2O_3, 6·23; Cr_2O_3, 59·68; CaO, 1·25; MgO, 3·89, Total 101·64.

Found as sand and as a constituent of mica schist at Zeljin Mt., a part of the Kopaonik Mts., Servia.

CHRYSOBERYL, Min., pp. 229, 1031; App. II, p. 28. — **Cryst.** — From granite from Helsingfors, Finland; Sergelius, [Öfversigt Finska Vetenskaps-Soc. Förh., 50, No. 9, 1908], Zs. Kr., 49, 304, 1911; from Marschendorf, Moravia; Kretschmer, Min. Mitt., 30, 85, 1911; *alexandrite* from Tokowaia, Ural Mts.; Duparc and Sabot, Bull. Soc. Min., 34, 139, 1911; with new forms from St. Nicholas Ave., New York City; Whitlock, Bull. N. Y. State Mus., 158, 183, 1912.

From Kabambaie, Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, 31, 1913.

CHRYSOCOLLA, Min., p. 699; App. II, p. 29. — Three new analyses given and a discussion of composition with the conclusion that chrysocolla is best regarded as a solid solution of copper oxide, silica, and water as essential constituents, whose composition depends upon the conditions of formation; Foote and Bradley, Am. J. Sc., 36, 180, 1913.

Occ. with anal. from Congo Free State and discussion of chem. comp.; Buttgenbach, Ann. Soc. Geol. Belgique, 31, 1913. Anal. of material from Huiquintipa, Tarapacá, Chile; Keller, [Proc. Am. Phil. Soc., 48, 65, 1909], Zs. Kr., 53, 404, 1914.

Found at Mackay, Idaho, in microscopic acicular crystals in radiating groups or narrow bands composed of closely packed individuals oriented normal to sides of the bands. Optical study gave the following: uniaxial, optically +; refractive indices, $\omega = 1·46$; $\epsilon = 1·57$; weak pleochroism, ω = colorless, ϵ = pale bluish green. Partial analysis given. Umpleby, J. Wash. Ac. Sc., 4, 181, 1914.

CHRYSOLITE, Min., pp. 441, 1031; App. I, p. 17; II, p. 29. — **Cryst.** — From Maillargues, Cantal; Gonnard, Bull. Soc. Min., 32, 81, 1909; from Podhorn, Marienbad, Bohemia; Himmelbauer, Min. Mitt., 31, 326, 1912.

Opt. — Crystallographic and optical study of Egyptian material; Steiner, [Ann. Mus. Nat. Hung., 4, 293 and 310, 1906], Zs. Kr., 46, 304, 1909; study of the variation of optical properties with variation of chemical composition with new anal. of material from Windisch-Matrei, Tyrol, from Kammerbühl near Eger, Bohemia, from Vesuvius, from Itkul, Ural Mts.; Blacklund, Trav. Mus. Geol., Ac. Sc., St. Pet., **3**, 77, 1909; Zs. Kr., **51**, 207, 1912. Anal. from various localities with determination of optical constants and discussion of their variation with variation in chem. comp.; Jugovics, Ann. Mus. Nat., Hung., **11**, 323, 329, 1913; discussion of the optical and crystallographic relations between the *chrysolite* and *humite groups*; Vogt, Videnskapsselskapets Skrifter, No. 5, 1912.

Anal. — From Rentières, Puy-de-Dôme; Gonnard, Bull. Soc. Min., **32**, 78, 1909; from basalt of Medves near Salgó-Tarján, Comitat Nógrád, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from meteorite found at Sismondium, Cape Colony; Prior, Min Mag., **15**, 312, 1910; from chrysolite bombs found in the basalt tuffs of southern Styria; Schadler, Min. Mitt., **32**, 485, 1914; of nodules in basalt flow, north of Scano, Sardinia; Washington, J. Geol., **22**, 746, 1914.

Occ. in dike rocks from Espichel, Portugal; Souza-Brandão, [Ann. Polytech. Ak. Porto, **2**, 1, 1907], Zs. Kr., **49**, 292, 1911.

Experiments with silicate melts containing various mixtures of *chrysolite* and *diopside*; Lebedew, Ann. Inst. Polytech. St. Pet., **15**, 691, 1911. Synthesis of dunite; Duparc, Schunoff-Deleano and Sabot, Bull. Soc. Min., **36**, 265, 1913.

Cinnabar, Min., pp. 66, 1031; App. I, p. 17; II, p. 29. — Change in refractive index with lowering of temperature; Becquerel, C. R., **147**, 1281, 1908. Dispersion; Rose, Centralbl. Min., 527, 1912.

Artif. formation and thermal relations; Allen, Crenshaw and Merwin, Am. J. Sc., **34**, 341, 1912; Zs. Anorg. Chem., **79**, 125, 1912.

Cliachite. See under *Sporogelite.*

Clinochlore, Min., p. 644; App. I, p. 17; II, p. 29. — Anal. of material in serpentine from Markirch, Alsace; Rhein, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 132], Zs. Kr., **47**, 308, 1909.

Occ. from Sasso di Chiesa, Val Malenco, Lombard, Italy; Magistretti, Rend. Acc. Linc., **19**, (1), 758, 1910; of *kotschubeite*, and *kämmererite* from chromite deposit, northern Caucasus; Besborodko, N. Jb., Min., Beil.-Bd., **34**, 783, 1912.

Clinoenstatite, App. II, p. 30. — Crystallography of artificial material discussed by Zambonini, Zs. Kr., **46**, 1, 1909, with the conclusion that it is identical with *enstatite*, having the following crystallographic constants: $a : b : c = 1 \cdot 0331 : 1 : 0 \cdot 591$; $\beta = 90° 49'$. Further see Wright, Zs. Kr., **46**, 599, 1909, and Zambonini, *ibid.*, 601.

Occ. in meteorites; Michel, Centralbl. Min., 161, 1913.

Artif. formation; Zinke, N. Jb. Min., **2**, 117, 1911; artif. formation and its thermal relations; Bowen and Anderson, Am. J. Sc., **37**, 487, 1914; Zs. Anorg. Chem., **87**, 283, 1914; formation in artificial melts of mixtures of the system, *forsterite-silica*; Bowen, Am. J. Sc., **38**, 207, 1914; Zs. Anorg. Chem., **90**, 1, 1914.

Clinohumite, Min., p. 535; App. II, p. 30. — Parallel intergrowth with *forsterite* from Langoën, Vesteraalen Islands, Norway; see further under *Chrysolite*. Vogt, Videnskapsselskapets Skrifter, No. 5, 1912.

Clinozoisite, App. I, p. 18; II, p. 30. — Crystals from Campo a' Peri, Elba; Millosevich, Rend. Acc. Linc., **22**, (2), 544, 1913.

Anal. and optical study from the Maigelstal, Switzerland; Grubemann, Festschr. Uni. Zürich, 1914. Description with anal. from limestone at Candoglia, Toce valley, Italy; Tacconi, [Att. Soc. Ital. Sc. Milano, **50**, 55, 1911], Zs. Kr., **54**, 388, 1914.

Cobaltite, Min., p. 89; App. I, p. 18; II, p. 30. — Crystals from Chester, Mass.; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909.

Chem. constitution and relation to other members of the group; Beutell, Centralbl. Min., 663, 1911; *ibid.*, 225, 271, 299, 1912.

Cobaltnickelpyrite. *Henglein*, Centralbl. Min., 129, 1913.

Isometric; pyritohedral. A member of the *pyrite group* showing the forms, (001), (023), (111). Crystals from 0·5 mm. to 3 mm. in diameter. Metallic. Steel-gray color. Gray-black streak. H = 5–5·5. G. = 4·716. Conchoidal fracture. Distinct cleavage parallel to cube.

Comp. — $(Co,Ni,Fe)S_2$.

Anal. — 1, Varga; 2, König.

	Co	Ni	Fe	S	Insol.	Total
1.	[6·61]	17·50	21·15	53·70	1·04	100·00
2.	10·6	11·7	22·8	53·9	0·7	99·7

(A third incomplete anal. showed small amts. of Cu and As.)

Pyr.—Soluble in nitric acid. Heated in closed tube gives sublimate of sulphur and leaves a magnetic residue. On charcoal takes fire and burns with a blue flame. Gives reactions for cobalt and nickel with the fluxes.

Obs.—Found on specimens obtained about ten years ago from the Victoria mine, Müsen, Germany, associated with *siderite*, *quartz*, *pyrite*, *chalcopyrite* and *barite*.

General relations briefly discussed; Vernadsky, Centralbl. Min., 494, 1914.

Cobaltoadamite. *A. Lacroix*, Min. de la France, **4**, 424, 1910.

A var. of *adamite* containing cobalt replacing zinc. Pale rose-red to carmine color. From Cap Garonne, Var.

Cobaltocalcite. See under *Calcite*.

COLEMANITE, Min., p. 882; App. I, p. 18; II, p. 30.—A variety found at Lang, Los Angeles Co., Cal., was thought to be a new species and given the name *neocolemanite*. Anal. together with crystallographic and optical description given. Eakle, Bull. Uni. Cal. Geol. Dept., **6**, 179, 1911. Shown, however, by a change in the orientation of the crystals, to be identical with *colemanite*; Hutchinson, Min. Mag., **16**, 236, 1912.

Origin; Gale, U. S. G. S., Prof. Paper, **85**, 3, 1913.

COLLOPHANITE, Min., p. 808.—Description of the minerals of the French phosphorite deposits compiled from publications of Lacroix, and discussion of their composition; Schaller, J. Wash. Ac. Sc., **1**, 151, 1911; U. S. G. S., Bull., **509**, 89, 98, 1912.

The name *fluocollophanite* given to a variety containing fluorine, which occurs as an important constituent of the sedimentary calcium phosphates; Lacroix, Min. de la France, **4**, 561, 1910.

COLUMBITE, Min., p. 731; App. I, p. 18; II, p. 30.—Crystals with anal. from Ampangabé, Madagascar; Lacroix, Bull. Soc. Min., **35**, 180, 1912; from Ambatofotsikely, Madagascar; Duparc, Sabot and Wunder, Bull. Soc. Min., **36**, 5, 1913.

Anal. of material from monazite sand from North Carolina; Tschernik, [Bull. Ac. St. Pet., **2**, 243, 1908], Zs Kr., **50**, 68, 1911; from Brazil; Chesneau, C. R., **149**, 1132, 1909; of *ferrotantalite* from Rincon, Cal.; Schaller, (priv. contr. to be published in U. S G. S., Prof. Paper, **94**).

Description of occurrence of *manganotantalite* at Caterina mine, Hiriat Hill, Pala, Cal.; Schaller (priv. contr. to be published in U. S. G. S., Prof. Paper, **94**.)

CONICHALCITE, Min., p. 836.—Crystals from Maya-Tass, province of Akmolinsk, Siberia, are shown to be orthorhombic. Plane of optical axes is parallel to (010). Optically −. Bx_{ac} perpendicular to (001). 2E = about 88°. H. = 4·5. G. = 4·15. Anal. given. Michel, Bull. Soc. Min., **32**, 50, 1909.

CONNELLITE, Min., p. 919.—Needle-like crystals from Calumet and Arizona mine, Bisbee, Arizona, gave (0001) : (10$\bar{1}$1) = 53° 50′, corresponding to c = 1·185. G. = 3·396. Refractive indices: ω = 1·724; ϵ = 1·746. Anal. gave: SO_3, 3·43; Cl, 6·37; CuO, 75·96; H_2O, 16·07; −0 = Cl., 1·42; Total, 100·41. This corresponds to the formula, $Cu_{22}Cl_4SO_{23}.20H_2O$, which may be written $[CuSO_4.3Cu(OH)_2.H_2O].2[CuCl_2.Cu(OH)_2].14[Cu(OH)_2]$. Palache and Merwin, Am. J. Sc., **28**, 537, 1909.

Crystals and refractive indices of material from Arenas, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 205, 1912.

Occ. from Mouzaïa, Algeria; Lacroix, Bull. Min. Soc., **33**, 33, 1910.

COPIAPITE, Min., p. 964; App. II, p. 31.—The so-called *ihleite* from Elba shown to be identical with copiapite and the latter shown to be triclinic; discussion of chem. comp. with probable formula given as $Fe_4S_6O_{21}.16H_2O$; Manasse, Proc. Soc. Tosc., July, 1911.

Anal. and optical study from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

Discussion of crystallographic orientation and chemical composition with relations to similar minerals; Scharizer, Zs. Kr., **52**, 372, 1914.

COPPER, Min., p. 20; App. I, p. 19; II, p. 31.—Cubic crystals embedded in gypsum from Veta Rica mine, Sierra Mojada, Coahuila, Mexico; Van Horn, Am. J. Sc., **35**, 23, 1913.

CORUNDUM, Min., pp. 210, 1031; App. I, p. 19; II, p. 32.—Crystals from granite from Helsingfors, Finland: Sergelius, [Öfversigt Finska Vetenskaps-Soc. Förh., **50**, No. 9, 1908], Zs. Kr., **49**, 304, 1911; from Chester, Mass., with new form; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909; from Ceylon and Burma with new forms and critical discussion of uncertain forms, combinations, etc.; Goldschmidt and Schroeder, Min. Mitt., **29**, 461, 1910.

Refractive indices of artif. stones; Brauns, Centralbl. Min., 673, 1909.

Determination of hardness by grinding tests; Holmquist, G. För. Förh., **33**, 281, 1911.

Anal. and optical study of synthetic sapphires; Moses, Am. J. Sc., **30**, 271, 1910.
Anal. of material found with *graphite* from an American locality given as "South Mountains, Blue Ridge"; Tschernik, [Vh. Min. Ges., **45**, 425, 1907]; Zs. Kr., **47**, 291, 1909. Anal. of blue corundum from Dungannon Township and of brown corundum from Craigmont, Raglan Township, Ontario, Canada; Adams and Barlow, Trans. Roy. Soc. Canada, **2**, Sect. IV, 3, 1908.
Occ. of TiO_2 in natural sapphires; Verneuil, C. R., **151**, 1063, 1910.
Occ. of rubies at Naniazeik, Myitkyina District, Upper Burma; Bleeck, Rec. Geol. Sur. India, **36**, pt. 3, **37**, pt. 1, 18, 1908. Occ. in Madagascar; Lacroix, C. R., **154**, 797, 1912. Distinction between rubies from Burma and Siam; Michel, Zs. Kr., **53**, 533, 1914.
Artif. formation; Hönigschmid, Ber. Ak. Wien, **116**, (2*b*) 1013, 1907; Monatshefte Chem. **28**, 1107; Schlaepfer and Niggli, Zs. Anorg. Chem., **87**, 52, 1914. Synthetic rubies; Michel, Centralbl. Min., 135, 1914.

Cosalite, Min., p. 121. — Anal. from Deer Park, Wash.; Bancroft, Bull. U. S. G. S., **430**, 214, 1910.

Cotunnite, Min., p. 165; App. I, p. 20. — Crystals formed upon Roman lead plates found in the sea near Mahdia, Tunis; Lacroix, C. R., **151**, 276, 1910.
Radioactivity of material from Vesuvius; Zambonini, Rend. Acc. Linc., **16**, (1), 975, 1907; Riv. Min., **39**, 88, 1909; Rossi, Rend. Acc. Linc., **16**, (2), 631, 1907; *ibid.*, **19**, (2), 578, 1910.

Covellite, Min., p. 68; App. I, p. 20; II, p. 32. — Artif. formation; Quercigh, Rend. Acc. Linc., **23**, (1), 826, 1914.

Cristobalite, Min., p. 400; App. II, p. 32. — Formation in quartz brick; Holmquist, G. För. Förh., **33**, 245, 1911. Formation and thermal relations; Smits and Endell, Zs. Anorg. Chem., **80**, 176, 1913.

Cryolite, Min., pp. 166, 1032; App. I, p. 20; II, p. 32. — General description of crystals and their deformation with critical study of the twinning laws. The mineral does not show a cleavage, the cleavages previously described being parting planes due to twinning lamellæ. Relations to *perovskite* and *boracite*. Böggild, Zs. Kr., **50**, 349, 1911; see also, Wallerant, Bull. Soc. Min., **35**, 177, 1912.
Refractive indices of mineral from Greenland; Krenner, [Ann. Mus. Nat. Hung., **8**, 370, 1910], Zs. Kr., **53**, 66, 1913.
Description of occ. at Ivigtut, Greenland, and in the Ural Mts.; Böggild, Zs. Kr., **51**, 591, 1912.

Cryolithionite, App. II, p. 33. — Occ. at cryolite locality, Ural Mts.; Böggild, Zs. Kr., **51**, 591, 1912.

Cuproadamite. *A. Lacroix*, Min. de la France, **4**, 424, 1910.
A var. of *adamite* from Cap Garonne, Var, containing copper. Sea-green color.

Cuprodescloizite, Min., p. 787; App. II, p. 33. — Crystals from Camp Signal, San Bernardino Co., Cal.; Schaller, J. Wash. Ac. Sc., **1**, 149, 1911; U. S. G. S., Bull., **509**, 88, 1912.
Found at the Shattuck Arizona mine, Bisbee, Arizona, where it occurred in the form of stalactites. Optical study gave: elongated fibers show parallel extinction; the elongation is parallel to $\mathfrak{a}$: pleochroism; parallel to elongation, yellow; normal thereto, brown; $n > 1{\cdot}74$. Birefringence strong. Anal. gave the following: PbO, 55·64; CuO, 17·05; ZnO, 0·31; V_2O_5, 21·21; As_2O_5, 1·33; P_2O_5, 0·24; CrO_3, 0·50; H_2O, 3·57; Insol., 0·17; Total, 100·02. Wells, Am. J. Sc., **36**, 636, 1913.
Anal. of material from Old Yuma mine near Tucson, Arizona, and from Argentina; Guild, Zs. Kr., **49**, 321, 1911.

Cuproiodargyrite. See under *Miersite.*

Cuproscheelite, Min., p. 988; App. II, p. 33. — Anal. from wolframite mine Sorpresa at Montoro, Spain; Granell, [Boll. Soc. Esp. Hist. Nat., **9**, 81, 1909], Zs. Kr., **50**, 472, 1911

Cuspidine, Min., p. 533. — Anal. of material from Franklin Furnace, N. J., by Warren leads to formula $Ca_2Si(O,F_2)_4$. Material analyzed consisted of white crystal fragments. G. = 2·965–2·989. Anal. — SiO_2, 32·35; CaO, 61.37; MnO, 0·71; Na_2O, 0·48; K_2O, 0·27; F, 9·05; less O = F_2, 3·81; Total, 100·43. Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.
Occ., with description of crystals from the Alban Mts., Italy; Starrabba, Rend. Acc. Linc., **22**, 871, 1913.

Custerite. *J. B. Umpleby, W. T. Schaller,* and *E. S. Larsen;* Am. J. Sc., **36**, 385, 1913; Zs. Kr., **53**, 321, 1914.

Monoclinic. In fine granular masses. Perfect cleavage ‖ to $c(001)$; good cleavage ‖ to $m(110)$. Three cleavages make nearly 90° angles with each other. Twinning plane $c(001)$, showing in twinning lamellæ. H. = 5. G. = 2·91. Luster, greasy to vitreous. Color greenish gray. Transparent. Brittle. Optically +. Bx_{ac} nearly perpendicular to $c(001)$. Extinction angle on plane cut ‖ to $b(010)$ = 6–7° with trace of twinning plane. 2V = 60·1°. α = 1·586; β = 1·589; γ = 1·598. Strong dispersion $\rho > v$.

Comp. — A fluor-hydroxyl silicate of calcium; $4CaO.2(H_2O,F_2).2SiO_2$ or $Ca_2(OH,F)SiO_3$.

Anal. —

SiO_2	CaO	H_2O	F	MgO	Magnetite	Total	O = F
32·17	55·11	5·30	8·12	1·19	1·00	102·89	−3·42 = 99·47

Pyr. — Easily decomposed by hydrochloric acid. B. B. fuses with difficulty to a white enamel. Heated in a closed tube phosphoresces with a yellow light. At higher temperature yields water and fluorine.

Obs. — Found in contact metamorphic zone of a limestone at the Empire Mine, Custer Co., Idaho. Associated with *magnetite, garnet* and *diopside.*

Cyanite, Min., p. 500; App. I, p. 21; II, p. 33. — Discussion of crystal orientation; Federov, [Vh. Min. Ges., **44**, 299, 1906], Zs. Kr., **46**, 213, 1909.

Anal. from garnet-mica-schist from Lauffenberg near Radenthein, Zillertal, Tyrol; Kern, Centralbl. Min., 215, 1909; from various localities in Pa.; Eyerman [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914.

Occ. at Klosterkogel near Admont, Styria, in veins with quartz and siderite; Kittl, Centralbl. Min., 463, 1914.

Cyprusite, Min., p. 971. — Chem. comp; see under *Carphosiderite.*

Cyrtolite. See under *Zircon.*

Dahllite, Min., p. 866; App. I, p. 21. — Anal. of mineral near dahllite from Mouillac, Tarn-et-Garonne, France; Lacroix, C. R., **150**, 1388, 1910; from Tonopah, Nev., with anal. and optical description. General discussion of relations to *apatite group.* Rogers, Am. J Sc., **33**, 475, 1912; Zs. Kr., **52**, 209, 1913. Description of the minerals of the French phosphorite deposits compiled from publications of Lacroix and discussion of their composition; Schaller, U. S. G. S., Bull., **509**, 89, 98, 1912; also *idem,* J. Wash. Ac. Sc., **1**, 151, 1911.

See also under *Podolite.*

Danburite, Min., p. 490; App. I, p. 22; II, p. 33. — Crystals from Maharitra, Madagascar; Lacroix, Bull. Min. Soc., **33**, 37, 1910; from Obira, Japan with several new forms and a Goldschmidt table of angles for them; Goldschmidt and Philipp, Zs. Kr., **50**, 443, 1911; from Japan; Ungemach, Ann. Soc. Geol. Belgique, Mem., **39**, 421, 1912.

Datolite, Min., p. 502; App. I, p. 22; II, p. 34. — Cryst. — From Franklin Furnace, N. J., with new forms; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909; from Bergen Hill, N. J.; Ford and Pogue, Am. J. Sc, **28**, 185, 1909; with new forms from Sainte-Marie, Alsace; Ungemach, Bull Soc. Min., **32**, 397, 1909; from Erie R. R. cut, Bergen Hill, N. J. with new forms; Whitlock, School of Mines Quart., **31**, 225, 1910. Description of crystals from following localities: Karadja, Crimea; Westfield, Mass.; Tamarac mine, Lake Superior, Mich.; Serra dei Zanchetti, Bologna, Italy; Seiseralpe, Tyrol; Wäschgrund near Andreasberg, Harz Mts. A critical discussion is given of zones and combinations and of occurrence and size of the faces of the different forms and a table of angles supplementary to that of Goldschmidt's "Winkeltabellen." Görgey and Goldschmidt, Zs. Kr., **48**, 619, 1910. Discussion of the two chief orientations in general use with description of crystals from Westfield, Mass. with 9 new forms. With corrections and criticisms of various recent articles on crystallography of datolite Ungemach, Zs. Kr., **49**, 459, 1911. Crystals from Markirch, Alsace; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, No. 3, 293], Zs. Kr., **53**, 569, 1914.

Occ. in the Lizard District, Cornwall, with optical and crystallographic description and anal.; M'Lintock, Min. Mag., **15**, 407, 1910.

Anal. from Kunstmanntal, Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; from Machouk Mt, near Pyatigorsk, northern Caucasia; Tschirwinsky, Ann. Geol. Min. Russ., 171, 1911.

Davidite, App. II, p. 34. — Shown to be a mixture; Crook, Min. Mag., **15**, 281, 1910.

Davyne, Min., p. 428; App. I, p. 22. — Anal. from extrusive rocks in the Laacher See district, Prussia, with discussion of chem. comp.; Brauns and Uhlig, N. Jb. Min., Beil-Bd., **35**, 723, 1913.

Hexagonal crystals from lavas of Vesuvius, which were found to contain no potassium and much carbon dioxide, named *natrodavyne*; Zambonini, Min. Ves., Mem. Acc. Sc. Napoli, **14**, 188, 1910.

Dawsonite, Min., p. 299. — Study of specimens from the original locality gave the following. Orthorhombic. $a : b : c = 0{\cdot}6475 : 1 : 0{\cdot}5339$. $mm' = 114° 9'$; $cd = 28° 6'$; $md = 75° 10'$ Forms: $a(100)$, $b(010)$, $c(001)$, $m(110)$, $d(011)$, and probably also (130), (230), (210), (101). Crystals acicular, elongated parallel to c-axis. Cleavage parallel to $m(110)$ perfect. Ax. pl. $\parallel c(001)$; $Bx_{ac.} \perp a(100)$. Refractive indices, Na-light; $\alpha = 1{\cdot}466$, $\beta = 1{\cdot}542$; $\gamma = 1{\cdot}596$; $2V = 76° 46'$. Dispersion weak, $\rho < v$. Anal. after deducting $CaCO_3$: CO_2, 30·57; Al_2O_3, 36·01; Na_2O, 21·81; H_2O, 11·61; Total, 100·00. Graham, Trans. Roy. Soc. Canada, **2**, Sect. IV, 165, 1908.

Deeckeite. *J. Soellner*, Mitt. Bad. Geol. Landesanst., **7**, 415, 1913.

Occurs as pseudomorph after *melilite*, either in partial replacement when the characteristic peg-structure shows or in complete replacement. Color pale yellow in powder, colorless and transparent in thin section. Apparently uniaxial with very weak birefringence. Optically −. Refractive index about 1·48. G. = 2·1.

Comp. — $(H,K,Na)_2(Mg,Ca)(Al,Fe)_2(Si_2O_5)_5.9H_2O$.

Anal. — SiO_2, 61·94; Al_2O_3, 9·99; Fe_2O_3, 1·56; CaO, 3·15; MgO, 2·23; K_2O, 2·25; Na_2O, 0·17; H_2O, 18·31; Total, 99·60.

Pyr. — On heating becomes opaque. Not attacked by hydrochloric acid.

Obs. — Found in a melilite basalt rock from the Kaiserstuhl, Baden.

Name. — After Prof. Deecke, Director of the Geological Survey of Baden.

Delafossite, Min., p. 259. — This mineral has been found in the Calumet and Arizona mine at Bisbee, Arizona, associated with *kaolin* and ferruginous clay. It is hexagonal-rhombohedral. Chief forms present are (0001) and (10$\bar{1}$1). The prism, (10$\bar{1}$0) and two doubtful rhombohedrons, possibly (10$\bar{1}$4) and (01$\bar{1}$2) are also present. The crystals are tabular parallel to base to equidimensional in habit. Angle (0001) ∧ (10$\bar{1}$1) is approx. 66°, giving $c = 1{\cdot}94$. Color and streak, black. H. = 5·5. Easily fusible and becomes magnetic. Soluble in HCl and H_2SO_4, but not in HNO_3. Anal. gave: Cu, 41·32; Fe, 37·26; Insol., 0·21; O, [21·21]; Total, 100·00. Formula is $CuFeO_2$, probably a cuprous metaferrite. Rogers, Am. J. Sc., **35**, 290, 1913.

Delatynite. *J. Niedzwiedzki*, [Kosmos, **33**, 529, 1908], Zs. Kr., **49**, 223, 1910.

Closely related to *succinite*. From near Delatyn in East Galicia.

Delvauxite, Min., p. 849. — Anal. from a siderite mine at Payerbach, Lower Austria; Dittler, [Zs. Chem. u. Industrie der Colloide, **5**, 35, 1909], Zs. Kr., **51**, 641, 1912.

Descloizite, Min., p. 787; App. I, p. 22. — Crystals from Ruwe, Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, 83, 1912.

A mineral from Bena e Padru near Ozieri, Province Sassari, Sardinia, similar to descloizite in general but having a blacker color than the descloizite from that locality and therefore thought perhaps to be a new species, described by Lovisato, Rend. Acc. Linc., **19**, (2), 326, 1910.

Deweylite, Min., p. 676; App. II, p. 34. — Anal. from Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914.

Mineral from Chester Co., Pa., differing slightly from *deweylite* in composition has been called *pseudodeweylite*; Zambonini, Att. Acc. Napoli, **14**, (1), 84, 1908; Rend. Acc. Napoli, **14**, 148, 1908.

Diamond, Min., pp. 3, 1033; App. I, p. 22; II, p. 34. — Crystals from Lüderitzbucht, German S. W. Africa; Kaiser, Centralbl. Min., 235, 1909. From study of electric properties thought to belong to holohedral class of Isometric System. Description of many crystals; Van der Veen, Zs. Kr., **51**, 545, 1912.

Electrical conductivity at high temperatures; Doelter, Ber. Ak. Wien, **120**, (1), 49, 1911; Min. Mitt., **30**, 135, 1911.

Relative stability of *diamond* and *graphite*; Boeke, Centralbl. Min., 321, 1914.

Statistics concerning the larger diamonds found in South Africa; Spencer, Min. Mag., **16**, 140, 1911. Large stone from near Bagagem, Minas Geraes, Brazil; Derby, Am. J. Sc., **32**, 191, 1911. Occ. at Lüderitzbucht, German S. W. Africa; several articles reviewed in Zs. Kr., **51**, 399, 1912.

On genesis; Derby, J. Geol., **19**, 627, 1911; **20**, 451, 1912.

Diaspore, Min., pp. 246, 1033; App. II, p. 35. — Crystals from Chester, Mass., with new forms; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909; crystals from Horrsjöberg, Sweden, described. The locality of Broddbo, given in the Sys., p. 247, is said to be incorrect for this mineral. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Relation to similar minerals; Dittler and Doelter, Centralbl. Min., 104, 1912.

Didymolite. *A. Meister*, Vh. Min. Ges., **36**, 151, 1908.

Monoclinic. Axes, $a : b : c = 0{\cdot}6006 : 1 : 0{\cdot}2867$; $\beta = 74°$. Observed forms: (010), (110), (011). $010 \wedge 110 = 60°$, $010 \wedge 011 = 73° 30'$, $110 \wedge 011 = 68° 30'$. In small crystals always twinned with (110) as tw. pl. Brittle. H. = 4–5. G. = 2·71. Color dark gray. Opaque. Optically −. Ax. pl. parallel to (010). One of the optical axes nearly coincident with *c* axis. 2V = 78°–87° 30′. $\beta = 1{\cdot}5$. $\gamma - \alpha = 0{\cdot}015$.

Comp. — $2CaO.3Al_2O_3.9SiO_2$ = Silica, 54·03; alumina, 33·27; lime, 12·70.

Anal.—	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	C	Total
	53·33	30·13	4·07	10·83	1·22	0·40	99·98

Two other anal. are given in which the lime is largely replaced by magnesia.

Pyr. — Difficultly fusible to white slag. Insoluble except in hydrofluoric acid.

Obs. — Found in a fine-grained crystalline limestone near contact with a nepheline syenite from the Tatarka River, a tributary of the Angará River, Yenisei District, Siberia.

Name. — Derived from δίδυμος, *twin*.

DOLOMITE, Min., pp. 271, 1033; App. I, p. 23; II, p. 36. — Crystals with anal. from Beaume, near Oulx, Piedmont; Colomba, Riv. Min., **38**, 35, 1909; from Sulzbach am Saar, Germany; Slavík, Bull. Ac. Sc. Bohême, **17**, May, 1912. Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of *calcite group;* Rinne, Centralbl. Min., 705, 1914.

Anal. and refractive indices on material from Biskra, Algeria; Hutchinson, Brit. Assoc. Rep., 701, 1908. Anal. from Markirch ore veins, Alsace; Dürr, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 183], Zs. Kr., **47**, 303, 1909; from the magnesium rocks of Vogtland, Germany; Uhlemann, Min. Mitt., **28**, 415, 1909; from limestone of northern Tyrol; Haas, N. Jb. Min., **1**, 1, 1912. New anal. with view to determination of the limits of the excess amount of calcium carbonate that may be present; Foote and Bradley, Am. J. Sc., **37**, 339, 1914.

Microchemical reactions; Thugutt, [Kosmos, 409, 1911], Zs. Kr., **54**, 198, 1914.

Occ. of ferriferous dolomite in Simplon tunnel; Lincio, [Att. Acc. Torino, **46**, 969, 1911], Zs. Kr., **54**, 201, 1914; Delgrosso, Riv. Min., **41**, 1912.

Origin; Linck, Sep. Pub. of address to Geol. Ges., Berlin, May, 1909. Artif. formation; Spangenberg, Zs. Kr., **52**, 529, 1913.

See also under *Calcite*.

DUFRENITE, Min., p. 797; App. II, p. 36. — Anal. by Schaller, from Grafton, N. H.; Clark, U. S. G. S., Bull., **419**, 1910.

DUFRENOYSITE, Min., p. 120; App. I, p. 23; II, p. 36. — Crystals with new forms from Lengenbach, Binnental, Switzerland; Solly, Min. Mag., **16**, 282, 1912.

DUNDASITE, App. I, p. 23; II, p. 37. — Occ. at Mill Close mine, Wensley, Derbyshire, and at Clements mine near Maam, County Galway, Ireland; Russell, Min. Mag., **16**, 272, 1912.

DUMORTIERITE, Min., p. 558; App. II, p. 37. — Occ. in pegmatite near Rio de Janeiro, Brazil; Eimann, Centralbl. Min., 615, 1914.

DYSANALYTE, Min., p. 724; App. II, p. 37. — Optical study of mineral from Vogtsburg, and Schelingen, Kaiserstuhl, Baden, showed that it is pseudoisometric, probably orthorhombic. The apparently cubic crystals are composed of intergrowths of six individuals with at times lamellar structure. Commonly faint zonal structure parallel to "cubic" faces. Refractive index high. Birefringence weak. Soellner, Centralbl. Min., 310, 1912.

New analysis of material from original locality, Vogtsburg, Kaiserstuhl, Baden, shows marked difference from analysis by Knop (see Sys., p. 724). From this analysis the mineral is considered to be a *perovskite* in which the lime has been to some extent replaced by FeO, MnO, and Na_2O. Anal. — TiO_2, 50·93; SiO_2, 2·21; Nb_2O_5, 4·86; FeO, 9·22; CaO, 25·60; MnO, 0·23; Na_2O, 4·37; Ce_2O_3, 2·80; Total, 100·22. G. = 4·21. H. = 4–5. In thin section isotropic. Hauser, Zs. Anorg. Chem., **60**, 237, 1908. Anal. of material from same locality; Meigen and Hugel, Zs. Anorg. Chem., **82**, 242, 1913.

EGLESTONITE, App. II, p. 37. — Crystals with anal. from San Mateo Co., Cal.; Rogers, Am. J. Sc., **32**, 48, 1911.

Detailed description; Hillebrand and Schaller, Zs. Kr., **47**, 433, 1909; U. S. G. S., Bull., **405**, 1909; see App. II.

Eichbergite. *O. Grosspietsch*, Centralbl. Min., 433, 1911.

Fracture uneven. Color iron-gray. H. = >6. G. = 5·36.

Comp. — $(Cu,Fe)_2S.3(Bi,Sb)_2S_3$.

Anal. — Cu, 3·62; Fe, 1·45; Bi, 51·53; Sb, 30·00; S, 17·74; Total, 99·34.

Obs. — Found at magnesite deposit at Eichberg, Semmering district, Austria. Assoc. with *magnesite* and *marcasite*. Altered on the outside of specimens.

Eguelite. *A. Lacroix*, Min. de la France, **4**, 536, 1910; *G. Garde*, C. R., **148**, 1616, 1909.
Amorphous. In small nodules with fibrous-lamellar structure. Very friable. G. = 2·6. Color brownish yellow. Powder yellow. Luster vitreous to slightly greasy. Isotropic with occasional birefringent spots. $n = 1\cdot65$.

Comp. — A hydrous basic phosphate of ferric iron with calcium and aluminium; $5(FePO_4)_2.\{Ca_3(PO_4)_2.2Fe(OH)_3.20H_2O$.

Anal. — By Pisani:

	P_2O_5	Fe_2O_3	Al_2O_3	CaO	H_2O	Insol.	Total
1.	31·5	46·7		2·3	19·5		100·00
2.	30·30	44·20	1·50	2·28	20·47	0·75	99·50

Pyr. — In C. T. blackens and gives much water. Fus. = 1. On charcoal fuses with intumescence to a black globule. Soluble in cold hydrochloric acid.

Obs. — Found embedded in clay from Egueï, Sudan.

Ehrenwerthite. *F. Cornu*, Zs. prakt. Geol., **17**, 82, 1909.
Colloidal form of iron hydroxide with the composition of göthite, $Fe_2O_3.H_2O$. Occurring as pseudomorphs after pyrite. Named after Prof. Josef von Ehrenwerth, of Loeben, Styria.

Embolite, Min., p. 159; App. II, p. 38. — Twins according to spinel law, which show new form (311), from Veta Rica mine, Sierra Mojada, Coahuila, Mexico; Van Horn, Am. J. Sc., **35**, 23, 1913.

Occ. at Tonopah, Nev.; Burgess, Econ. Geol., **6**, 13, 1911.

Empressite. *W. M. Bradley*, Am. J. Sc., **38**, 163, 1914.
Massive. In fine granular and compact masses. Fracture finely conchoidal to uneven. H. = 3–3·5. G. = 7·510. Color pale bronze. Streak grayish black to black.

Comp. — AgTe = Silver, 45·8; tellurium, 54·2.

Anal. — Insol., 0·39; Ag, 45·17; Te, 54·75; Fe, 0·22; Total, 100·53.

Pyr. — Fuses at 1. On charcoal in oxidizing flame gives coating of tellurium dioxide and a black globule. The latter on heating in reducing flame shows dendritic points of metallic silver. Readily soluble in hot dilute nitric acid.

Obs. — Found associated with *galena* and *native tellurium* at Empress-Josephine Mine, in the Kerber Creek District of Colorado.

Considered by Schaller to be a gold-free *muthmannite*; J. Wash. Ac. Sc., **4**, 497, 1914.

Enargite, Min., pp. 147, 1033; App. I, p. 24; II, p. 38. — Crystals from Kinkwaseki, Formosa; Jimbō, Beitr. Min. Japan, No. 3, 122, 1907; Okamoto, *ibid.*, No. 4, 157, 1912.

Anal. from Ouray Co., Col.; Thornton, Am. J. Sc., **29**, 358, 1910.

Enstatite, Min., p. 346; App. I, p. 24; II, p. 38. — Relations to *clinoenstatite*, *diopside*, *hedenbergite*, *ægirite* and *spodumene* discussed. Review of observed crystal forms and combinations; Zambonini, Zs. Kr., **46**, 1, 1909. Analogy between *enstatite-clinoenstatite* and *orthoclase-microcline*; Wahl, [Öfvers. Finska Vetenskaps-Soc. Förh., **50**, No. 2, 1908], Zs. Kr., **49**, 303, 1911.

Anal. of *bronzite* from chrysolite bombs found in the basalt tuffs of southern Styria; Schadler, Min. Mitt., **32**, 485, 1914.

Chem. comp.; Zambonini, Mem. Acc. Sc., Napoli, **16**, 1914.

Artif. formation; Doelter and Dittler, Ber. Ak. Wien, **121**, (1), 897, 1912; also Doelter, Min., Mitt., **32**, 130, 1913; Ber. Ak. Wien, **122**, (1), 1, 1913; Zinke, N. Jb. Min., **2**, 117, 1911.

Behavior of mixtures of *oligoclase* and *enstatite* when melted together; Schmidt, N. Jb. Min., Beil.-Bd., **27**, 604, 1909.

Epidesmine. *V. Rosický* and *St. J. Thugutt*, Centralbl. Min., 422, 1913; C. R. Soc. Sc. Varsovie, **6**, 225, 231, 1913.
Orthorhombic. Crystals minute, prismatic in habit with vertical pinacoids in equal development or tabular with $a(100)$ prominent. Only the three pinacoids definitely observed. Cleavage parallel to both vertical pinacoids; better parallel to $a(100)$. Colorless to yellow. Transparent to translucent. Minimum refractive index = 1·498. Ax. pl. parallel to $a(100)$. $Bx_{ac} \perp c(001)$. Negative. Birefringence, $\gamma - \alpha = 0\cdot015$. G. = 2·16.

Comp. — Same as for *stilbite* (*desmine*), $3Ca(Na_2,K_2)Al_2Si_6O_{16}.20H_2O$.

Anal. — SiO_2, 56·66; Al_2O_3, 16·00; CaO, 7·58; MgO, 0·06; K_2O, 0·67; Na_2O, 0·88; H_2O, 18·69; Insol., 0·44; Total, 100·98.

Pyr. — Easily fusible with intumescence to a white glass. Gives water in the closed tube.

Obs. — Occurs as a crust on *calcite* associated with small *orthoclase* crystals and *fluorite* from Schwarzenberg.

EPIDOTE, Min., p. 516; App. I, p. 25; II, p. 39. — **Cryst.** — From Chester, Mass.; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 410, 1911; from Val Torreggio; Tacconi, Mem. Acc. Linc., **8**, 736, 1911; with anal. from Notodden, Telemarken, Norway; Andersen, [Arch. Math. Nat., **31**, No. 15, 1, 1911], Zs. Kr., **53**, 595, 1914; from Maddalena archipelago, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 273, 1912; from Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, **31**, 1913; with anal. from Brosso, Piedmont, Italy; Grill, Rend. Acc. Linc., **23**, (1), 535, 1914.

Anal. — An iron-poor epidote from S. Barthélemy, Valle d'Aosta; Millosevich, Att. Soc. Ligustica Sc., **19**, 1908; of epidote from Dun Mt., near Nelson, New Zealand; Finlayson, Quart. Geol. Soc., **65**, 351, 1909; from various localities in Pa.; Eyerman, [Minerals of Pensylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912; from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913; from Mt. Ruwenzori, Congo Free State; Colomba, Sep. Pub., "Il Ruwenzori," **2**, 281.

Occ. at Zöptau, Moravia; Kretschmer, Min. Mitt., **30**, 104, 1911.

Isomorphous mixtures with *allanite* from near Kristiania, Norway; Goldschmidt, Centralbl. Min., 4, 1911.

Epinatrolite. *St. J. Thugutt*, Centralbl. Min., 405, 1911. See under *Natrolite*.

EPSOMITE, Min., p. 938; App. I, p. 25; II, p. 39. — Anal. from Lafayette, Montgomery Co., Pa.; Eyermann, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914.

Occ. in Laramie Basin, Wyoming, with anal.; Darton and Siebenthal, U. S. G. S., Bull., **364**, 58, 1909.

ERYTHRITE, Min., p. 817; App. I, p. 25; II, p. 40. — Crystals from Cobalt, Ontario, Canada, with new forms. Axial ratio calculated as follows: $a : b : c = 0{\cdot}7502 : 1 : 0{\cdot}7006$. $\beta = 74° 59'$. Green, Trans. Can. Inst., **8**, 443, 1910; from the Veta Rica mine, Sierra Mojada, Coahuila, Mexico; Van Horn, Am. J. Sc., **35**, 23, 1913.

ERYTHROSIDERITE, Min., p. 176; App. II, p. 40. — Crystals derived from alteration of *rinneite*; Slavík, Bull. Ac. Sc. Bohême, **17**, May, 1912.

EUCLASE, Min., p. 508; App. I, p. 25; II, p. 40. — Crystals from Epprechtstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 591, 1909; **47**, 242, 1909; from Brazil with new forms; *idem, ibid.*, **47**, 376, 1909. Correction of orientation assumed by Hussak (Min. Mitt., **12**, 473, 1892) and Dürrfeld, (Zs. Kr., **46**, 591, 1909); Dürrfeld, Zs. Kr., **47**, 372, 1909. A crystal from an unknown locality having a yellow color showing new form; Koechlin, Min. Mitt., **31**, 532, 1912.

Artif. formation; Doelter, Min. Mitt., **32**, 130, 1913; Ber. Ak. Wien, **122**, (1), 1, 1913.

EUCRYPTITE, Min., p. 426. — An artif. orthorhombic modification formed; Weyberg, [Trav. Soc. Nat. Varsovie, Nos. 14, 15, 1903–1904], Zs. Kr., **46**, 299, 1909. Artif. formation; Ginsberg, [Ann. Inst. Polytech. St. Pet., **16**, 1, 1911], Zs. Kr., **53**, 617, 1914; Zs. Anorg. Chem., **73**, 277, 1912. Artif. formation and thermal relations; Balló and Dittler, *ibid.*, **76**, 39, 1912.

EUXENITE, Min., p. 744; App. II, p. 40. — Anal. — From Eitland and Arendal, Norway; Hauser and Wirth, Ber. Chem. Ges., **42**, 4443, 1909; from Cooglegong, W. Australia; Simpson, Proc. Austral. Ass. Adv. Sc., **12**, 310, 1909; from the following localities in Madagascar: Ambolotara near Betafo; Lacroix, Bull. Min. Soc., **33**, 321, 1910; C. R., **152**, 559, 1911; from Andibakely; *idem*, Bull. Soc. Min., **35**, 233, 1912; from Samiresy Hill, east of Antsirabé; *idem, ibid.*, **35**, 84, 1912.

EVANSITE, Min., p. 846; App. I, p. 25; II, p. 40. — Description of occurrence in the Coosa coal field of Alabama; Grasty, Bull. Phil. Soc., Uni. Va., **1**, 223, 1912.

FAMATINITE, Min., pp. 149, 1041. — Anal. of material from Goldfield, Nev.; Ransome, U. S. G. S., Prof. Paper, **66**, 1909.

Faratsihite. *A. Lacroix*, Bull. Soc. Min., **37**, 231, 1914.

Monoclinic. In aggregates of microscopic hexagonal plates, resembling the structure of *kaolinite*. H. = less than that of a knife. G. = 2+. Color pale yellow. Refractive index a little higher than that for kaolinite. Clings to the tongue. Fracture fine granular.

Comp. — $(Al,Fe)_2O_3.2SiO_2.2H_2O$. Intermediate between *kaolinite* and *chloropal*.

Anal. — By Raoult:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O
41·60	22·68	15·22	0·54	0·11	0·60	0·16

K_2O	TiO_2	P_2O_5	H_2O at 150° C.	H_2O at red heat.	Total
0·22	0·13	0·21	5·71	13·02	100·20

Pyr. — Decomposed by hydrochloric acid, leaving a residue of pulverulent silica. Difficultly fusible to a grayish glass.
Obs. — Found in veins associated with opal traversing trachyte and phonolite rocks to the south of Faratsiho, Madagascar.

Fasernephrite. *J. Uhlig*, N. Jb. Min., **2**, 91, 1910. See under *Nephrite*.

FAUJASITE, Min., p. 598; App. II, p. 40. — Artif. formation of a potassium-faujasite; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

FAVAS, App. II, p. 40. — Anal. of minerals composed largely of ZrO_2 from Brazil; Wedekind, Ber. Chem. Ges., **43**, 290, 1910; Weiss, Zs. Anorg. Chem., **65**, 178, 1910.

FAYALITE, Min., pp. 456, 1034; App. I, p. 26; II, p. 41. — Study of the mineral from Cuddia Mida, Island of Pantelleria, Italy, gave the following facts: Axial ratio; $a : b : c$ = 0·4600 : 1 : 0·5811. Cleavage, $b(010)$, good, $c(001)$, fair. G. = 4·24. H. = 6·5–7. Refractive indices for yellow Hg line: α = 1·8044, β = 1·8382, γ = 1·8462; 2V = 51° 1′ 35″. Optically –. Anal. by Dittrich; SiO_2, 28.89; TiO_2, 1·19; Fe_2O_3, 5·08; FeO, 56·05; MnO, 3·39; CaO, 0·74; MgO, 3·11; Alk., 0·42; H_2O, 1·07; Total 99·94. Soellner, Zs. Kr., **49**, 138, 1910.
Zonal structure in artif. fayalite; Michel, Min. Mitt., **32**, 541, 1914.

FELDSPARS, Min., pp. 314, 1034; App. I, p. 26; II, p. 41. — Anal. of feldspars from various French localities; Barbier and Gonnard, Bull. Soc. Min., **33**, 81, 1910.
Discussion of the chemical constitution of feldspars and related silicates; Clarke, U. S. G. S., Bull., **588**, 1914.
Occ. of cæsium and rubidium in feldspars; Vernadsky, Bull. Ac. St. Pet., **3**, 163, 1909; Zs. Kr., **51**, 88, 1912.
The melting-point curve of *potassium-sodium feldspars* determined by experimenting with a number of natural minerals; Dittler, Min. Mitt., **31**, 413, 1912. Study of the melting phenomena of the *plagioclase feldspars* with more accurate determination of the solidus and liquidus curves. Bowen, Am. J. Sc., **35**, 577, 1913.
Grinding tests have been made upon various feldspars in order to determine their relative hardness and that of different crystal faces; Holmquist, G. För. Förh., **36**, 401, 1914.
Occurrence of feldspars in meteorites; Michel, Min. Mitt., **31**, 563, 1912; **32**, 170, 1913.
See also under the individual members of the *Feldspar Group*.

FERBERITE, Min., p. 985. — General description of occurrence in Boulder County, Col., with anal. and general discussion of composition of *wolframite series*. Description of crystals with list of new forms. Hess and Schaller, U. S. G. S., Bull., **583**, 1914.

Ferganite. *I. A. Antipov*, [Gornyi Zhurnal, St. Pet., **4**, 259, 1908], N. Jb. Min., **2**, *ref.* 38, 1909.
In scales. Color sulphur-yellow. Comp. — A hydrated uranium vanadate, $U_3(VO_4)_2.6H_2O$. Occurs with other uranium minerals in province of Fergana, Russian Turkestan.

FERGUSONITE, Min., p. 729; App. I, p. 26; II, p. 41. — Anal. from Trig Hill, Coolegong, W. Australia; Simpson, Proc. Austral. Ass. Adv. Sc., **12**, 310, 1909; from near Beforona, Madagascar; Lacroix, C. R., **152**, 559, 1911.

Fermorite. *G. F. H. Smith* and *G. T. Prior*, Min. Mag., **16**, 84, 1911.
Probably hexagonal, pyramidal; a member of the *apatite group*. H. = 5. G. = 3·518. Color pale pinkish-white to white. Uniaxial. Optically –. Refractive index about 1·660.
Comp. — Probably $(Ca,Sr)_4[Ca(OH,F)][(P,As)O_4]_3$.
Anal. — By Prior: — CaO, 44·34; SrO, 9.93; As_2O_5, 25·23; P_2O_5, 20·11; F, 0·83; H_2O, *tr.*; Insol., 0·08; Less O for F, 0·53; Total, 100·17.
Obs. — Found in veins of manganese ore with *braunite, hollandite, pyrolusite* and *sitaparite*, at Sitapar, Chhindwara District, Central provinces, India.
Name. — In honor of Dr. L. Leigh Fermor of the Geological Survey of India.

Fernandinite. *W. T. Schaller*, J. Wash. Ac. Sc., **5**, 7, 1915, and priv. contr.
Massive. Cryptocrystalline. Rarely in rectangular plates. Color dull green. In transmitted light, color from light green to dark olive-green to brownish green. Non-pleochroic. Moderate birefringence.
Comp. — $CaO \cdot V_2O_4 \cdot 5V_2O_5 \cdot 14H_2O$. A hydrous calcium vanadyl vanadate.
Anal. — Insol., 12·18; V_2O_4, 10·18; V_2O_5, 55·42; MoO_3, 1·38; Fe_2O_3, 0·79; CaO, 3·35; MgO, 0·06; K_2O, 0·52; H_2O, 15·81; Total, 99·69.
Pyr. — Dissolves readily in acids to a green solution; sufficiently soluble in cold water to give a yellow solution.
Obs. — Found at Minasragra, Peru.
Name. — After Eulagio E. Fernandini, the former owner of the vanadium deposit.

Ferritungstite. *W. T. Schaller*, J. Wash. Ac. Sc., **1**, 24, 1911; Am. J. Sc., **32**, 161, 1911; Zs. Kr., **50**, 112, 1911; U. S. G. S., Bull., **509**, 83, 1912.

Hexagonal. In microscopic hexagonal plates. Color pale yellow to brownish yellow.

Comp. — Hydrous ferric tungstate, $Fe_2O_3.WO_3.6H_2O$ = Tungstic oxide, 46·4; ferric oxide, 32·0; water, 21·6.

Anal. — After deducting 14 and 16% insol. material and recalculating.

	WO_3	Fe_2O_3	H_2O	Total
1.	45·1	32·3	22·6	100·00
2.	42·6	32·5	24·9	100·00

Pyr. — Yields water in C. T. Decomposed by acids, leaving yellow tungstic oxide.

Obs. — Product of oxidation of wolframite and found with that mineral and quartz at the Germania Tungsten mine, Deer Trail mining district, Washington.

Ferrobrucite. *A. Lacroix*, Min. de la France, **3**, 402, 1909. See under *Brucite*.

Ferropallidite, App. II, p. 42. — See *Szomolnokite*.

Ferroprehnite. *Johnston*, Can. Geol. Sur., Victoria Memorial Mus., Bull., **1**, 95, 1913. See under *Prehnite*.

Ferrotantalite. See under *Columbite*.

Fibroferrite, Min., p. 968; App. II, p. 42. — Anal. from Capo Calamita, Vigneria, and Capo d'Arco, Elba; Manasse, Mem. Soc. Tosc., **27**, 76, 1911.

Fichtelite, Min., p. 1000; App. II, p. 42. — Study of natural crystals from Kolbermoor, and of crystals obtained by dissolving and recrystallizing material from Kolbermoor and Wunsiedel, Bavaria; Rosati, Zs. Kr., **50**, 126, 1911.

Fizelyite. A new species is reported by mineral dealers with this name and said to be monoclinic in crystallization and to have the composition, $Ag_2Pb_5Sb_8S_{18}$. A description has not been available.

Flajolotite. *A. Lacroix*, Min. de la France, **4**, 509, 1910.

Compact or earthy. Color, lemon-yellow. In nodular masses. Hydrous antimonate of iron, $4FeSbO_4.3H_2O$. From Hammam N'Baïl, Constantine, Algeria. Anal. by Flajolot.

Florencite, App. II, p. 42. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite*.

Fluorcerite, Min., pp. 175, 1034; App. I, p. 26. — Crystals from Broddbo, near Falun, Sweden, showed the following forms, (0001), (10$\bar{1}$0), (11$\bar{2}$0) and (10$\bar{1}$1). The angle (10$\bar{1}$1) : (0001) = 63° 53′ from which c = 1·7736. Distinct cleavage parallel to (0001), less distinct parallel to (10$\bar{1}$0). Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Fluocollophanite. *A. Lacroix*, Min. de la France, **4**, 561, 1910. See under *Collophanite*.

Fluorite, Min., pp. 161, 1034; App. I, p. 26; II, p. 42. — **Cryst.** — From various localities in the Vosges Mts.; Ungemach, Bull. Soc. Min., **32**, 304, 1909; from Rossie, St. Lawrence Co., N. Y., with new form; Whitlock, Bull. N. Y. State Mus., **140**, 197, 1910; from Nordmarken, Sweden, showing new forms; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; with new forms from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 233, 1911; from Fallon granite pegmatite, Quincy, Mass., with new hexoctahedrons; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Proc. Am. Ac., **47**, 125, 1911; Zs. Kr., **49**, 332, 1911; from Artenberg near Steinbach, Schwarzwald, Baden; Dürrfeld, Zs. Kr., **53**, 182, 1913.

Luminesence of blue fluorite; Meyer, [Vh. Deutsch. Phys. Ges., **10**, 643, 1908], Zs. Kr., **49**, 318, 1911. Dispersion in ultra-red light; Paschen, Ann. Phys., **41**, 670, 1913.

Deformation under pressure; Adams, J. Geol., **18**, 489, 1910. Determination by grinding methods of the hardness of fluorite in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911.

Anal. by Steiger of material from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

Occ. in the Waldstein granite, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; in agate-like form with *thomsenolite*, from Ivigtut, Greenland; Böggild, Zs. Kr., **51**, 614, 1912; as cement in arkose from region of the Dents de Morcles, Rhone Valley, Switzerland; Hartmann, Centralbl. Min., 141, 1914.

Artificial mixtures of calcium fluoride with 50% or more of yttrium and cerium fluorides have been made. Mixtures of the CaF_2 molecule with YF_3 have been called *yttrofluorite* and of YF_3 with CeF_3 *yttrocerite*. The name *cerfluorite* is proposed for mixtures of CaF_2 with CeF_3

not yet observed in nature. This group of compounds is called the *fluorite-yttrofluorite group*. Vogt, N. Jb. Min., **2**, 9, 1914.

FORSTERITE, Min., p. 450; App. I, p. 26; II, 43. — Artif. formation; Allen, White, Wright, and Larsen; Am. J. Sc., **27**, 1, 1909; and thermal relations; Bowen and Anderson, Am. J. Sc., **37**, 487, 1914; Zs. Anorg. Chem., **87**, 283, 1914; in silicate melts in the ternary system, *diopside-forsterite-silica*; Bowen, Am. J. Sc., **38**, 207, 1914; Zs. Anorg. Chem., **90**, 1, 1914.
See under *Clinohumite*.

Fouchérite. *A. Lacroix*, Min. de la France, **4**, 535. Given as the correct spelling of *fucherite* (A. Leymerie, Min., **2**, 340, 1867). An amorphous hydrated basic phosphate of ferric iron with some aluminium and calcium. From Fouchères, Aube, France. Possibly identical with *borickite*.

FRANCOLITE. See under *Apatite*.

FRANKLINITE, Min., p. 272. — Anal. by Schaller, (G. = 5·09) from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

Fremontite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; to be published in U. S. G. S., Bull., **610**). **Natramblygonite.** *W. T. Schaller*, Am. J. Sc., **31**, 48, 1911; Zs. Kr., **49**, 233, 1911; **51**, 246, 1912; U. S. G. S., Bull., **509**, 101, 1912.
Monoclinic. Axes taken same as for amblygonite. Forms: $c(001)$, $b(010)$, $a(100)$, $z(1\bar{2}0)$, $e(0\bar{2}1)$, $h(101)$. Crystals coarse with rough faces. Usually in cleavable masses. Two directions o polysynthetic twinning are to be seen under microscope. Three cleavages; c and a distinct. H. = 5·5. G. = 3·04. Luster vitreous to greasy. Color grayish white to white. Translucent to opaque. Optically −. Cleavage $c(001)$ is nearly normal to a bisectrix and shows an interference figure with large angle.
Comp. — A sodium amblygonite or a fluor-phosphate of aluminium and sodium with some lithium replacing the sodium; $(Na,Li)Al(OH,F)PO_4$.
Anal. —

P_2O_5	Al_2O_3	Li_2O	Na_2O	K_2O	H_2O	F	Less O = F	Total
44·35	33·59	3·21	11·23	0·14	4·78	5·63	2·37	100·56

Pyr. — Easily fsuible with slight intumescence to an opaque white enamel; strong sodium flame color. Water in C. T.
Obs. — Found in a pegmatite near Canon City, Colorado, associated with *feldspar*, *quartz*, *tourmaline* and *lepidolite*.
Name. — Originally called *natramblygonite* in reference to its relations to *amblygonite*. This name later withdrawn because of certain etymological objections to it and *fremontite* substituted. The latter is derived from Fremont County, Col., in which the mineral was found.

FRIEDELITE, Min., pp. 465, 1035; App. I, p. 27; II, p. 43. — Occ. with anal. from Veitsch, Styria; Hofmann and Slavík, Bull. Ac. Sc. Bohême, **14**, June, 1909. Anal. by Schaller of material from Franklin Furnace, N. J., with discussion of formula; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

FUGGERITE, App. I, p. 27. — See under *Melilite*.

GADOLINITE, Min., pp. 509, 1035; App. I, p. 27; II, p. 43. — Crystals from Radautal, Harz Mts.; Fromme, Min. Mitt., **29**, 265, 1910; from pegmatite at Ytterby, Sweden; Nordenskjöld, [Bull. Geol. Inst., Upsala, **9**, 183, 1910], Zs. Kr., **53**, 406, 1914.
Mean specific heat of material from Ytterby, Sweden, and Hitterö, Norway; Schulz, Centralbl. Min., 393, 1912.

Gageite. *A. H. Phillips*, Am. J. Sc., **30**, 283, 1910.
In thin needle-like crystals in radiating groups or bundles. Colorless and transparent. Luster vitreous.
Comp. — A hydrous silicate of manganese, magnesium and zinc; $8RO.3SiO_2.2H_2O$.
Anal. — By R. B. Gage.

SiO_2	MnO	ZnO	MgO	H_2O	Total
24·71	50·19	8·76	11·91	[4·43]	100·00

Obs. — Found at Parker shaft, Franklin, N. J., assoc. with *zincite*, *willemite*, *calcite*, and *leucophœnicite*.
Name. — In honor of Mr. R. B. Gage, of Trenton, N. J.

GAHNITE, Min., pp. 223, 1035; App. I, p. 27; II, p. 43. — Anal. of *dysluite* (by Schaller) with G. = 4·6, from Stirling Hill, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909; anal. with refractive index from Ambatofosikely, Madagascar; Duparc, Sabot, and Wunder, Bull. Soc. Min., **37**, 19, 1914. Occ. in pegmatite near Träskböle in Perniö, Finland, with anal. and determination of refractive index (*n*, green-light = 1·8196). **Eskola**, G. För. Förh., **36**, 25, 1914.

Gajite. *Fr. Tućan*, Centralbl. Min., 312, 1911.

Fine granular. Under microscope shows twinning lamellæ. Cleavage, rhombohedral, perfect. Fracture, uneven. H. = 3·5. G. = 2·619. Color, white. Uniaxial. Birefringence strong.

Comp. — Hydrous calcium, magnesium carbonate.

Anal. —

CaO	MgO	CO_2	H_2O	Total
37·05	23·85	32·34	6·67	99·91

Pyr. — Easily soluble in acids with evolution of carbon dioxide. In C. T. yields alkaline water. Gives color reactions similar to aragonite.

Obs. — Found near Plešce, in the district Gorski kotar, Croatia.

Name. — In honor of Ljudevit Gaj.

Galafatite. See under *Alunite*.

GALENA, Min., p. 48; App. I, p. 27; II, p. 43. — Crystals from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Markirch, Alsace; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, 115, 1909], Zs. Kr., **49**, 512, 1911; from Weiden in the Fischbachtal, Rheinland, with new forms; Dürrfeld, Zs. Kr., **47**, 375, 1909.

Gliding planes; Taricco, Rend. Acc. Linc., **19**, (2), 508, 1910; Mügge, N. Jb. Min., **1**, 43, 1914.

Occ. in contact zones near Kristiania, Norway. From one locality it showed octahedral cleavage; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 254, 1911.

Occ. of selenium in galena from Tschudak and Syrjanowskji, Altai Mts., Russia; Pilipenko, Bull. Ac. St. Pet., **3**, 1113, 1909; Zs. Kr., **51**, 105, 1912.

GARNET, Min., pp. 437, 1035; App. I, p. 27; II, p. 44. — **Anal.** — *Grossularite* from Wyssokaja Mt., Ural Mts.; Loewinson-Lessing, [Bull. Polytech. Inst. St. Pet., **5**, 219, 1906], Zs. Kr., **46**, 295, 1909; from near Friedeberg, Silesia; Rosiwal, [Vh. G. Reichs., 141, 1906], Zs. Kr., **46**, 123, 1909; with determination of refractive index from Maigelstal, Switzerland; Grubemann, Festschr. Uni. Zürich, 1914; from Island of Nisi, Ægean Sea; Grill, Mem. Acc. Linc., **10**, 14, 1914; of *pyrope* from Mt. Ruwenzori, Congo Free State; Colomba, Sep. Pub., "Il Ruwenzori," **2**, 281; Zs. Kr., **50**, 511, 1911; of *almandite* and its alteration products from district of Berdichef, Kief, Russia; Glinka [Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906], Zs. Kr., **46**, 283, 1909; from Szokolyahuta, Comitat Nógrád, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from southern Black Hills, South Dakota; Sharwood, Econ. Geol., **6**, 729, 1911; from Hoole Canyon, Pelly River, Yukon; Johnston, [Summary Rep. Geol. Sur. Canada, Dept. Mines, for 1910, 257, 1911], Zs. Kr., **54**, 79, 1914; from muscovite schist on Angara River, southern part of Yenisei District, Siberia; Meister, *ref.* Zs. Kr., **53**, 596, 1914; of *spessartite* with optical study of mineral from Tsilaisina, near Antsirabé, Madagascar; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 283, 1910; Bull. Soc. Min., **33**, 53, 1910; from Ambatofosikely, Madagascar; *idem*, Bull. Soc. Min., **37**, 19, 1914; of *andradite* from Ural Mts.; Kryschanowsky, [Trav. Mus. Geol. Ac. Sc. St. Pet., **1**, (3), 57, 1907], Zs. Kr., **47**, 287, 1909; from monazite sand from North Carolina; Tschernik, Bull. Ac. St. Pet., **2**, 243, 1908; Zs. Kr., **50**, 68, 1911; occurring in sand from Yong Choon district, Kwang Tung, China; Scrivenor, Min. Mag., **17**, 51, 1913; occurring with galena at Fluminimaggiore, Sardinia; Serra, Rend. Acc. Napoli, **16**, 222, 1910; of a titaniferous *andradite* (n = 1·907) from rocks of Iron Hill area, Beaver Creek, Gunnison County, Col.; Larsen and Hunter, J. Wash. Ac. Sc., **4**, 473, 1914; from the Binnental, Switzerland; Hezner, Centralbl. Min., 325, 1914; anal. of three garnets from the diamond-bearing rocks of the Colossus Mine, South Africa; Mennell, [Rep. So. African Ass. Adv. Sc., 104, 1908], Zs. Kr., **52**, 418, 1913; from Dorothy Mine, Chillagoe, Queensland; Connah, [Proc. Roy. Soc. Queensland, **22**, 31, 1909], Zs. Kr., **52**, 419, 1913; from near Reading, Pa.; Smith, [Proc. Ac. Nat. Sc., **62**, 538, 1910], Zs. Kr., **52**, 69, 1912; of an iron-chrome garnet from Praborna, Valle d'Aosta, Italy; Colomba, Rend. Acc. Linc., **19**, (2), 146, 1910; from various localities in Pa.; Eyerman [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914; from the volcanic rocks of the lower Rhine; Uhlig, [Vh. Nat. Ver. Preuss. Rheinlande u. Westfalens, **67**, 307, 1910], Zs. Kr., **53**, 203, 1913; of several varieties from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 361, 1911; from crystalline schists, etc., of the Laacher See district, Prussia; Brauns, N. Jb. Min., Beil.-Bd., **34**, 85, 1912; from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913. Description with anal. of *almandite-spessartite-pyrope* group of garnets from Madagascar; Lacroix, Bull. Soc. Min., **37**, 108, 1914.

Discussion of chemical constitution of garnet minerals and related silicates; Clarke,

U. S. G. S., Bull., **588**, 1914. The limits to the miscibility of the various molecules; Boeke, Zs. Kr., **53**, 149, 1913.

Study of origin of light circles and spots seen on sphere of garnet from India; Goldschmidt and Brauns, N. Jb. Min., Beil.-Bd., **31**, 220, 1911. Behavior under pressure; Adams, J. Geol., **18**, 489, 1910.

A white mineral from the gabbro of Dun Mt., New Zealand, originally described as *saussurite*, is proven to be *grossularite*; Marshall, [Trans. New Zealand Inst., **40**, 320, 1907], Zs. Kr., **50**, 277, 1911.

Occ. of gem garnets in Lower California; Wittich, Centralbl. Min., 449, 1914.

Anal. of *spessartite* from Chárgáon, District Nagpur, India; name "*spandite*" given to a garnet intermediate between *spessartite* and *andradite* (anal. from Garbhám mine, Vizagapatam District, Madras, India); name "*grandite*" given to a garnet intermediate between *grossularite* and *andradite*; Fermor, Mem. G ol. Sur. India, **37**, 1909.

Gay-Lussite, Min., p. 301; App. I, p. 28; II, p. 44. — Pseudomorphs found in Cambrian alum schists from Bornholm Island, Denmark, thought to be after *gay-lussite*; Stolley, [Medd. Dansk. Geol. For., **3**, 351, 1909], Zs. Kr., **50**, 282, 1911; but later shown to be after *barite*, which see.

Artif. formation; Bütschli, J. prakt. Chem., **75**, 556, 1907.

Gearksutite, Min., p. 181. — Greenland and Uralian occ. described. Refractive index of Greenland mineral, $n = 1{\cdot}448$; Böggild, Zs. Kr., **51**, 591, 1912.

Gehlenite, Min., p. 476; App. I, p. 28; II, p. 44. — Chemical constitution and relations; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909; Zs. Kr., **51**, 108, 1912.

See under *Melilite*.

Gibbsite, Min., p. 254; App. I, p. 29; II, p. 45. — Relation to similar minerals; Dittler and Doelter, Centralbl. Min., 104, 1912.

Gismondite, Min., p. 586; App. I, p. 29; II, p. 45. — Crystals from Podhorn, Marienbad, Bohemia; Himmelbauer, Min. Mitt., **31**, 328, 1912.

By microchemical study the mineral from Vesuvius appears to be very similar to *phillipsite*, but is thought to be distinct; (material from Löbau is probably a mixture of *phillipsite* and *levynite*. Thugutt, [Ber. Ges. Wiss., Warsaw, 1911], Zs. Kr., **54**, 198, 1914.

Glaserite. See under *Aphthitalite*.

Glauberite, Min., p. 898; App. I, p. 29; II, p. 45. — New determinations of the temperature at which glauberite becomes uniaxial were made by means of an oil bath and gave the following: for Na-light, 42·9° C. and for Li-Light, 51·8° C.; Kraus, Zs. Kr., **52**, 321, 1913.

Glaucochroite, App. I, p. 29; II, p. 46. — Crystals with terminal forms from Franklin Furnace, N. J., gave axial ratio: $a : b : c = 0{\cdot}4409 : 1 : 0{\cdot}5808$. Forms present: $a(100)$, $b(010)$, $m(110)$, $s(120)$, $x(103)$, $h(021)$, $e(111)$, $f(121)$. Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

Glaucodot, Min., p. 101. — Crystals from Håkansboda, Sweden, gave the axial ratio: $a : b : c = 0{\cdot}6764 : 1 : 1{\cdot}193$; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1908.

Chem. constitution and relation to other members of the group; Beutell, Centralbl. Min., 411, 1911; *ibid.*, 225, 271, 299, 1912.

Glauconite, Min., p. 683; App. I, p. 29; II, p. 46. — Anal. of material from the soil on the Baltic Coast of Courland, Russia; Johnsen, [Schr. phys.-ökon. Ges. Königsberg, **1**, 51, 1908], Zs. Kr., **50**, 90, 1911; of material obtained from deep-sea dredging; Caspari, Proc. Edinb. Roy. Soc., **30**, 364, 1909; by Steiger of material from Big Goose Cañon, S. W. of Sheridan, Big Horn Mts., Wyo.; Clark, U. S. G. S., Bull., **419**, 1910; from marl near Cracow, Galicia; Morozewics, [Kosmos, **34**, 610, 1909], Zs. Kr., **50**, 661, 1912.

Glaucophane, Min., p. 399; App. I, p. 29; II, p. 46. — Anal. from Elek Dagh, Asia Minor; Milch, N. Jb. Min., Festbd., 348, 1907.

Occ. in eastern Pennsylvania; Bliss, Am. Mus. Nat. Hist., Bull., **32**, 517, 1913.

Glockerite, Min., p. 970; App. I, p. 29. — Anal. from Germantown, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914.

Gmelinite, Min., p. 593 App. I, p. 29; II, p. 46. — Effect upon optical properties of saturation by various compounds; Grandjean, C. R., **149**, 866, 1909.

Gold, Min., p. 14; App. I, p. 29; II, p. 46. — Crystals on pyrite cube from Snettisham District, Alaska; Pogue, Smithsonian Misc. Coll., **52**, 477, 1909; Zs. Kr., **49**, 225, 1911; from Gold Harbour, Queen Charlotte Islands; Graham, Am. J. Sc., **31**, 45, 1911.

Anal. of gold containing over 20% copper from Karabasch Mt., east of Sojmonow valley, Ural Mts.; Nenadkewitsch, Trav. Mus. Geol., Ac. Sc. St. Pet., **5**, 37, 1911; Zs. Kr., **53**, 609, 1914.

Goldfieldite. *F. L. Ransome*, U. S. G. S., Prof. Paper, **66**, 1909.

Uncrystallized. Forms a mineral crust. Color dark lead-gray. Metallic luster. Brittle. Fracture conchoidal. H. = 3–3·5.

Comp. — A copper sulfantimonite with Bi and As replacing the Sb, and Te replacing the S; $5\,Cu_2S.(Sb,Bi,As)_2(S,Te)_3$.

Anal. — By Palmer:

Cu	S	Te	Sb	As	Bi	Au	Ag	Gangue	Total
33·49	21·54	17·00	19·26	0·68	6·91	0·51	0·18	2·00	101·57

Obs. — Occ. with marcasite at Mohawk mine, Goldfield, Nev.

GOLDSCHMIDTITE, App. I, 30; II, p. 46. — Anal. of crystals from Cripple Creek gave, Te, 65·97; Au, 24·25; Ag, 8·68; Total, 98·90; from which was derived the formula, $(Au,Ag_2)Te_5$. On the strength of this anal. *goldschmidtite* is thought to be distinct from *sylvanite*; Gastaldi, Rend. Acc. Napoli, **17**, 22, 1911.

GORCEIXITE, App. II, p. 46. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite*.

GÖTHITE, Min., pp. 247, 1036; App. II, p. 47. — Crystals from Příbram, Bohemia, with new form; axial ratio determined as, $a : b : c = 0·9241 : 1 : 0·6051$; Rosický, Bull. Ac. Sc. Bohême, **13**, 1908; from Walton, Nova Scotia, and Lostwithiel, Cornwall, the latter showing new forms; Goldschmidt and Parsons, Zs. Kr., **47**, 238, 1909; Am. J. Sc., **29**, 235, 1910; from Vaskö, Comitat Krassószörény, Hungary; Löw, Földt. Közl., **41**, 811, 1911.

Anal. from Capo d'Arco, and Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **27**, 76, 1911; *ibid.*, **28**, 118, 1912.

GOYAZITE, Min., p. 855. — Doubt cast upon the original anal. by Damour by the finding of considerable strontia (Hussak, Min. Mitt., **25**, 335, 1906) with suggestion that it is the same as *hamlinite*; Schaller, Am. J. Sc., **32**, 359, 1911; Zs. Kr., **50**, 106, 1911.

GRAHAMITE, Min., p. 1020; App. I, p. 30; II, p. 47. — Discussion of character of bitumens included under this name with occurrences in the United States and analyses; Richardson, J. Am. Chem. Soc., **32**, 1032, 1910. Occ. with anal. at Kunda, Esthonia, Russia; Doss, Centralbl. Min., 609, 1914.

GRAPHITE, Min., pp. 7, 1036; App. I, p. 31; II, p. 47. — Determination of specific gravity from different localities and under different conditions. The gravity of pure air-free graphite suspended in water at temperature of 4° C. was found to be 2·255; Chatelier and Wologdine, C. R., **146**, 49, 1908. Relative stability of diamond and graphite; Boeke, Centralbl. Min., 321, 1914.

Anal. from an American locality given as "South Mountains, Blue Ridge"; Tschernik, [Vh. Min. Ges., **45**, 425, 1907]; Zs. Kr., **47**, 291, 1909.

GREENOCKITE, Min., pp. 69, 1036; App. I, p. 31; II, p. 48. — Artif. formation and thermal behavior; Allen, Crenshaw, and Merwin, Am. J. Sc., **34**, 341, 1912; Zs. Anorg. Chem. ,**79**, 125, 1912.

Grothine. *F. Zambonini*, Rend. Acc. Linc., **22**, (1), 801, 1913.

Orthorhombic, $a : b : c = 0·4575 : 1 : 0·8484$. Observed forms: $b(010)$, $c(001)$, $m(110)$, $a(101)$, $o(111)$, $r(121)$. In small well-developed crystals, tabular parallel to $b(010)$. Colorless. Transparent. G. = 3·090. Optically +. Ax. pl. parallel to (001). Bx_{ac} perpendicular to (100). Medium axial angle. Dispersion $\rho < v$.

Comp. — A silicate of calcium with aluminium and a little iron. No anal. made.

Pyr. — B. B. becomes white but does not fuse. Easily attacked by sulphuric acid, leaving separated silica.

Obs. — Found assoc. with *microsommite* on metamorphic limestone near Nocera and Sarno, Campagna, Italy.

Name. — After Prof. P. von Groth of Munich.

Guadarramite. See under *Ilmenite*.

GUANAJUATITE, Min., pp. 38, 1036. — Occurrence noted from Salmon, Idaho; Schaller, (priv. contr.; to be published in U. S. G. S., Bull., **610**).

GYPSUM, Min., p. 933; App. I, p. 31; II, p. 48. — **Cryst.** — From Cetine di Cortoniano, Siena, Italy; Viola, Riv. Min., **39**, 65, 1909; from Mt. Elliott mine, Chillagoe, Queensland; Anderson, Rec. Austral. Mus., **7**, 274, 1909; *ibid.*, **8**, 120, 1911; from Dobrzyn, Poland;

Tokarski, [Kosmos, **34**, 721, 1909], Zs. Kr., **50**, 662, 1912; from Garbutt, Monroe County, N. Y.; Whitlock, Bull. N. Y. State Mus., **140**, 197, 1910; from Chihuahua, Mexico; Wittich and Pastor y Giraud, Centralbl. Min., 731, 1912; Boll. Soc. Geol. Mex., **8**, 61, 1913. Artif. crystals; Fletcher, Min. Mag., **16**, 137, 1911.

Optical. — Dispersion of extinction directions upon (111); Berek, Centralbl. Min., 739, 1912; variation in the optical constants with varying temperatures; Tutton, Zs. Kr., **46**, 135, 1909; change in axial angle at high temperatures; Braums, Centralbl. Min., 401, 1911; Kraus and Youngs, N. Jb. Min., **1**, 123, 1912; determination of temperature at which the mineral becomes uniaxial as 90·9° C. in Na-light; Hutchinson and Tutton, Min. Mag., **16**, 257, 1912; Zs. Kr., **52**, 218, 1913.

Poikilitic gypsum from Islam-kuju, Transcaspia, Russia; Samojlov, Bull. Ac. Sc. St. Pet., **7**, 783, 1913.

Solubility upon different crystal faces; Tolloczkò, Bull. Ac. Sc. Cracovie, **6**A, 209, 1910.

Deformation under pressure; Adams, J. Geol., **18**, 489, 1910.

Determination by grinding methods of the hardness of gypsum in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911.

GYROLITE, Min., p. 566; App. II, p. 48. — Study of mineral from the Bohemian localities Mückenhauberg (with anal.), from Scharfenstein and Kreibitz near Rumburg; from Scotland and the Färöe Islands (with anal.); from various localities in Greenland, from Mogy Guassù, São Paulo, Brazil, from Poonah, India, with the following conclusions: It is an independent species most closely related to *reyerite* and *zeophyllite*. Rhombohedral. Basal cleavage. H. = 3-4. G. = 2·4. ω = 1·545. Formula, $6SiO_2.4CaO.5(H,K,Na)_2O$. Cornu and Himmelbauer, Ber. Ak. Wien, **116**, (1), 1213, 1907.

Description of material from Workotsch near Aussig, Bohemia, and the determination of ω = 1·54, as the mean of determinations upon material from several different localities. Himmelbauer, Min. Mitt., **32**, 133, 1913.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

Hæmatogelite. See under *Hematogelite*.

HALITE, Min., pp. 154, 1036; App. I, p. 32; II, p. 49. — Refractive indices for ultra-red light; Paschen, Ann. Phys., **26**, 120, 1908; Trowbridge, *ibid.*, **27**, 231, 1908; dispersion of ultra-violet light; Pflüger, [Phys. Zs., **10**, 230, 1909], Zs. Kr., **51**, 310, 1912.

Origin of blue color; Spezia, Centralbl. Min., 398, 1909; Cornu, *ibid.*, 324, 1910; Doelter, Min. Mitt., **30**, 143, 1911.

Solution experiments with crystals; Poppe, N. Jb. Min., Beil.-Bd., **38**, 363, 1914; Schnorr, Zs. Kr., **54**, 289, 1914.

Increase of plasticity with increase of temperature; Milch, N. Jb. Min., **1**, 60, 1909; natural deformation of crystals from Gräfentonna, Thuringia; Rinne, Zs. Kr., **50**, 159, 1911; from Boryslaw, Galicia; Lachmann, Zs. Kr., **52**, 137, 1912; deformation under pressure; Adams, J. Geol., **18**, 489, 1910; Ritzel, Zs. Kr., **53**, 97, 1913; with resultant optical anomalies; Ritzel, Zs. Kr., **52**, 238, 1913. Curving of crystal faces possibly due to the presence of gliding planes; Andree, Centralbl. Min., 696, 1913; Baumann, *ibid.*, 698, 1913.

Growth of artif. crystals under various conditions; Fastert, N. Jb. Min., Beil.-Bd., **33**, 265, 1912.

Occurrence from Cardona, Catalonia, Spain; Kaiser, N. Jb. Min., **1**, 14, 1909. Discussion of the occurrence and genesis of the different varieties; Görgey, Min. Mitt., **31**, 664, 1912.

Mixture with *sylvite* in crystals from Vesuvius; see under *Sylvite*.

Hallerite. *P. Barbier*, C. R., **146**, 1220, 1908.

A mica with iridescent silver color and pearly luster. Considered to be a lithium-bearing *paragonite*. On ignition gives 4·60% of H_2O. The ignited mineral gave the following analysis: SiO_2, 49·18; Al_2O_3, 36·56; Fe_2O_3, 2·19; K_2O, 3·12; Na_2O, 7·63; Li_2O, 1·26; Total, 99·94. Found at Mesvres, near Autun, France. Named after the chemist Albin Haller.

HALLOYSITE, Min., p. 688; App. II, p. 49. — Chem. comp.; Thugutt, Centralbl. Min., 97, 276, 1911; 35, 1912; Stremme, *ibid.*, 205, 1911.

Anal. of material derived from decomposition of a zeolite found at Tschakwa, near Batum, on Black Sea; Glinka, Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906; Zs. Kr., **46**, 283, 1909; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

HALOTRICHITE, Min., p. 954. — Anal. by Schaller from Alum Creek, N. M.; Clark, U. S. G. S., Bull., **419**, 1910; chem. comp. and assoc. with *alunogen*; Uhlig, Centralbl. Min., 723, 766, 1912.

HAMBERGITE, Min., p. 878. — **Cryst.** and **Optical.** — Crystals from Madagascar showed the new forms, *c*(001), *l*(410), *k*(230), *d*(104), *r*(112), *p*(111), *v*(221), *s*(212), *u*(121), *y*(122), *w*(132), *q*(123), *t*(124). The following new axial ratio has been calculated: $a : b : c$ = 0·8023 : 1 : 0·7268. A Goldschmidt table of angles is given. Optical study gave: for Na-light,

$\alpha = 1{\cdot}5442$, $\beta = 1{\cdot}5885$, $\gamma = 1{\cdot}6285$, $\gamma - \alpha = 0{\cdot}0743$, 2V = 87° 17·4′ (meas.), 87° 38·8′ (calc.). Optically +. $a = \mathfrak{a}$, $c = \mathfrak{c}$. Dispersion $\upsilon > \rho$. Goldschmidt and Müller, Zs. Kr., **48**, 473, 1910. Large twin crystal from Madagascar with $m(110)$ as tw. pl.; Drugman and Goldschmidt, Zs. Kr., **50**, 596, 1912; crystals from pegmatites of Vakinankaratra, Madagascar; Lacroix, Bull. Soc. Min., **35**, 76, 1912; from Antsirabé, Madagascar, with new forms; Ungemach, Bull. Soc. Min., **35**, 526, 1912; found at various places near Betafo, particularly at Anjanabonsana, Madagascar. G. = 2·36. H. = 7·5. Refractive indices: $\alpha = 1{\cdot}5530$, $\beta = 1{\cdot}5864$, $\gamma = 1{\cdot}6272$. Lacroix, Bull. Soc. Min., **32**, 320, 1909. Optical study of material from Madagascar with description of figures seen on cleavage faces; Sokolov, [Ann. Inst. Mines, St. Pet., **2**, 394, 1910], Zs. Kr., **52**, 633, 1913.

Anal. from Anjanabonsana, Madagascar; Lacroix, Bull. Min. Soc., **33**, 37, 1910.

HAMLINITE, Min., p. 762; App. II, p. 49. — Crystals from near Diamantina, Minas Geraes, Brazil, showed new form $n(40\bar{4}1)$. Axial ratio calculated from $r(10\bar{1}1) \wedge f(20\bar{2}1) = 56° 14'$, gave $c = 1{\cdot}18504$. Refractive indices for Na-light; $\omega = 1{\cdot}6294$, $\epsilon = 1{\cdot}6387$; $\omega - \epsilon = 0{\cdot}0093$. Ježek, Bull. Ac. Sc. Bohême, **13**, 1908, ["Rozpravy," Böhm. Ak., **17**, No. 2, 1908], Zs. Kr., **48**, 660, 1910.

Probable identity with *goyazite*; Schaller, Am. J. Sc., **32**, 359, 1911; Zs. Kr., **50**, 106, 1911; relations to similar minerals; *idem*, Am. J. Sc., **32**, 363, 1911.

See also under *Alunite*.

HARMOTOME, Min., p. 581; App. I, p. 33; II, p. 50. — Crystals from Oberstein, Germany; Seebach and Görgey, Centralbl. Min., 161, 1911.

Effect upon optical properties of saturation by various compounds; Grandjean, C. R., **149**, 866, 1909.

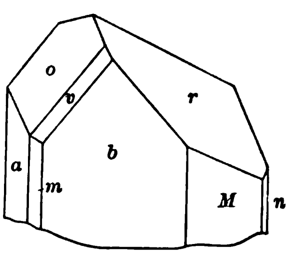
Chem. constitution; Bruckmoser, Ber. Ak. Wien, **116**, (1), 1653, 1907.

HARTTITE, App. II, p. 50. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911.

See also under *Alunite*.

HATCHETTITE, Min., p. 997. — Anal. of material from Bonarka, near Cracow, Galicia, gave; C, 85·25; H, 14·59; Total, 99·84, giving formula $C_{38}H_{78}$. G. = 0·961. Refractive indices for Li-light; $\alpha = 1{\cdot}518$, $\beta = 1{\cdot}523$, γ(calc.) $= 1{\cdot}588$. One good cleavage which is perpendicular to direction $\mathfrak{c}$. Probably orthorhombic. Occurrence and paragenesis. Morozewicz, Bull. Ac. Sc. Cracovie, 1067, 1908; [Kosmos, **34**, 610, 1909], Zs. Kr., **50**, 661, 1912.

HATCHETTOLITE, Min., p. 727; App. II, p. 50. — Occurs at Mesa Grande, Cal.; Schaller (priv. contr.; to be published in U. S. G. S., Prof. Paper, **94**).



Hatchite.

Hatchite. *R. H. Solly* and *G. F. H. Smith*, Min. Mag., **16**, 287, 1912.

Triclinic. Axial ratio: $a : b : c = 0{\cdot}9787 : 1 : 1{\cdot}1575$; $\alpha = 116° 53' 30''$, $\beta = 85° 12'$, $\gamma = 113° 44' 30''$.

$100 \wedge 010 = 65° 46'$, $101 \wedge \bar{1}1\bar{1} = 76° 2'$, $100 \wedge 1\bar{1}1 = 56° 11'$, $010 \wedge 001 = 62° 41'$, $100 \wedge 11\bar{1} = 36° 5'$.

Forms: $a(100)$, $b(010)$, $c(001)$, $m(110)$, $n(\bar{2}10)$, $l(\bar{3}20)$, $M(\bar{1}10)$, $g(0\bar{1}2)$, $e(0\bar{1}1)$, $f(0\bar{2}1)$, $d(103)$, $r(1\bar{1}1)$, $u(2\bar{2}1)$, $o(11\bar{1})$, $v(12\bar{1})$, $i(2\bar{5}1)$, $q(25\bar{6})$, $j(13\bar{6})$, $w(32\bar{1})$, $p(\bar{1}11)$, $s(\bar{1}12)$.

Comp. — Undetermined.

Obs. — Five small crystals found at Lengenbach, Binnental, Switzerland.

Name. — In honor of Dr. Frederick H. Hatch.

HAUERITE, Min., p. 87; App. II, p. 50. — Decomposition in air with sulphur set free with subsequent reaction of the sulphur upon associated silver, etc.; Beutell, Centralbl. Min., 758, 1913.

HAUSMANNITE, Min., pp. 230, 1036; App. I, p. 33; II, p. 50. — Crystals described from various Swedish localities. From measurements made on crystals from Jakobsberg, near Nordmarken, the following new axial ratio was derived: $a : c = 1 : 1{\cdot}1661$. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

HEDENBERGITE. See under *Pyroxene*.

HEINTZITE, Min., p. 885; App. I, p. 33. — Optical study of material from Stassfurt gave the following: $Bx_{ac} \wedge c = -64° 30'$. Refractive indices, *D*-line, $\alpha = 1{\cdot}5081$, $\beta = 1{\cdot}5255$, $\gamma = 1{\cdot}5500$. 2V = 80° 38′, (meas.). Boeke, Centralbl., Min., 531, 1910.

HELVITE, Min., p. 434; App. I, p. 34. — Anal. of material found in contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 394, 1911.

HEMATITE, Min., pp. 213, 1037; App. I, p. 34; II, p. 51. — **Cryst.** — From Dognácksa, Banat, Hungary, with several new forms; Kleinfeldt, N. Jb. Min., Beil.-Bd., **24**, 325, 1907; from Padria, Sardinia; Millosevich, Riv. Min., **39**, 80, 1909; from Rancho de los Nuñes, Guanajuato and Cerro la Gigante, Lower California, Mexico, with new forms; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Norberg, Sweden, with new forms, from Dalkarlsberg, Sweden, with new forms. Crystals also described from the following Swedish localities, Långban, Nordmarken, Gellivare, and Tuollavara. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; from Island of Elba with new forms; Grill, [Pubbl. Ist. Firenze, Sez. Sc. Fis. Nat., No. 34, 1911], Zs. Kr., **54**, 392, 1914; from Sysserskaya-Datcha, Ural Mts.; Duparc and Sabot, Bull. Soc. Min.. **34**, 139, 1911; from Arany Mt. and Déva, Comitat Hunyad, Hungary; Zimányi, Ann. Mus. Nat. Hung., **10**, 263 ,267, 1912; Zs. Kr., **51**, 49, 1912; from Puy de la Tâche, Mont-Dore, Puy de Dôme, France, and from Caveradi, Grisons, Switzerland; Gonnard, Bull. Soc. Min., **35**, 517, 1912; with new forms from Caveradi, Grisons, Switzerland; Ungemach, Ann. Soc. Geol. Belgique, Mem., **39**, 421, 1912; with new form from Kakuk-Berge, Hungary; Zimányi, Földt. Közl., **43**, 511, 1913; from Ambatofosikely, Madagascar; Duparc, Sabot and Wunder, Bull. Soc. Min., **37**, 19, 1914; from Island of Nisi, Ægean Sea; Grill, Mem. Acc. Linc., **10**, 14, 1914. Review of recent literature on crystals of hematite; Gonnard, Bull. Soc. Min., **37**, 113, 1914.

Natural and artificial etching figures; Kleinfeldt, N. Jb. Min., Beil.-Bd., **28**, 661, 1909.

Magnetic properties; Kunz, [Arch. Sc. Genf., **23**, 137, 1907], Zs. Kr., **46**, 511, 1909. Constants of elasticity; Voigt, Ann. Phys., **22**, 129, 1907.

Occ. with anal. from Betaimby near Mandraty, Province of Mevatanana, Madagascar; Duparc, Sabot, and Wunder, Bull. Soc. Min., **37**, 19, 1914.

Study of the parallel growth of *rutile* upon *hematite;* Viola, Zs. Kr., **46**, 326, 1909. Regular intergrowth with *carnallite* from near Stassfurt; Johnsen, Centralbl. Min., 168, 1909. Regular inclusions in *cancrinite* from Miask, Ilmen Mts., Russia; Johnsen, Centralbl. Min., 369, 1911.

As product of weathering of *feldspars*; Thugutt, Centralbl. Min., 65, 1910.

Hematogelite, Hæmatogelite. *F. Tućan*, Centralbl. Min., 68, 1913.
A colloidal form of ferric oxide occurring as coloring material of *bauxite*.

HERDERITE, Min., p. 760; App. I, p. 34; II, p. 51. — Twin crystals from Auburn, Me., with reentrant angles showed new forms. Angles of faces agreed more closely with the calculated values derived from the axial ratio given by Penfield than those from that given by Dana. An estimation of fluorine and water was made to determine whether this was to be considered a *hydro-fluor-* or a *hydro-herderite*, with the following results: F, 6·04; H_2O, 3·62. The material is evidently to be considered a *hydro-fluor-herderite*. Probably the axial ratio given by Penfield is applicable to all varieties of the mineral and the crystal constants do not vary with the composition as he supposed. Ford, Am. J. Sc., **32**, 287, 1911; Zs. Kr., **50**, 97, 1911. Twin crystals from Epprechtstein, Fichtelgebirge, Bavaria; Henglein, Centralbl. Min., 121, 1909; Dürrfeld, *ibid.*, 552; crystals from same locality with new forms; Dürrfeld, Zs. Kr., **46**, 563, 1909; **47**, 242, 1909; **48**, 236, 1910.

HESSITE, Min., pp. 47, 1037; App. I, p. 35; II, p. 51. — Crystals from Botés, Siebenbürgen, Hungary, with new forms. Rosický, Bull. Ac. Sc. Bohême, **13**, 1908.

HETÆROLITE, Min., p. 259. — Anal. by Schaller of material from Franklin Furnace, N. J., (G. = 4·85) proves identity of species and leads to formula, $ZnO.Mn_2O_3$; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909. Found with calamine at the Wolftone Mine at Leadville, Col. Formula derived from anal. as, $2ZnO.2Mn_2O_3.1H_2O$. Ford and Bradley, Am. J. Sc. **35**, 600, 1913; Zs. Kr., **53**, 219, 193. Before identity was established this material was called *wolftonite*; Butler, Econ. Geol., **8**, 8, 1913.

HETEROMORPHITE. See under *Plagionite.*

HETEROSITE, Min., p. 757. — Proposed that name *heterosite* be restricted to the iron phosphate, $Fe_2O_3.P_2O_5.H_2O$, and *purpurite* to the analogous manganese compound; Schaller, J. Wash. Ac. Sc., **1**, 113, 1911; U. S. G. S., Bull., **490**, 72, 1911.

HEULANDITE, Min., p. 574; App. I, p. 35; II, p. 51. — Crystals and anal. from Colle Giurgada, near Villanova-Monteleone, Sassari, Sardinia; Serra, Rend. Acc. Linc., **18**, (2), 80, 348, 1909; crystals from Oberstein, Germany; Dürrfeld, Zs. Kr., **49**, 480, 1911; Seebach and Görgey, Centralbl. Min., 161, 1911; from Maddalena archipelago, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 273, 1912.

Anal. from Maze, Echigo, Japan; Jimbō, Beitr. Min. Japan, **3**, 115, 1907; from Teigarhorn, Iceland, with discussion of chem. constitution; Baschieri, Mem. Soc. Tosc., **24**, 133, 1908; from volcanic bomb from Vesuvius; Thugutt, Centralbl. Min., 761, 1911; from Val dei Zuccanti, Venetia; Billows, Riv. Min., **41**, 1912.

Hexahydrite. *R. A. A. Johnston*, Summary Rep. Geol. Sur., Canada, Dept. Mines, for 1910, 256, 1911.

Columnar to fibrous structure. Cleavage prismatic. Conchoidal fracture. G. = 1·757. Color white with light green tone. Pearly luster. Opaque. Salty, bitter taste.

Comp. — $MgSO_4.6H_2O$; Sulphuric anhydride, 35·09; magnesia, 17·55; water, 47·37.

Anal. — SO_3, 34·52; MgO, 17·15; H_2O, 46·42; Insol., 1·78; Total, 99·87.

Pyr. — B. B. exfoliates, yields water, but does not fuse. Easily soluble in cold water.

Obs. — Found on east bank of Bonaparte River about halfway between Cargill and Scottie Creeks, Lillooet District, B. C.

Hewettite. *W. F. Hillebrand, H. E. Merwin*, and *F. E. Wright*, Proc. Am. Phil. Soc., **53**, 31, 1914; Zs. Kr., **54**, 209, 1914.

Orthorhombic (?). In aggregates of microscopic needles. G. = 2·5–2·6. Color deep red. Luster somewhat silky. Approximate refractive indices for Li-light; α = 1·77, β = 2·18, γ = 2·35–2·4. Elongation of needles paralel to c. Parallel extinction. Strongly pleochroic; a and b very light orange-yellow, c dark red.

Comp. — Hydrous vanadate of calcium, $CaO.3V_2O_5.9H_2O$ or perhaps $CaH_2V_6O_{17}.8H_2O$.

Anal. — V_2O_5, 68,19; V_2O_4, 1·21; MoO_3, 1·56; CaO, 7·38; Na_2O, 0·15; H_2O, 21·33; Fe_2O_3, etc., 0·11; Insol., 0·17; Total, 100·10. Material analyzed was previously brought into equilibrium with water-vapor with tension of 21·8 mm. at 25°.

Dimorphous with *metahewettite*, the two minerals differing in their crystal habit the character of their absorption of light, in the manner they lose water on heating and the color changes they assume on dehydration.

Pyr. — On heating loses water, changing in color through various shades of brown to a bronze. Water content varies to some extent with atmospheric changes in humidity. On exposure to moisture, the dehydrated mineral regains only a part of the original amount of water and does not change color. Easily fusible to a dark red liquid. Slightly soluble in water.

Obs. — Occurs in the oxidized zone of the vanadium deposits at Minasraga, Peru. An alteration product of *patronite*. Observed also on one specimen from Paradox Valley, Col.

Name. — After Mr. D. Foster Hewett.

HIBSCHITE, App. II, p. 52. — Chem. constitution and relations; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909; Zs. Kr., **51**, 108, 1912.

HIERATITE, Min., p. 169. — Artif. formation; Schlaepfer and Niggli, Zs. Anorg. Chem., **87**, 52, 1914.

Hinsdalite. *E. S. Larsen, Jr.*, and *W. T. Schaller*, J. Wash. Ac. Sc., **1**, 25, 1911; Am. J. Sc., **32**, 251, 1911; Zs. Kr., **50**, 101, 1911; U. S. G. S., Bull., **509**, 66, 1912.

Pseudorhombohedral. *c* = 1·2677. Forms: Positive and negative rhombohedrons and base. $r \wedge r'$ = 91° 18′. Coarsely crystalline with rough and dull faces.

Cleavage basal perfect. H. = 4·5. G. = 4·65. Colorless with greenish cast; often dark gray because of inclusions. Luster vitreous to greasy. Optically shows zonal structure. Basal section shows isotropic center surrounded by six segments showing biaxial interference figures, the axial plane of each segment being in a radial direction. Refractive indices; α = 1·670, β = 1·671, γ = 1·689. 2E varies, usually near 32°.

Comp. — A lead sulphate and phosphate belonging in same group as *svanbergite, corkite* and *beudantite*. $2PbO.3Fe_2O_3.2SO_3.P_2O_5.6H_2O$.

Anal. —

PbO	SrO	CaO	Al_2O_3	SO_3	P_2O_5	H_2O	Total
31·75	3·11	*tr.*	26·47	14·13	14·50	10·25	100·21

Obs. — Found at the Golden Fleece mine, 3 miles south of Lake City, Hinsdale Co., Colorado.

Relation to other minerals, see Schaller, Am. J. Sc., **32**, 363, 1911, and under *Alunite*.

HISINGERITE, Min., p. 702. — Study of thin sections of specimens from various localities shows that it has a crypto-crystalline structure similar to that of *chalcedony*; Sustschinsky, Zs. Kr., **47**, 231, 1909.

Hodgkinsonite. *C. Palache* and *W. T. Schaller*, J. Wash. Ac. Sc., **3**, 474, 1913; **4**, 153, 1914; Zs. Kr., **53**, 529, 1914.

Monoclinic. $a : b : c$ = 1·538 : 1 : 1·1075. β = 84° 35′. Observed forms: *c*(001), *m*(110), *l*(210), *s*(011), *o*(021), *v*($\bar{4}$03), *w*($\bar{2}$01), *t*($\bar{4}$01), *x*($\bar{3}$05), *p*(111), *r*(221), *q*(552), *u*(322), *n*($\bar{3}$11). Habit acute pyramidal.

Cleavage, *c*(001) perfect. H. = 4·5–5. G. = 3·91. Color from bright pink to reddish brown. Luster vitreous. Mean refractive index = 1·73. Ax. pl. parallel to (010).

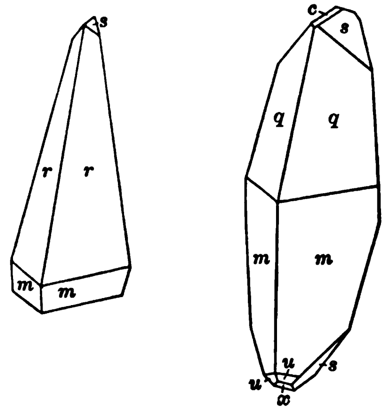
Comp. — A hydrous silicate of manganese and zinc; $3(Zn,Mn)O.SiO_2.H_2O$.

Anal. — By Schaller. — SiO_2, 19·86; MnO, 20·68; ZnO, 52·93; CaO, 0·93; MgO, 0·04; H_2O, 5·77; Total, 100·21.

Pyr. — B. B. decrepitates and then fuses readily and quietly to a brown enamel. Decrepitates and yields water in C. T. Readily soluble in acids, giving silica jelly.

Obs. — Found with *willemite* and *franklinite* at the Parker mine, Franklin, N. J.

Name. — After Mr. H. H. Hodgkinson, who discovered the mineral.



Hodgkinsonite.

Hokutolite. Named by K. Jimbō, 1913. Described by Y. Okamoto, J. Geol. Soc. Tokyō, **18**, 19, 1911; Beitr. Min. Japan, No. **4**, 178, 1912; *anglesobarite*, M. Hayakawa and T. Nakano, Zs. Anorg. Chem., **78**, 183, 1912.

Crystalline crust deposited by the Hokuto hot springs in Formosa. Comp. — A mixture in variable proportions of lead and barium sulphates. Color gray. Radioactive.

Hollandite, App. II p. 52. — New facts given by Fermor. Mem. Geol. Sur. India, **37**, 1099. Crystals from Kájlidongri have appearance of tetragonal prism with low pyramid but from measurements are probably triclinic. H. = 6 (on crystal face). G. = 4·7–4·95. Streak black.

Anal. — 1, from Kájlidongri; 2, from Bálághát; 3, from Gowári Warhona; 4, from Junawáni; 3 and 4 corrected for included *braunite*.

	G	MnO_2	MnO	Fe_2O_3	Al_2O_3	BaO	CaO	MgO	K_2O
1.	4·95	65·63	5·12	10·56	0·94	17·59	....	....	....
2.	....	75·05	9·02	4·43	1·04	2·96	0·31	0·36	3·31
3.	....	71·25	14·20	5·73	0·42	7·22	0·38	0·35	....
4.	....	72·44	9·09	9·26	1·09	5·55	2·50	....	....

	Na_2O	SiO_2	S	P_2O_5	CoO	TiO_2	H_2O	Total
1.	....	tr.	.....	.....	....	...	....	99·84
2.	0·57	1·40	0·02	0·04	0·05	0·03	1·25	99·84
3.	....	.....	.....	.....	....	.....	0·45	100·00
4.	....	.....	.....	.....	....	.....	0·07	100·00

Hopeite, Min., p. 808; App. I, p. 35; II, p. 53. — Study of material from Moresnet, Belgium, gives β = 1·6; 2E = 83° 13′; $\gamma - \alpha$ = 0·0115. Material from Broken Hill shows new forms. Criticism of formula assigned to mineral with proposal of a more complex one. Cesàro, Bull. Ac. Belg., No. 5, 567, 1909.

Crystals from Broken Hill, Rhodesia, with several new forms; a new orientation for the crystals proposed; Ungemach, Bull. Soc. Min., **33**, 132, 1910.

Howlite, Min., p. 881; App. II, p. 53. — Anal. from Lang, Los Angeles Co., Cal.; Eakle, Bull. Uni. Cal., Geol. Dept., **6**, 179, 1911.

Hübnerite, Min., p. 982; App. II, p. 53. — Crystals from Palagatos mine, Conchucos District, Province of Santiago de Chuco, Peru; Tronquoy, Bull. Soc. Min., **36**, 113, 1913.

Hügelite. *V. Dürrfeld*, Zs. Kr., **51**, 278, 1912; **53**, 183, 1913.

Monoclinic. $a : b : c = 0·48954 : 1 : 0·38372$; $\beta = 60° 12′ 6″$. Usually in an aggregate of microscopic hair-like needles in irregular arrangement. A few small crystals observed, showing *m*(110), *c*(001) and very small *n*(01̄1). Angles: (110) : (1̄10) = 46° 2′; (110) : (001) = 62° 47′; (011) : (001) = 18° 25′. G. = 5. Color, orange-yellow to yellow-brown. Pleochroic; yellow-green parallel to length of fibers, greenish yellow at right angles thereto.

Comp. — Hydrous lead-zinc vanadate.

Anal. — Complete anal. not given. PbO = 32·59.

Obs. — Found in a hornstone gangue with altered *galena* at Reichenbach near Lahr, Baden.

Name. — After Prof. F. Hügel.

Hulsite, App. II, p. 53. — Description; Knopf and Schaller, Zs. Kr., **48**, 1, 1910; see App. II. Anal. given and formula proposed as, $12(Fe,Mg)O.2Fe_2O_3.1SnO_2.3B_2O_3.2H_2O$; Schaller, Am. J. Sc., **29**, 543, 1910; U. S. G. S., Bull., **490**, 8, 1911.

HUMBOLDTINE, Min., p. 994. — Manasse, Rend. Acc. Linc., **19**, (2), 138, 1910; Mem. Soc. Tosc., **28**, 118, 1912, has studied the mineral from Capo d'Arco, Elba. The analysis gave, C_2O_3, 40·18; FeO, 40·72; H_2O, [19·10], which leads to the formula, $FeC_2O_4.2H_2O$. Artificial material having the same composition was prepared. The mineral occurs in transparent prisms or plates, which belong to the orthorhombic system and show the following forms, (110), (001), (100), (101). From the following angles, (110) : (1$\bar{1}$0) = 75° 24½′ and (001) : (101) = 55°, approx.; the axial ratio was derived as $a : b : c = 0·7730 : 1 : 1·1039$. Perfect cleavage ∥ (110), less perfect ∥ (100) and (010). The optical orientation is $\mathfrak{a} = a$; $\mathfrak{b} = b$; $\mathfrak{c} = c$. Positive. Axial plane ∥ (010). Pleochroism, $\mathfrak{a}$ = light yellow-green; $\mathfrak{b}$ = greenish yellow; $\mathfrak{c}$ = intense yellow. Strong birefringence and large optical angle. Indices approx., α = 1·494–1·515; β = 1·561; γ = 1·692.

HUMITE, Min., p. 535; App. I, p. 35. — Crystals from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.
See also under *Chrysolite.*

HYDRODOLOMITE, Min., p. 306. — Occ. at Marino, Italy, of a mixture of *calcite* and *hydromagnesite*; Millosevich, Rend. Acc. Linc., **22**, (1), 642, 1913.

HYDROGIOBERTITE, Min., p. 305; App. I, p. 36. — Anal. of material deposited from the waters of Phillips Springs, Chiles Valley, Napa Co., Cal.; Wells, Am. J. Sc., **30**, 189, 1910.

Hydromelanothallite. See under *Melanothallite.*

HYDROMAGNESITE, Min., p. 304. — Anal. from serpentine rocks of Coast Range, Cal.; Kramm, Proc. Am. Phil. Soc., **49**, 315, 1910.

HYDRONEPHELITE, Min., p. 609. — Study of the original material from Litchfield through analysis and micro-chemical tests shows that it is a mixture of *natrolite* and *hydrargillite* with a small amount of *diaspore*. Two occurrences of "*spreustein*" from Brevik and Arven in Norway respectively, are shown to be similar mixtures. Thugutt, N. Jb. Min., **1**, 25, 1910.

HYDROPHILITE, Min., p. 161. — Found intergrown with *halite* and *tachhydrite* at Desdemona mine in Leinetal, Germany; and thought to be new mineral and called *baeumlerite*; Renner, Centralbl. Min., 106, 1912.

Hydrothomsonite. *K. D. Glinka*, [Trans. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906], Zs. Kr., **46**, 283, 1909.
Crystallized. G. = 2·0. Comp. — $(H_2,Na_2,Ca)Al_2Si_2O_8.5H_2O$. Anal. — H_2O, 29·80; SiO_2, 35·38; Al_2O_3, 29·27; CaO, 4·24; Na_2O+K_2O, 1·17; Total, 99·86. A decomposition product of *thomsonite* or *scolecite* found at Tschakwa near Batum on the Black Sea.

Hydroxyapatite. See under *Apatite.*

HYDROZINCITE, Min., p. 299; App. I, p. 36. — Anal. of material from Granby, Mo.; Rogers, [Uni. Geol. Sur. Kansas, **8**, 445, 1904], Zs. Kr., **49**, 370, 1911; from Chihuahua, Mexico; Wittich, Boll. Soc. Geol. Mex., **8**, 47, 1913.

HYPERSTHENE, Min., p. 348; App. I, p. 54. — Anal. of material from hypersthene gneiss from the upper Anabar River, East Siberia; Backlund, Bull. Ac. St. Pet., **1**, 467, 1907; Zs. Kr., **47**, 287, 1909. Description with anal. of material from diabase from Mt. Niedzwiedzia, near Cracow, Galicia; Rozen, [Bull. Ac. Sc., Cracovie, 801, Nov., 1909], Zs. Kr., **50**, 659, 1912.

ICE, Min., p. 205; App. I, p. 36; II, p. 54. — Hollow spiral prismatic crystals of ice formed on the surface of snow; Fermor, Min. Mag., **17**, 150, 1914.

IHLEITE, Min., p. 957. — Doubt as to its existence; Scharizer, Zs. Kr., **46**, 427, 1909.
See also under *Copiapite.*

ILMENITE, Min., p. 217; App. I, p. 36; II, p. 55. — **Cryst.** — From Chester, Mass.; Palache and Wood; Proc. Am. Ac., **44**, 641, 1909; with anal. from Beaume, near Oulx, Piedmont; Colomba, Riv. Min., **38**, 35, 1909; from the Binnental, Switzerland; Desbuissons, Bull. Soc. Min., **34**, 242, 1911; Lewis, Min. Mag., **16**, 343, 1913; from granite pegmatite, Quincy, Mass., with new forms; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Proc. Am. Ac., **47**, 125, 1911; Zs. Kr., **49**, 332, 1911; with new forms from Sasso di Chiesa, Val Malenco, Lombardy, Italy; anal. given; Magistretti, Rend. Acc. Linc., **21**, (2), 761, 1912; from Princeton and Byram, N. J.; Hawkins, Am. J. Sc., **35**, 446, 1913; from Val Devero, Piedmont, Italy; Bianchi, Rend. Acc. Linc., **23**, (1), 722, 1914.
Anal. — Of material from monazite sand, North Carolina; Tschernik, Bull. Ac. St. Pet., **2**, 243, 1908; Zs. Kr., **50**, 68, 1911; from Mt. Ruwenzori, Congo Free State; Colomba, Sep. Pub., "Il Ruwenzori," **2**, 281; from Pelotas, Brazil; Azéma, Bull. Soc. Min., **34**, 29, 1911; from Ambatofosikely, Madagascar; Duparc, Sabot, and Wunder, Bull. Soc. Min., **37**, 19, 1914.

Chem. constitution; Manchot, Zs. Anorg. Chem., **74**, 79, 1912.

Occ. in a quartz inclusion in basalt of the Finkenberg near Bonn and its alteration into *titanite*; Schürmann, N. Jb. Min., **2**, 107, 1911.

Further study confirms individual character of crystals called *mohsite* from Beaume, near Oulx, Piedmont; (see App. II, p. 55). Suggestion made of crystallographic relationship between *eudialyte*, *catapleiite*, *senaite* and *mohsite*. Colomba, Riv. Min., **38**, 35, 1909.

A radioactive var. from the Sierra de Guadarrama, Castile, Spain, called, *guadarramite*. J. Muñoz del Castillo, [Boll. Soc. Esp. Hist. Nat., **6**, 479, 1906]; S. Calderón, [Los Min. de Espana, **1**, 323, 1910], Min. Mag., **16**, 361, 1913.

Ilmenorutile, Min., p. 238; App. II, p. 55. — Discussion of composition and relation to members of *rutile group*; Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

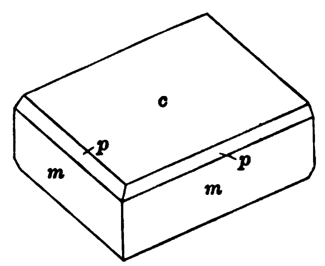
Ilvaite, Min., pp. 541, 1037; App. I, p. 37; II, p. 55. — Chem. constitution and relations; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909; Zs. Kr., **51**, 108, 1912; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912. Anal. of material from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 402, 1911.

Imerinite. See under *Amphibole*.

Inesite, Min., p. 564; App. I, p. 37; II, p. 55. — Anal. of material, probably inesite, from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 392, 1911.

Inyoite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; the complete description to be published in U. S. G. S., Bull., **610**).

Monoclinic. $a : b : c = 0{\cdot}9408 : 1 : 0{\cdot}6665$. $\beta = 62° 37'$. Angles: (001) : (110) = 69° 20′, (110) : (1$\bar{1}$0) = 79° 45′, (110) : (111) = 36° 15′. Forms: *c*(001), *b*(010), *m*(110), *p*(111). Crystals large and tabular parallel to *c*(001). Largely altered to *meyerhofferite* and above measurements are only approximate. Cleavage, *c*(001), good. Fracture irregular. Brittle. H. = 2. G. = 1·875. Unaltered material is transparent, colorless with vitreous luster. Optical orientation probably as follows: Ax. pl. parallel to *b*(010). Bx_{ac} inclined to *c*(001). Refractive indices, $\alpha = 1{\cdot}495$; $\beta = 1{\cdot}50$; $\gamma = 1{\cdot}520$.



Inyoite.

Comp. — Hydrous calcium borate, $2CaO.3B_2O_3.13H_2O$; CaO, 20·2; B_2O_3, 37·8; H_2O, 42·0.

Anal. — CaO, 20·5; B_2O_3, [37·2], H_2O, 42·3; Total, 100·00.

Pyr. — B. B. decrepitates and fuses with intumescence, giving green flame. Abundant water in C. T. Easily soluble in acids.

Alteration. — Largely altered to a white fibrous mineral called *meyerhofferite*. On the outside of the crystals the latter mineral is also found in transparent glassy prisms.

Obs. — Found in a prospect tunnel in the Mt. Blanco district, on Furnace Creek, near Death Valley, Inyo Co., Cal., associated with *colemanite*.

Name. — From Inyo Co., Cal.

Iodyrite, Min., p. 160; App. II, p. 55. — Crystals from Tonopah, Nev., and Broken Hill, N. S. W.; Kraus and Cook, Zs. Kr., **46**, 417, 1909; see App. II; also on crystals from Tonopah, Nev.; Eakle, Bull. Uni. Cal. Geol. Dept., **7**, 1, 1912. Discussion of the validity of the new forms on crystals from Tonopah, Nev., given in App. II.; Kraus and Cook, Centralbl. Min., 385, 1913.

Occ. at Tonopah, Nev.; Burgess, Econ. Geol., **6**, 13, 1911.

Artif. formation; Quercigh, Rend. Acc. Linc., **23**, (1), 826, 1914.

Iolite, Min., p. 419; App. I, p. 37; II, p. 56. — Crystals altered to *pinite* found at Düllenberg near Neualbenreuth in Eastern Bavaria; Laubmann and Cathrein, N. Jb. Min., **2**, 11, 1911.

Anal. of crystals from Vizézy, Montbrison, Loire; Barbier, Bull. Soc. Chim. France, **3**, 724, 1908.

Anal. and optical study of mineral from Ibity, Madagascar; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 283, 1910.

Pleochroic halos and their connection with α-rays from radioactive elements; Hovermann, N. Jb. Min., Beil.-Bd., **34**, 321, 1912.

Iserine, Min., p. 219. — Discussion of composition and relation to members of *rutile group*. Suggested that it be called an *iron rutile*. Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

Isomicrocline. See under *Microcline.*

ITTNERITE, Min., p. 432. — By microchemical tests shown to be a mixture; Thugutt, [Ber. Ges. Wiss. Warsaw, 79, 1911], Zs. Kr., **54**, 197, 1914.

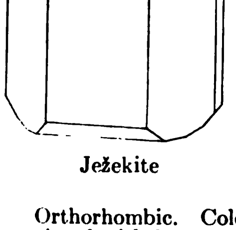
IXIOLITE, Min., p. 736. — Crystals from Ural Mts.; Vernadsky and Fersmann, Bull. Ac. St. Pet., **4**, 511, 1910; Zs. Kr., **52**, 517, 1913.
Anal. of a supposed ixiolite from West Australia; Simpson, Proc. Austral. Ass. Adv. Sc., **12**, 310, 1909.

JADEITE, Min., p. 369; App. I, p. 37; II, p. 57. — Occ. in Upper Burma with discussion of origin; Bleeck, Rec. Geol. Sur. India, **36**, 254 and **37**, 16, 1908.
Experiments concerning the crystallizing together of *diopside* and *jadeite*; Schumoff-Deleano, Centralbl. Min., 227, 1913.

JAMESONITE, Min., p. 122; App. I, p. 37; II, p. 57. — Study of four crystals from Kasejovic in West Bohemia which agree in qualitative tests and physical characters with jamesonite has given the following facts about the crystal character of the mineral.
Monoclinic. $a : b : c = 0{\cdot}8316 : 1 : 0{\cdot}4260$. $\beta = 88°\ 35'\ 45''$. $(011) : (0\bar{1}1) = 46°\ 8'$.* $(011) : (\bar{1}01) = 35°\ 17'$ *. $(10\bar{1}) : (110) = 70°\ 28'$ *. Forms present: $a(100)$, $b(010)$, $m(110)$, $l(210)$, $n(120)$, $c(001)$, $d(\bar{1}01)$, $e(011)$, $f(012)$, $t(112)$, $r(\bar{1}12)$, $o(\bar{1}11)$, $q(\bar{2}12)$, $s(\bar{2}32)$, $z(\bar{3}54)$, $v(\bar{1}32)$. Slavík, Centralbl. Min., 7, 1914.
Anal. of *plumosite* from Felsöbánya, Hungary; Loczka, [Ann. Mus. Nat. Hung., **6**, 586, 1908], Zs. Kr., **48**, 445, 1910.
Chem. composition discussed; Schaller, Zs. Kr., **48**, 562, 1910; U. S. G. S., Bull., **490**, 25, 1911.

JANOSITE, App. II, p. 57. — No evidence as to the existence of such a compound; Scharizer, Zs. Kr., **46**, 427, 1909.

JAROSITE, Min., p. 974; App. I, p. 37; II, p. 57. — Well-crystallized material has been found at the Shattuck-Arizona copper mine at Bisbee, Ariz.; Schaller (priv. contr.; to be published in U. S. G. S., Bull., **610**).
Occ. with anal. from Capo d'Arco and Capo Calamita, Elba; Manasse, Mem. Soc. Tosc., **27**, 76, 1911; from Mte. Arco, *idem*, *ibid.*, **28**, 118, 1912.
Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite.*
Occ. at the mercury locality, Brewster Co., Texas; Hillebrand and Schaller, Zs. Kr., **47**. **433**, 1909; U. S. G. S., Bull., **405**, 17, 1909.
Material known as *pastreite* from Saint-Félix-de-Pallières, Gard, France, is shown to be jarosite; anal. given; Azéma, Bull. Soc. Min., **33**, 130, 1910.



Ježekite

Ježekite. *F. Slavík*, [Bull. Ac. Sc. Bohême, Jan., 1914], Bull. Soc. Min., **37**, 152, 1914.
Monoclinic. $a : b : c = 0{\cdot}8959 : 1 : 1{\cdot}0241$. $\beta = 74°\ 28'\ 55''$. Angles: $(110) : (100) = 40°\ 48'$; $(001) : (100) = 74°\ 28'\ 55''$; $(001) : (011) = 44°\ 37'$. Forms: (001), (100), (010), (110), (011), (012), $(\bar{1}01)$, (102), (104). H. = 4·5. G. = 2·94. Cleavage perfect, (100); imperfect, (001). Extinction angle on (010), $a : c = 29°$ in obtuse angle β. Ax. pl. parallel to (010). Refractive indices: $\alpha = 1{\cdot}55$, $\beta = 1{\cdot}56$, $\gamma = 1{\cdot}59$. Optically −. Colorless or white.
Comp. — A fluophosphate of lime, soda, and alumina, $Na_4CaAl(AlO)(F,OH)_4(PO_4)_2$.
Anal. — P_2O_5, 30·30; Al_2O_3, 21·92; Fe_2O_3, *tr.*; CaO, 13·50; Na, 18·71; Li, 0·86; F, 8·15; OH, 6·26; Total, 100·70.
Obs. — Found at Ehrenfriedersdorf, Saxony. Also thought to be the unknown acicular mineral occurring on the *morinite* from Montebras.
Name. — After Bohuslav Ježek, of the Royal Bohemian Museum.

Joaquinite. *G. D. Louderback*, Bull. Uni. Cal., Geol. Dept., **16**, 576, 1909.
Orthorhombic. Color, honey-yellow. Comp. — A titano-silicate of calcium and iron. Associated with *benitoite*, from San Benito Co., Cal. Named after Joaquin ridge of the Diable mountain range.

Juddite. See under *Amphibole.*

KALINITE, Min., p. 951. — From Vesuvius; Zambonini, [Rend. Acc. Napoli, 156, 1908], Zs. Kr., **49**, 106, 1910.

KALIOPHILITE, Min., p. 427. — Artif. formation; Ginsberg, Zs. Anorg. Chem., **73**, 277, 1912.

KAOLINITE, Min., pp. 685, 1039; App. II, p. 59. — Crystals from National Belle mine, Silverton, Col., shown to be monoclinic; Johnsen, Centralbl. Min., 33, 1911.

Anal. of material from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Kovászó, Hungary; Kalecsinszky, [Jb. Ung. Geol. Anstalt, 294, 1909], Zs. Kr., **48**, 446, 1910; of various Hungarian occurrences; Petrik, *ref.* Zs. Kr., **53**, 64, 1913.

Chem. constitution; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909; Zs. Kr., **51**, 108, 1912; Mellor and Holdcroft, [Trans. Engl. Ceramic Soc., **10**, (1), 94, 1910–1911], Zs. Kr., **53**, 569, 1914; Weyberg, [Trav. Mus. Geol., Ac. Sc. St. Pet., **5**, 57, 1911], Zs. Kr., **53**, 610, 1914; Samojlov, Bull. Ac. St. Pet., **3**, 1137, 1909; **8**, 779, 1914; Zs. Kr., **51**, 106, 1912. Chemistry of; Stremme, Fortschr. Min., **2**, 87, 1912. Effects of acetic acid upon *kaolin* and *allophane* compared; van der Leeden, Centralbl. Min., 289, 1910.

Genesis, with anal. from Giesshübel, Bohemia; Gagel and Stremme, Centralbl. Min., 427, 467, 1909; at Schwanberg, Styria; van der Leeden, Centralbl. Min., 489, 1910; general; Butler, Min. Mag., **16**, 63, 1911.

KIESERITE, Min., p. 932; App. I, p. 39; II, p. 59. — Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

KLEINITE, App. II, p. 59. — Detailed description; Hillebrand and Schaller, Zs. Kr., **47**, 433, 1909; U. S. G. S., Bull., **405**, 1909; see App. II.

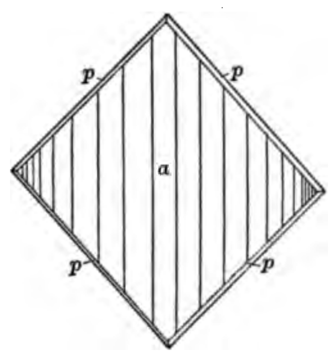
Effect of heating; Canfield, Hillebrand and Schaller, Am. J. Sc., **30**, 202, 1910; Zs. Kr., **49**, 1, 1910.

Kliachite and **Kljakite.** See under *Sporogelite*.

KNOPITE, App. I, p. 39. — Anal. of material from an unknown locality in Siberia; Tschernik, Bull. Ac. St. Pet., **2**, 75, 1908; Zs. Kr., **50**, 66, 1911.

Koechlinite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; complete description to be published in U. S. G. S., Bull., **610**).

Orthorhombic. $a : b : c = 0{\cdot}9774 : 1 : 1{\cdot}0026$. Angles: $a : p = 54° 5'$, $m : m' = 88° 42'$. Forms: $a(100)$, $b(010)$, $l(130)$, $n(230)$, $j(450)$, $m(110)$, $h(430)$, $k(210)$, $p(111)$, $r(322)$, $s(533)$, $u(131)$, $x(362)$. In minute crystals tabular parallel to $a(100)$ with edges beveled by faces of $p(111)$. Crystals are commonly nearly square in outline. Twinning both as contact and penetration twins. Tw. pl. is (011). Face $a(100)$ frequently vertically striated. Perfect cleavage parallel to $a(100)$. Brittle. Color greenish yellow. Vitreous to slightly adamantine luster. Transparent. Ax. pl. parallel to $c(001)$. Bx_{ac} probably perpendicular to $b(010)$. Optically –. β for Li-light = 2·55. Birefringence about 0·1. Non-pleochroic on flat face.



Koechlinite.

Comp. — A molybdate of bismuth, $Bi_2O_3.MoO_3$ or $(BiO)_2MoO_4$; Bi_2O_3, 76·36; MoO_3, 23·64.

Anal. — Average of three partial analyses, after deducting admixed quartz: Bi_2O_3, 77·1; MoO_3, 22·4; H_2O, 0·2; Total, 99·7.

Pyr. — Fuses easily in C. T. without formation of a sublimate. Readily soluble in hydrochloric acid. Gives characteristic reactions for a molybdate and for bismuth.

Obs. — Found on a single specimen preserved in the Collection of the Hof Museum at Vienna. Was originally labelled *torbernite* and came from the Daniel mine, Schneeberg, Saxony, Germany. Associated with *quartz*, *native bismuth*, *smaltite*, and some other unidentified minerals.

Name. — After Dr. Rudolf Koechlin of Vienna.

KOENENITE, App. II, p. 60. — Occ. at Sarstedt, Hannover, Germany, with *anhydrite* and *carnallite*; Erdmannsdörffer, Centralbl. Min., 449, 1913.

KORNERUPINE, Min., p. 560. — A new study of *prismatine* from Waldheim, Saxony, with new anal. leads to formula $NaH_3Mg_6Al_{12}Si_7O_{40}$. A very similar formula may be derived from the anal. of kornerupine from Fiskernäs. Optical and crystallographic study gave results closely in accord with the original description. Prismatine was found to be fusible to a gray glass. Uhlig, Zs. Kr., **47**, 215, 1909.

Occ. near Betroka, Madagascar, in large clear crystals of a sea-green color of gem quality. Optical study showed that it is optically –. Bx_{ac} coincides with vertical axis; refractive indices, α = 1·6613, β = 1·6733, γ = 1·6742; 2V = 20° 10′. Anal. leads to the formula, $6(Mg,Na_2,K_2,H_2)O.4(Al,Fe)_2O_3.5SiO_2$. G. = 3·27. Anal. by Pisani; SiO_2, 31·35; Al_2O_3, 41·20; Fe_2O_3, 2·27; MgO, 23·80; K_2O, 0·24; Na_2O, 0·60; H_2O, 0·64; Total 100·10. Lacroix, C. R., **155**, 672, 1912.

KREMERSITE, Min., p. 176. — Found in fumeroles at Mt. Etna, Sicily; Lacroix, C. R., **147**, 161, 1908.

KRENNERITE, Min., pp. 105, 1039; App. I, p. 39; II, p. 60. — The earlier anal. by Schrauf and Scharizer, Sys., p. 105, are probably of the species *muthmannite*, which see. The later anal. by Sipöcz (Sys. p. 105) and Myers (App. I, p. 39) made upon crystallized material and giving the formala $(Au,Ag)Te_2$, with Au in excess, represent the true krennerite. Zambonini, Zs. Kr., **49**, 246, 1911.

KRYPTOTIL, Min., p. 561. — Thought to be a member of the mica group with the composition, $H_2Al_3Si_3O_{12}$; Uhlig, Zs. Kr., **47**, 215, 1909.

LABRADORITE, Min., p. 334; App. II, p. 61. — Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of the *plagioclase group*; Rinne, Centralbl. Min., 705, 1914.
Anal. of material from a norite on Flakstadö Island, Norway; Vogt, Quart. J. Geol. Soc., **65**, 81, 1909; Zs. Anorg. Chem., **71**, 138, 1911; anal. and optical description of material from Altar Mts., Mexico; Ford and Bradley, Am. J. Sc., **30**, 151, 1910; anal. from County Down, Ireland; Hutchinson and Smith, Min. Mag., **16**, 264, 1912.

Lacroixite. *F. Slavík*, [Bull. Ac. Sc. Bohême, Jan. 1914], Bull. Soc. Min., **37**, 157, 1914.
Monoclinic? Nearly orthorhombic in angles but optical character points to a monoclinic symmetry. $a : b : c$ = 0·82 : 1 : 1·60. Angles: (111) : (1$\bar{1}$1) = 72°; (111) : (11$\bar{1}$) = 42° 30′–43°; ($\bar{1}$11) : (1$\bar{1}\bar{1}$) = 87° 30′–88°. Only in fragmentary crystals. Cleavage parallel to pyramid. H. = 4·15. G. = 3·126. Color pale yellow to pale green, at times almost white. Luster vitreous to resinous.
Comp. — A fluophosphate of soda, lime, manganese oxide and alumina;

$$Na_4(Ca,Mn)_4Al_3(F,OH)_4P_3O_{16}.2H_2O.$$

Anal. — P_2O_5, 28·95; Al_2O_3, 18·92; MnO, 8·45; CaO, 19·51; NaF, 14·47; NaOH, 5·51; H_2O, 4·22; Total, 100·03.
Obs. — Found at Ehrensfriedersdorf, Saxony.
Name. — After Prof. A. Lacroix.

LÅNGBANITE, Min., pp. 543, 1039; App. I, p. 40. — Five types of crystals from Långban, Sweden, described. From the angle (22$\bar{4}$3) : (0001) = 62° 30′, was calculated the new ratio, $a : c$ = 1 : 1·4407. The symmetry is proved to be rhombohedral-tetartohedral. The following list of forms is given: c(0001), m(10$\bar{1}$0), n(11$\bar{2}$0), s(21$\bar{3}$0), σ(3$\bar{1}\bar{2}$0), o(22$\bar{4}$3), ω(4$\bar{2}\bar{2}$3), p(2$\bar{1}\bar{1}$3), π(11$\bar{2}$3), k(22$\bar{4}$9), a(44$\bar{8}$3), f(20$\bar{2}$3), ϕ(02$\bar{2}$3), e(10$\bar{1}$3), ϵ(01$\bar{1}$3), g(40$\bar{4}$3), γ(04$\bar{4}$3), l(42$\bar{6}$3), i(21$\bar{3}$3) h(8·2·$\bar{10}$·3). Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910).

LANGBEINITE, App. I, p. 40; II, p. 61. — Anal. with determination of refractive indices, of material from Hall, Tyrol; Görgey, Min. Mitt., **28**, 334, 1909. Artif. formation; Nacken, Nachr. Ges. Wiss. Göttingen, 602, 1907; Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

LANSFORDITE, Min., p. 305. — Discussion of crystal orientation; Federov, [Vh. Min. Ges., **44**, 299, 1906], Zs. Kr., **46**, 213, 1909. Optical properties; Cesàro, [Bull. de la Classe des Sc., Bruxelles, 234, 1910], Zs. Kr., **52**, 204, 1912.

LANTHANITE, Min., pp. 302, 1040. — New axial ratio derived from crystals from Bastnäs, Sweden; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1910; new anal.; Lindström, G. För. Förh., **32**, 206, 1911.

LASSALLITE, App. II, p. 61. — See under *Palygorskite*.

LAUMONTITE, Min., p. 587; App. I, p. 40; II, p. 61. — Crystals from Maddalena archi pelago, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 273, 1912.
Anal. from near Reading, Pa.; Smith, [Proc. Ac. Nat. Sc., **62**, 538, 1910], Zs. Kr., **52**, 79, 1912; of crystals from Heimbach near Oberstein, Germany; Dürrfeld, Zs. Kr., **50**, 257, 1911; from Ashio copper mines, Shimotsuke, Japan; Fukuchi, Beitr. Min. Japan, No. 4, 190, 1912.
The variety *leonhardite* is thought by Fersmann, [Trav. Mus. Geol. Ac. Sc. St. Pet., **2**, 103, 1908], Zs. Kr., **50**, 75, 1911, to be a definite species with formula $(Ca,K_2,Na_2)_2Al_4Si_8O_{24}.7H_2O$. *Secondary leonhardite* is name given to the alteration product of *laumontite*. Anal. and description of material from near Simferopol, Crimea, Russia.

LAURIONITE, Min., p. 171; App. I, p. 41; II, p. 62. — Comparison made between crystals, twinning laws, etching figures and optical properties of *laurionite* and *paralaurionite* with conclusion that the orthorhombic crystals of laurionite are formed by sub-microscopic twinning lamellæ of the monoclinic paralaurionite; Ktenas, Bull. Min. Soc., **33**, 173, 1910.

LAUTITE, Min., p. 148; App. I, p. 41. — Found in an ore vein in the "Gabe Gottes" mine near Markirch, Alsace, associated with *arsenic, tetrahedrite, smaltite, rammelsbergite, proustite.* Occurs in crystals and radiating aggregates. Color, light steel-gray with reddish tone. Streak black. H. = 3–3·5. G. = 4·53. Anal.: Cu, 37·07; As, 44·53; S, 18·30; Total, 99·90. Dürr, [Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 249, 1907], Zs. Kr., **47**, 202, 1909. Crystals probably from the same locality described. Orthorhombic. Axes, $a : b : c = 0·69124 : 1 : 1·0452$. Nineteen forms recorded. Belongs to *marcasite group.* Habit, tabular parallel to c(001) and elongated parallel to brachy-axis. Cruciform twins with (110) as tw. pl. Cleavage, (001) good, (021) poor, (011) very poor. H. = 3–3·5. G. = 4·53. Color, light steel-gray with red tone. Luster, metallic. Easily soluble in conc. nitric acid. Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, 121, 1909], Zs. Kr., **51**, 635, 1912.

LAWSONITE, App. I, p. 41; II, p. 62. — Chem. constitution and relations; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909.

LEADHILLITE, Min., p. 921; App. I, p. 42; II, p. 62. — Crystals from Eureka Hill mine, Tintic District, Utah, showed many new forms. Twins with (120) as tw. pl. $2E_{Na} = 19° 54'$. Palache and La Forge, Proc. Am. Ac., **44**, 435, 1909. Crystals from Quartette Gold mine, Searchlight, Nev., showed more new forms. A table of angles after Goldschmidt of all known forms given, based on the following new constants: $a : b : c = 0·8742 : 1 : 1·1122$; $\beta = 89° 30'$. Palache, Proc. Am. Ac., **44**, 452, 1909; also Palache, La Forge, and Goldschmidt, Zs. Kr., **48**, 129, 1910.

Lefkasbestos. See under *Serpentine.*

LEONHARDTITE. See under *Laumontite.*

LEPIDOLITE, Min., p. 624; App. I, p. 42; II, p. 63. — Crystal structure and parallel growth with *muscovite*; Baumhauer, Zs. Kr., **51**, 344, 1912.

Anal. of mineral from three localities near Antsirabé, Madagascar, with optical study; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 367, 1910; from Urgutschan River near Ljesskowa, Transbaikalia, Siberia; Kusnetzov, Bull. Ac. St. Pet., **4**, 711, 1910; Zs. Kr., **52**, 518, 1913; from various localities in California lead to formula for pure mineral as $12SiO_2.3Al_2O_3.3Li_2O.2K_2O.8F$. Most lepidolites are mixtures of this and *muscovite.* Schaller, (priv. contr.; to be published in U. S. G. S., Prof. Paper, **94**.)

LEPIDOMELANE, Min., p. 634; App, I, p. 42; II, p. 63. — Anal. of material from Monmouth Township, Ontario, Canada; Adams and Barlow, Trans. Roy. Soc. Canada, **2**, Sect. IV, 3, 1908; from the Ilmen Mts., Russia; Baljankin [Ber. Polytech. Inst. St. Pet., **12**, 135, 1909], Zs. Kr., **51**, 283, 1912; from Frankford, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 99, 1914; from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913.

LEUCITE, Min., pp. 341, 1041; App. I, p. 42; II, p. 63. — Study of the change in the index of refraction for varying wave-lengths of light over a temperature range from 21° to 750°. There is a decrease in values of the index of refraction with rise of temperature which is uniform and gradual until about 500°, when it becomes much more rapid. The change from α-leucite to β-leucite occurs slowly over a range of 30° near the 700° point. The index continues to decrease in value beyond this point. Rinne and Kolb, N. Jb. Min., **2**, 138, 1910.

Structure; Colomba, Riv. Min., **40**, 37, 1911.

LEUCOPHANITE, Min., p. 417; App. II, p. 63. — Artif. formation; Doelter, Min. Mitt., **32**, 130, 1913; Ber. Ak. Wien, **122**, (1), 1, 1913.

LEUCOPHŒNICITE, App. II, p. 63. — Crystals from Franklin Furnace, N. J., gave the elements, $a : b : c = 1·1045 : 1 : 2·3155$; $\beta = 76° 44'$. Forms present: c(001), b(010), a(100), m(110), s(120), e(101), f(102), x(103), r($\bar{1}$01), i($\bar{1}$02), y($\bar{1}$03), o(011), f(012), l(121), n($\bar{1}$21), u($\bar{1}$22), d(123), h($\bar{1}$23), q($\bar{1}$24). Crystals elongated parallel to b-axis, the orthodome zone deeply striated Twinning on base. Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

LEVYNITE, Min., p. 595; App. II, p. 64. — Effect upon optical properties of saturation by various compounds; Grandjean, C. R., **149**, 866, 1909.

LILLIANITE, Min., p. 130; App. II, p. 64. — Crystals from Gladhammar, Sweden, proved to be orthorhombic and showed the following forms: (100), (010), (110), (210), (011). The axial ratio: $a : b : c = 0{\cdot}8002 : 1 : 0{\cdot}5433$. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Anal. of material containing selenium, from Jilijärvi; Borgström, G. För. Förh., **32**, 1525, 1911.

LIMONITE, Min., p. 250; App. II, p. 64. — Anal. of various hydrated oxides of iron from peninsulas of Kertch and Taman, Crimea; Popov, Trav. Mus. Geol. Ac. Sc. St. Pet., **4**, 99, 1910; Zs. Kr., **52**, 606, 1913; from Whitemarsh, Montgomery Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

Behavior under pressure; Adams, J. Geol., **18**, 489, 1910.

LINARITE, Min., p. 927; App. I, p. 43; II, p. 64. — Crystals with new forms from Broken Hill, N. S. W.; Ondřej, ["Rozpravy" Böhm. Ak., **19**, No. 37, 1910], Zs. Kr., **53**, 84, 1913; from Mammoth Collins mine near Schulz, Ariz.; Guild, Zs. Kr., **49**, 321, 1911; with new form and anal. from Beaver Mt., Slocan, West Kootenay, B. C.; Johnston, [Summary Rep. Geol. Sur. Canada, Dept. Mines for 1910, 257, 1911], Zs. Kr., **54**, 79, 1914.

LITHARGE. See under *Massicot*.

LITHIOPHILITE, Min., p. 756. — Crystals from Stewart mine, Pala, Cal.; Schaller, (priv. contr.; to be published in U. S. G. S., Prof. Paper, **94**).

LÖLLINGITE, Min., p. 96; App. I, p. 43. — Chem. constitution and relation to other members of the group; Beutell, Centralbl. Min., 225, 271, 299, 1912.

LORANDITE, App. I, p. 43; II, p. 65. — Occ. at Rambler mine, Encampment, Wyo.; Rogers, Am. J. Sc., **33**, 105, 1912.

LORANSKITE, App. II, p. 65. — Description from Impilaks, Finland; Borgström, G. För, Förh., **32**, 1525, 1911. See under *Wiikite*.

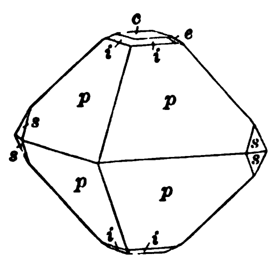
Losite. See under *Cancrinite*.

LÖWEITE, Min., p. 946; App. II, p. 65. — Refractive indices on material from Hall, Tyrol; $\omega = 1{\cdot}4896$, $\epsilon = 1{\cdot}4712$, making the mineral optically negative instead of positive as usually given; Görgey, Min. Mitt., **28**, 334, 1909. Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

LÖWIGITE, Min., p. 976. — Occ. with anal. from near Mt. Kinjal, Pyatigorsk mineral spring district, Northern Caucasia; Arschinov, Sep. Pub., Moscow, 1913.

LUDLAMITE, Min., p. 841. — An iron phosphate near ludlamite from Ashio copper mines, Shimotsuke, Japan; Fukuchi, Beitr. Min. Japan, No. 4, 192, 1912.

Lublinite. See under *Calcite*.



Lucinite.

Lucinite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; the complete description to be published in U. S. G. S., Bull., **610**).

Orthorhombic. $a : b : c = 0{\cdot}8729 : 1 : 0{\cdot}9788$. $c(001) : p(111) = 56° \ 6'$; $d(120) : d'(1\bar{2}0) = 59° \ 36'$. Forms: $c(001)$, $a(100)$, $d(120)$, $e(012)$, $r(113)$, $i(112)$, $p(111)$, $s(121)$. Habit octahedral with prominent development of $p(111)$. Also compact, massive. Shows no cleavage. H. = 5. G. = about 2·52. Color, green. Vitreous luster. Approx. refractive indices: $\alpha = 1{\cdot}56$, $\gamma = 1{\cdot}59$.

Comp. — Same as for *variscite*; $Al_2O_3.P_2O_5.4H_2O$; Al_2O_3, 32·21; P_2O_5, 44·93; H_2O, 22·76.

Anal. — Of granular material after deducting 26·29% quartz; Al_2O_3, 34·97; P_2O_5, 42·75; H_2O, 22·75; Total, 100·47.

Pyr. — Same as for *variscite*.

Obs. — Found lining cavities in the massive variety associated with tabular crystals of *variscite*, the indications being that both varieties were deposited under the same conditions at practically the same time. Occurs at Utahlite hill, five miles northeast of Lucin, Boxelder Co., Utah.

LUDWIGITE, Min., p. 877. — New analyses of material from Phillipsburg, Mont., and Hungary show that the formula should be written, $4RO.Fe_2O_3.B_2O_3$, in which RO = MgO and FeO. In the mineral from Montana, MgO : FeO as 3·57 : 0·43. The Montana ludwigite occurs in small spherulites of dark green to black color. Fibers show parallel extinction with strong pleochroism; sea-green parallel to elongation and chestnut-brown at right angles to it. Refractive index much $> 1{\cdot}67$. Anal. after deducting small amounts of forsterite and magnesite as follows: FeO, 7·27; MgO, 33·78; Fe_2O_3, 37·37; Al_2O_3, 2·27; H_2O +, 1·24; H_2O −, 1·13; B_2O_3, 16·94; Total 100·00. Schaller, Am. J. Sc., **30**, 146, 1910; Zs. Kr., **48**, 545, 1910; U. S. G. S., Bull., **490**, 28, 1911.

Luigite. Synonym for *aloisite*, (App. II, p. 3); Colomba, Rend. Acc. Linc., **17**, (2), 237, 1908.

LÜNEBURGITE, Min., p. 869. — Recent study gave the following facts: Blitz and Marcus, Zs. Anorg. Chem., **77**, 124, 1912. Apparently monoclin.c. In minute tables with hexagonal outline. Prismatic cleavage with angle of 73°. Ax. pl. in symmetry plane. Optically −. Bx. sharply inclined to tables. Refractive index about 1·53. New anal., P_2O_5, 29·61; B_2O_3, 12·90; MgO, 25·13; CaO, 0·15; H_2O, 32·16; Total, 99·95. Formula given as $Mg_3(PO_4)_2.1·77H_3BO_3.6H_2O$. Discussion of probable rôle of the boric acid in the molecule.

MAGNESITE, Min., p. 274; App. I, p. 44; II, p. 66. — Anal. of material from the Häuselberg, near Leoben, Styria; Redlich and Cornu, Zs. prakt. Geol., **16**, 145, 1908; from Jolsva, Hungary; Kalecsinszky, [Jb. Ung. Geol. Anstalt, 294, 1909], Zs. Kr., **48**, 446, 1910; of nickeliferous material from various localities in Croatia; Tućan, Centralbl. Min., 250, 1914.

Study of thermal dissociation; Marc and Šimek, Zs. Anorg. Chem., **82**, 17, 1913.

Occ. at Mte. Livornesi, Cape Castiglioncello, Tuscany; D'Achiardi, Proc. Soc. Tosc., **22**, 53, 1913. Genesis and occurrence; Redlich, Fortschr. Min., **4**, 9, 1914.

MAGNETITE, Min., pp. 224, 1041; App. I, p. 44; II, p. 66. — Crystals from Gammalkroppa, Sweden, show new forms; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; from Split Rock iron mine, Essex Co., N. Y., with new form; Whitlock, Bull. N. Y. State Mus., **140**, 197, 1910; of titaniferous magnetite with new forms from Mte. Nero, Val Malenco, Lombardy, Italy; Tacconi, Mem. Acc. Linc., **8**, 736, 1911.

Anal. of material containing MnO, TiO_2, Cr_2O_3, from an unknown locality in Siberia: Tschernik, Bull. Ac. St. Pet., **2**, 75, 1908; Zs. Kr., **50**, 66, 1911; from monazite sand from North Carolina; *idem*, Bull. Ac. St. Pet., **2**, 243, 1908; Zs. Kr., **50**, 68, 1911; from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913.

By study of the reduction products of hematite and the oxidation products of magnetite the conclusion is reached that magnetite is a solid solution of Fe_2O_3 in isometric FeO; Mügge, N. Jb. Min., Beil.-Bd., **32**, 491, 1911; Nachr. Ges. Wiss., Göttingen, 318, 1911.

Study of the magnetic properties of magnetite crystals; Quittner, Ann. Phys., **30**, 289, 1909. Behavior under pressure; Adams, J. Geol., **18**, 489, 1910.

Artif.; Sustschinsky, [Trav. Soc. Nat. St. Pet., **37**, No. 1, 158, 1906], Zs. Kr., **46**, 295, 1909.

Titano-magnetite from Norway shown to be a mixture of *magnetite* and *ilmenite*; Vogt, Zs. prakt. Geol., **18**, 59, 1910.

MALACHITE, Min., p. 294; App. I, p. 44; II, p. 66. — Crystals from Katanga, German East Africa, with new form; Dürrfeld, Zs. Kr., **50**, 582, 1912.

Manandonite. *A. Lacroix*, Bull. Soc. Min., **35**, 223, 1912; C. R., **155**, 441, 1912.

Micaceous; in lamellar aggregates or in mammillary crusts of hexagonal plates. Cleavage perfect. Color white. Luster pearly. Under microscope shows six sectors with planes of optical axes parallel to edges of hexagonal plate. Bx. perpendicular to surface of crystal plate. Optically +. Axial angle small and variable.

Comp. — A basic boro-silicate of lithium and aluminium corresponding to $H_{24}Li_4Al_{14}B_4Si_6O_{53}$. Silica, 24·2; alumina, 47·8; boron trioxide, 9·4; lithia, 4·0; water, 14·6.

Anal. — SiO_2, 25·20; Al_2O_3, 47·02; B_2O_3, 9·25; Li_2O, 3·97; Na_2O, 0·48; H_2O, 14·10; Total, 100·22.

Pyr. — Easily fusible, giving red flame color. Not attacked by acids.

Obs. — Found in pegmatite at Antandrokomby, near the Manandona River, Madagascar.

MANGANAPATITE. See under *Apatite*.

MANGANHEDENBERGITE. See under *Pyroxene*.

MANGANITE, Min., p. 248; App. I, p. 45; II, p. 66. — Crystals from Långban, Sweden, and Bölet show new forms. From measurements of these crystals the following new axial ratio was derived: $a : b : c = 0·8612 : 1 : 0·56289$. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

MANGANOSITE, Min., p. 207; App. I, p. 45. — Index of refraction determined for Na-light, as 2·18; Ford, Am. J. Sc., **38**, 502, 1914. Anal. of material by Steiger (G. = 5·364) from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

MANGANOTANTALITE. See under *Columbite*.

Marcasite, Min., pp. 94, 1041; App. I, p. 45; II, p. 66. — **Crystals from Nordmarken**, Sweden; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; concretions from Ljadawa, Mogileff District, Gouv. Podolia, Russia; Watitsch, [Ann. Geol. Min. Russ., **12**, No. 1-2, 16, 1910], Zs. Kr., **52**, 634, 1913. Pseudomorphs after pyrrhotite from Hüggel near Osnabrück, Prussia; twins from Misburg, near Hannover; Schöndorf and Schroeder, Jahresber. Niedersächs. Geol. Ver. Hannover, 132, 1909; on the Osnabrück pseudomorphs see also Pogue, Proc. U. S. Nat. Mus., **39**, 571, 1911; Zs. Kr., **49**, 455, 1911. *Limonite* pseudomorphs after *marcasite* from Richland Co., Wis.; North, Am. J. Sc., **35**, 270, 1913.

Hardness and distinction from *pyrite*, see under *Pyrite*.

Chemical constitution; Plummer, J. Am. Chem. Soc., **33**, 1487, 1911; and relation to other members of group; Beutell, Centralbl. Min., 225, 271, 299, 1912.

Conditions of formation and relations to *pyrite*, etc.; Allen, J. Wash. Ac. Sc., **1**, 170, 1911; Allen, Crenshaw, Johnston, and Larsen, Am. J. Sc., **33**, 169, 1912; Zs. Anorg. Chem., **76**, 204, 1912; Allen, Crenshaw, and Merwin, Am. J. Sc., **38**, 393, 1914; Zs. Anorg. Chem., **90**, 81, 1914.

Determination in presence of *pyrite* by the Stokes method; Allen and Crenshaw, Am. J. Sc., **38**, 371, 1914.

Margarite, Min., p. 636. — Chem. constitution; Weyberg, Trav. Mus. Geol., Ac. St. Pet., **5**, 57, 1911; Zs. Kr., **53**, 610, 1914.

Mariposite, Min., p. 1041; App. I, p. 45. — Suggested by Schaller, (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**) that *mariposite* is identical with the earlier described *alurgite*.

Massicot, Min., p. 209; App. I, p. 45. — A specimen of *litharge* found in an orpiment deposit on the Zarshuran River, Kurdistan, gave on study the following facts. Occurs in two forms, either in lustrous red, mica-like flakes or in massive form with dull red color. Streak yellowish brown. H. = 2–3. Under the microscope the laminæ are translucent, being red in thick flakes and yellow to yellowish green in thin ones. Shows two cleavages at right angles to each other together with several sets of subsidiary lines, taken to be gliding planes. Extinction parallel to cleavages. Mean refractive index = 1·735. Low birefringence. Biaxial with moderately large axial angle. Ax. pl. parallel to one cleavage. Optically −. Probably orthorhombic. Some of the thicker plates show apparently uniaxial interference figures probably due to the superposition of thin plates with different orientations. Anal., PbO, 97·17; CuO, 2·61; Sb_2O_3, 0·30; P_2O_5, *tr.*; CO_2, *tr.*; Total, 100·08. Scott, Min. Mag., **17**, 143, 1914.

Maucherite. *F. J. Grünling*, Centralbl. Min., 225, 1913; *A. Rosati*, Zs. Kr., **53**, 389, 1914.

Tetragonal. $c = 1·0780$. Commonly in square tabular crystals with $c(001)$ prominent; with small and strongly striated pyramid faces on the edges. Also in pyramidal crystals. Forms: $c(001)$, $t(223)$, $v(443)$, $l(221)$, $g(552)$, $h(331)$, $b(441)$, $q(661)$. Twinning common; twinning planes (111) and (433). Angles: $t : c = 45° 28'$; $v : c = 63° 48\frac{1}{2}'$; $l : c = 71° 50\frac{1}{2}'$; $g : c = 75° 18'$; $h : c = {}^*77° 40'$; $b : c = 80° 41'$; $q : c = 83° 45\frac{1}{2}'$; $h : h = 87° 23\frac{1}{2}'$.

Fracture uneven. Brittle. H. = 5. G. = 7·83. Metallic luster. Color on fresh fracture reddish silver-white tarnishing to a gray copper-red. Streak blackish gray.

Comp. — Nickel arsenide, with small amounts of cobalt; Ni_3As_2.

Anal. — By Friedrick (1); Prandtl (2).

	As	S	Ni	Co	Pb	Fe	Gangue	Total
1.	45·66	....	49·51	0·93	....	....	....	96·10
2.	43·67	0·17	52·71	2·15	0·20	0·40	0·40	99·70
Ni_3As_2	46·00	....	54·00	....	....	....	....	100·00

Pyr. — Easily fusible to shining globule. Gives arsenical odor and oxide coating when heated on charcoal. Reacts with the fluxes for nickel and cobalt.

Obs. — Occurs at Eisleben, Thuringia, associated with *niccolite*, *chloanthite*, *bismuth*, *manganite*, *calcite*, *barite*, *anhydrite*, and *gypsum*.

Name. — After W. Maucher.

Study of the crystals of the furnace product, *placodine*, proved it to be identical with *maucherite*.

In the course of experiments concerning the precipitation effect of nickel and cobalt arsenides upon silver in solution it was found that the material called *temiskamite* from Elk Lake, Ontario, is probably identical with *maucherite* and that the formula of both should be Ni_4As_3. A so-called *chloanthite* from Mansfeld, Thuringia, gave the same reactions. Palmer, Econ. Geol. **9**, 664, 1914.

Melanothallite, Min., p. 174. — Alteration of mineral from Vesuvius to a green-colored material for which the name *hydromelanothallite* is proposed. Suggested that it has the composition, $CuCl_2.CuO.2H_2O$, while *melanothallite* should be $CuCl_2.CuO.H_2O$. Zambonini, Mem. Acc. Napoli, **14**, No. 7, 57, 1910.

MELANTERITE, Min., p. 941; App. I, p. 46; II, p. 67. — Anal. from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912. Origin of hair-like crystals; Mügge, N. Jb. Min., **2**, 1, 1913.

MELILITE, Min., p. 474; App. I, p. 46; II, p. 67. — Crystals from Podhorn Mt., near Marienbad, Bohemia; Berwerth, Min. Mitt., **29**, 259, 1910; Himmelbauer, *ibid.*, **31**, 325, 1912.
Chem. constitution and relations; Vernadsky, Bull. Ac. St. Pet., **3**, 1183, 1909; Zs. Kr., **51**, 108, 1912. Schaller, J. Wash. Ac. Sc., **4**, 354, 1914, (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**) shows that the members of the *melilite-gehlenite group* can be explained as isomorphous mixtures of the three compounds; *sarcolite*, $3CaO.Al_2O_3.3SiO_2$ with *soda-sarcolite*, $3Na_2O.Al_2O_3.3SiO_2$; *åkermanite*, $8CaO.4MgO.9SiO_2$; *velardeñite* (which see), $2CaO.Al_2O_3.SiO_2$. The suggestion is made that a natural mixture of two or more of these compounds be called by the group name, *melilite*, and that the names *gehlenite* and *fuggerite* be dropped.
From inclusions in the lavas of Mt. Etna; Stella-Starrabba, Rend. Acc. Linc., 19, (1), 755, 1910. Found as chief constituent of a coarse-grained rock occurring on Beaver Creek, Gunnison County, Col. Refractive indices given for Na-light; ω = 1·6319–1·6336, ϵ = 1·6254–1·6273. Anal. by Schaller given. Larsen and Hunter, J. Wash. Ac. Sc., **4**, 473, 1914.

Melnikovite. *B. Doss*, [Ann. Geol. Min. Russ., **13**, 130], N. Jb. Min., Beil.-Bd., **33**, 662, 1912; Zs. prakt. Geol., **20**, 453, 1912.
In minute grains. Color black. Magnetic. H. = 2–3. G. = 4·1–4·3.
Comp. — Considered as a labile form of iron disulphide, FeS_2.
Pyr. — Easily soluble in hydrochloric acid with evolution of hydrogen sulphide.
Origin. — Thought to have been derived from a colloidal form of iron sulphide.
Obs. — Found by means of drill holes in a Miocene clay on the Melnikov estates, Gouv. Samara, Russia.

MENEGHINITE, Min., p. 142. — Anal. of material from Hellfors, Sweden; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Mercurammonite. Same as *kleinite* (App. II, p. 59.) — *W. F. Hillebrand* and *W. T. Schaller*, U. S. G. S., Bull., **405**, 18, 1909; Zs. Kr., **47**, 444, 1910.

MESOLITE, Min., p. 605; App. II, p. 68. — Study of crystals from the Färöe Islands gave the following. Axial ratio for the monoclinic orientation: $a : b : c$ = 0·9747 : 1 : 0·3122; β = 88°. Crystals are from optical evidence triclinic twinned upon (100) and (010). Cleavage: prismatic perfect; basal imperfect. Optical orientation: $b = \mathfrak{c}$, $c : \mathfrak{b}$ = 1° 40′, $a : \mathfrak{a}$ = 6° 45′. 2V, Na-light = 86°. Dispersion very strong, $\rho < v$. Refractive indices for Na-light, α = 1·5048, β = 1·5050, γ = 1·5053. Optical changes at different temperatures given. G. = 2·272. Elastic in thin needles. Anal. given. Occ. at Friedrichstal, near Bensen, Bohemia, described. Görgey, Min. Mitt., **28**, 77, 1909. Crystals from "Su Marralzu," Osilo, Sassari, Sardinia; Serra, Rend. Acc. Linc., **18**, (2), 348, 1909.
Discussion of optical and chemical characters; Cesàro, Bull. Ac. Belg., No. 1, 17, 1909.
Anal. of mineral and its alteration products from Zchra-Zkaro; Glinka, [Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906]; Zs. Kr., **46**, 283, 1909; of material from Palagonia, Sicily; Ponte, [Att. Acc. Sc. Catania, **1**, No. 15, 1908], Zs. Kr., **49**, 111, 1910; from Kunstmanntal, Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909; from Tiriolo, Catanzaro, Italy; Panichi, Rend. Acc. Linc., **20**, (2), 421, 518, 1911.

MESSELITE, Min., p. 812. — Suggested that it is an alteration product of *anapaïte* through the loss of a portion of its water; Popov, Trav. Mus. Geol. Ac. Sc. St. Pet., **4**, 99, 1910; Zs. Kr., **52**, 606, 1913.

Metabrucite. See under *Brucite.*

METACINNABARITE, Min., pp. 62, 1041; App. I, p. 46; II, p. 68. — Artif. formation and thermal relations; Allen, Crenshaw and Merwin, Am. J. Sc., **34**, 341, 1912; Zs. Anorg. Chem., **79**, 125, 1912.

Metahewettite. *W. F. Hillebrand, H. E. Merwin,* and *F. E. Wright,* Proc. Am. Phil. Soc., **53**, 31, 1914; Zs. Kr., **54**, 209, 1914.
Orthorhombic. Earthy, composed of minute tabular crystals or compact with the plates in radiating form. Prism angle measured under microscope = 57°. $a : b$ = 0·54 : 1. G. = 2·511. Color deep red; powder claret-brown to dark maroon. Approximate refractive indices for Li-light, α = 1·70; β = 2·10. 2V (calc.) = 52.° Optically −. Axial plane parallel to elongation of plates. Strongly pleochroic, $\mathfrak{a}$ = light orange-yellow, $\mathfrak{b}$ = deep red, $\mathfrak{c}$ = deeper red.
Comp. — Same as *hewettite*, $CaO.3V_2O_5.9H_2O$, or perhaps $CaH_2V_6O_{17}.8H_2O$.
Anal. — Material from Thompson's, Utah. V_2O_5, 70·01; V_2O_4, 0·35; MoO_3, 0·13; CaO, 7·25; MgO, 0·03; K_2O, 0·09; Na_2O, 0·08; H_2O, 21·30; Fe_2O_3, etc., 0·19; SiO_2 and Insol.,

0·80; Total, 100·23. Material analyzed was previously brought into equilibrium with water-vapor with tension of 38·8 mm. at 35°.

For distinction from *hewettite* see under that mineral.

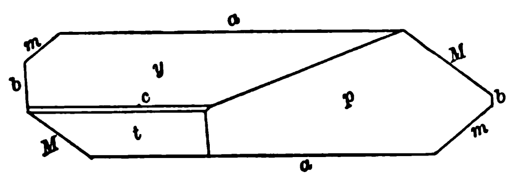
Pyr. — On heating loses water, changing from dark red to yellow-brown. Water content varies to some extent with atmospheric changes in humidity. On exposure to moisture, the dehydrated mineral regains its original weight and color. Easily fusible. Slightly soluble in water.

Obs. — Occurs as impregnation in sandstone, generally coating the sandstone grains, sometimes filling cavities and crevices. Associated with *gypsum*, with a gray hydrous silicate of aluminium, trivalent vanadium and potassium, and with selenium. Found in Paradox Valley, Montrose Co., Col., and at Thompson's, Utah, and other places in western Colorado and eastern Utah.

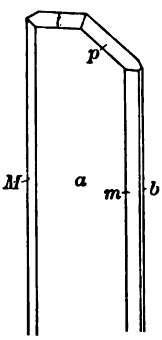
Metanatrolite. See under *Natrolite.*

METAVOLTINE, Min., p. 972; App. II, p. 69. — From Vesuvius; Zambonini, [Rend. Acc. Napoli, 156, 1908], Zs. Kr., **49**, 106, 1910. Occ. at solfatara of Pozzuoli near Naples; Aguiliar, [Boll. Soc. Nat. Napoli, **25**, 28, 1911], Zs. Kr., **54**, 389, 1914.

Meyerhofferite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; the complete description to be published in U. S. G. S., Bull., **610**).



(*Top View.*)



Meyerhofferite.

Triclinic. $a : b : c = 0·7923 : 1 : 0·7750$. $\alpha = 89° 32'$, $\beta = 78° 19'$, $\gamma = 86° 52'$. Forms: 27 different forms were observed, the most common being, *b*(010), *a*(100), *m*(110), *M*(1$\bar{1}$0), *t*(101), *y*($\bar{1}$01), and *p*(111). Less common were *c*(001), *n*(520), *v*(3$\bar{5}$0), *w*(4$\bar{3}$0), *h*(3$\bar{1}$0). Habit prismatic, often tabular parallel to *a*(100). Also fibrous. Cleavage, *b*(010), perfect. H. = 2. G. = 2·120. Colorless and transparent when fresh, but white and opaque on exposure. Luster vitreous to silky. Extinction angles: on *b*(010) = 33°; on *a*(100) = 25°. Optically −. Refractive indices for Na-light, $\alpha = 1·500$, $\beta = 1·535$, $\gamma = 1·560$.

Comp. — Hydrous calcium borate, $2CaO.3B_2O_3.7H_2O$; CaO, 25·02; B_2O_3, 46·85; H_2O, 28·13.

Anal. — 1, Average of 3 partial analyses on fibrous material; 2, on colorless, transparent crystals.

	CaO	B_2O_3	H_2O	Total
1.	25·45	46·40	28·76	100·61
2.	25·6	[45·6]	28·8	100·00

Pyr. — B. B. fuses readily without decrepitation but with intumescence to an opaque enamel, giving a green flame color. In C. T. fuses and yields abundant water. Soluble in acids.

Artif. — Was made artificially by Meyerhoffer and van 't Hoff, Ann. Chem., **351**, 100, 1907.

Obs. — Found as an alteration product of *inyoite* in a prospect tunnel of the Mt. Blanco district, on Furnace Creek, near Death Valley, Inyo County, Cal., associated with *colemanite.*

Name. — After W. Meyerhoffer.

MIARGYRITE, Min., p. 116; App. II, p. 69. — Crystals from Nagybánya, Hungary; Löw, Földt. Közl., **40**, 624, 674, 1910; from Příbram, Bohemia; Bräunsdorf, Silesia; Felsöbanya, Hungary; with new forms. Discussion of all known forms, of combinations, zones, etc.; Rosický, Bull. Ac. Sc. Bohême, **17**, 1912.

MICA GROUP, Min., p. 611; App. I, p. 46; II, p. 69. — Discussion of chemical constitution of the micas; Clarke, U. S. G. S., Bull., **588**, 1914. Pressure and percussion figures in micas and similar minerals; Wetzel, N. Jb. Min., **1**, 143, 1914.

MICROCLINE, Min., pp. 322, 1042; App. I, p. 47; II, p. 69. — From study of crystals from Pike's Peak, Col., the values were derived; $\alpha = 89° 20\frac{1}{2}'$, $\gamma = 91° 59'$; from crystals from Ivigtut, Greenland, the following: $a : b = 0·6637 : 1$; $\alpha = 89° 18\frac{1}{4}'$, $\beta = 115° 50'$, $\gamma = 92° 9\frac{1}{2}'$; Bøggild, Zs. Kr., **48**, 466, 1910. Pseudomorphs in granites of the Meuse valley, Ardennes, France; Lapparent, C. R., **146**, 588, 1908.

Analyses and determinations of indices of refraction of white microcline from Antsongombato and of amazon stone from Antaboko near Antsirabé in Madagascar; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, 36, III, 363, 365, 1910.

Anal. — Of material from Mesvres, Saône-et-Loire, France; Barbier, [Bull. Soc. Chim., France, **3**, 821, 1908; of microcline-microperthite from pegmatite of Ytterby, Sweden; Nordenskjöld, [Bull. Geol. Inst. Upsala, **9**, 183, 1910], Zs. Kr., **53**, 406, 1914; from nepheline syenite from Ditró, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from Mt. Ruwenzori, Congo Free State; Colomba, Sep. Pub., "Il Ruwenzori," **2**, 281; Zs. Kr., **50**, 511, 1911; from Elam, Delaware Co., and Bucks Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 96, 1914; from Runchy, Saône-et-Loire, and Vizézy, Loire, France; Gonnard and Barbier, Bull. Soc. Min., **34**, 235, 1911.

Occ. of rare alkalies in; Vernadsky and Revutzky, C. R., **151**, 1372, 1910; of rubidium; Vernadsky, Bull. Soc. Min., **36**, 258, 1913.

Mean specific heat; Schulz, Centralbl. Min., 632, 1911.

From pegmatite, Quincy, Mass.; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Zs. Kr., **49**, 332, 1911.

Spectroscopic distinction between *orthoclase* and *microcline*, see under *Orthoclase*.

An optically positive variety named *isomicrocline*; Luczizky, Min. Mitt., **24**, 347, 1905.

Microlite, Min., pp. 728, 1042; App. I, p. 47; II, p. 69. — Anal. from Wodigna, W. Australia; Simpson, Proc. Austral. Ass. Adv. Sc., **12**, 310, 1909.

Microsommite, Min., p. 428; App. II, p. 69. — Birefringence; Cesàro, Bull. Ac. Belg., No. 7, 619, 1908. Effect upon optical properties of saturation by various compounds; Grandjean, C. R., **149**, 866, 1909.

Miersite, App. I, p. 47; II, p. 69. — A study of the series AgI–CuI (*miersite* with *cuproiodargyrite*) shows that together they form a solid solution, crystallizing in the isometric system; Quercigh, Rend. Acc. Linc., **23**, (1), 446, 711, 825, 1914.

Millosevichite. *U. Panichi*, Rend. Acc. Linc., **22**, (1), 303, 1913.

As an incrustation. Color violet. Luster vitreous. Normal ferric and aluminium sulphate. Occurs in Alum Grotto, Island of Vulcano, Lipari Islands. Named in honor of Prof. F. Millosevich of Florence.

Mimetite, Min., p. 771; App. II, p. 69. — Crystals from Santa Eulalia, Chihuahua, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from El Potosi mine, Chihuahua, Mexico; Paul, Zs. Kr., **50**, 600, 1912.

Anal. of yellow variety from the copper mine, Bena e Padru, near Ozieri, Sassari, Sardinia, and study of crystals; Serra, Rend. Acc. Linc., **18**, (1), 361, 1909.

Minasragrite. *W. T. Schaller*, (priv. contr.).

Probably monoclinic. In granular aggregates, small mammillary masses, or in spherulites. Two cleavages observed. Maximum extinction observed = 12°. Color blue. Vitreous luster. Refractive indices, approx.: $\alpha = 1{\cdot}515$, $\beta = 1{\cdot}525$, $\gamma = 1{\cdot}545$. Strongly pleochroic; $\mathfrak{a}$ = deep blue, $\mathfrak{b}$ = blue, $\mathfrak{c}$ = colorless.

Comp. — A hydrated acid vanadyl sulphate, $V_2O_4.3SO_3.16H_2O$, or $(V_2O_2)H_2(SO_4)_3.15H_2O$; V_2O_4, 23·92; SO_3, 34·58; H_2O, 41·50.

Anal. — After deducting for admixed *melanterite*, *morenosite*, *gypsum*, and insol.: V_2O_4, 24·64; SO_3, 33·17; H_2O, 42·19; Total, 100·00.

Pyr. — In C. T. fuses readily and yields water. Very soluble in cold water.

Obs. — Found as an efflorescence on *patronite* from Minasragra, Peru.

Mineral Localities.

California; Eakle, Cal. State Min. Bureau, Bull., **67**, 1914.

Congo Free State; Buttgenbach, Am. Soc. Geol. Belgique, 83, 1912; 31, 1913.

Elba; Millosevich, Ist. Firenze, Sep. Pub., "Contributo alla Conoscenza della Mineralogia dell'Isola d'Elba," 1914.

Färöe Islands. (Localities given for various minerals and discussion of their paragenesis; Görgey, N. Jb. Min., Beil.-Bd., **29**, 269, 1910.

Formosa; Okamoto, Beitr. Min. Japan, No. 4, 157, 1912.

France; Lacroix, Mineralogie de la France, vol. **4**, 1910; vol. **5**, 1913.

Comitat Gömör, Hungary; Melzer, Sep. Pub., *ref.* in Zs. Kr., **47**, 294, 1909.

Sweden; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908.

Tyrol. Die Mineralien Tirols. G. Gasser, Sep. Pub., 1913.

Tonopah, Nev.; Eakle, Bull. Uni. Cal., Geol. Dept., **7**, 1, 1912.

Minervite, App. I, p. 47; II, p. 69. — Anal. and occ. of material near minervite in comp. from Réunion Island; Lacroix, Bull. Min. Soc., **33**, 34, 1910; **35**, 114, 1912.

Study of a series of related phosphates with new analyses shows that the composition of the group of minerals classed under minervite may be expressed by different combinations of the following molecules: ($Al_2O_3.P_2O_5.7H_2O$), ($2K_2O.P_2O_5.H_2O$), ($K_2O.P_2O_5.2H_2O$), H_2O. Gautier, C. R., **158**, 912, 1914.

Minguétite. *A. Lacroix*, Bull. Min. Soc., **33**, 270, 1910.
A member of the chlorite group. Crystals may reach 1·5 cm. in diameter. G. = 2·86. Color blackish green. Strong pleochroism; $\mathfrak{a}$ = light yellow, $\mathfrak{c}$ = opaque black. Birefringence stronger than with biotite. Optically −.
Comp. — $17SiO_2.4Fe_2O_3.8FeO.K_2O.8H_2O$. Intermediate in comp. between *stilpnomelane* and *lepidomelane*.
Anal. — By Pisani:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O	Total
43·65	5·22	18·80	19·00	3·22	0·94	0·66	3·00	6·00	100·49

Pyr. — Decomposed by hydrochloric acid. Fuses to a black magnetic enamel. Yields water in C. T.
Obs. — Found at the Minguet mine, near Segré, Maine-et-Loire, France.

MIZZONITE. Anal. from Capo d'Arco, Elba; Manasse, Rend. Acc. Linc., **19**, (2), 211, 1910; Mem. Soc. Tosc., **28**, 118, 1912.

MOHSITE. See under *Ilmenite*.

MOLDAVITE, App. II, p. 70. — Anal. of material from Oberkaunitz, Moravia; Weinschenk and Steinmetz, Centralbl. Min., 231, 1911. Refractive indices; Schwantke, Centralbl. Min., **26**, 781, 1909.
Discussion of its origin; Weinschenk, Centralbl. Min., 737, 1908; Řzehak, *ibid.*, 452, 1909; Suess, *ibid.*, 462; Weinschenk, *ibid.*, 545; Merrill, Proc. U. S. Nat. Mus., **40**, 481, 1911; Ježek, *ref.*, Zs. Kr., **53**, 81, 1913; Ježek and Woldřich, ["Rozpravy" Böhm. Ak., **19**, No. 30, 1910], Zs. Kr., **53**, 82, 1913.

Molengraaffite. *H. A. Brouwer*, C. R., **149**, 1006, 1909; Centralbl. Min., 129, 1911.
Monoclinic?, nearly orthorhombic. In imperfect prismatic crystals showing (100), (010), and (110). Tw. pl. (100). Polysynthetic twinning common. Cleavage, (100), perfect. Color yellow-brown. Pleochroism, $\mathfrak{c}$ = straw-yellow, $\mathfrak{a}$ and $\mathfrak{b}$ = light yellow to colorless. Ax. pl. nearly parallel to (100). Bx_{ac} nearly parallel to *c* axis. Optically +. Refractive indices, $\alpha = 1{\cdot}735$, $\gamma = 1{\cdot}770$. 2E = 50°.
Comp. — A titano-silicate of lime and soda.
Anal. —

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	H_2O	Total
28·90	27·70	3·75	0·95	2·07	2·72	19·00	2·38	10·30	0·60	1·00	99·37

Obs. — Found in a rock called "lujaurite" in Pilandsberg, northeast of Rustenberg, Transvaal.
Name. — In honor of Prof. G. A. F. Molengraaff, of Delft, Holland.

MOLYBDENITE, Min., pp. 41, 1042; App. I, p. 47; II, p. 70. — Anal. from various Russian localities; Nenadkewitsch, [Trav. Mus. Geol. Ac. Sc. St. Pet., **1**, 81, 1907], Zs. Kr., **47**, 288, 1909. Occ. in aplite dikes near Ginzling, Zillertal, Tyrol; Kittl, Centralbl. Min., 143, 1914.

MOLYBDITE, Min., p. 201; App. II, p. 70. — Pseudomorph after molybdenite found in Ilmen Mts., Russia, thought not to have composition assigned to this mineral by Schaller (see App. II); Gagarin, Bull. Ac. St. Pet., **1**, 287, 1907; Zs. Kr., **47**, 285, 1909.

Molybdosodalite. See under *Sodalite*.

MONAZITE, Min., p. 749; App. I, p. 47; II, p. 70. — **Cryst.** — From Trundle near Condobolin, N. S. W. and California Creek, Mt. Garnet, Queensland, with new forms; Anderson, Rec. Austral. Mus., **7**, 274, 1909; from King's Bluff, Olary, South Australia; *idem*, *ibid.*, **8**, 120, 1911; Zs. Kr., **53**, 578, 1914; from the following localities in Madagascar: Antsirabé; Lacroix, Bull. Soc. Min., **34**, 63, 1911; Ampangabé; *idem*, *ibid.*, **35**, 180, 1912; Ambatofosikely, with anal.; Duparc, Sabot, and Wunder, *ibid.*, **36**, 5, 1913; with optical determinations from the Kalasangashi River, Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, 31, 1913; with optical study from Dattas, Diamantina, Minas Geraes, Brazil; Busz, N. Jb. Min., Beil.-Bd., **39**, 482, 1914.
Anal. of material from sand, North Carolina; Tschernik, Bull. Ac. St. Pet., **2**, 243, 1908; Zs. Kr., **50**, 68, 1911; from the Serra dos Aimorés, Espiritu Santo, Brazil; Freise, Zs. prakt. Geol., **18**, 143, 1910.
Study of a large number of partial analyses leads to conclusion that the thorium in monazite does not exist there in the form of thorium silicate; Kress and Metzger, J. Am. Chem. Soc., **31**, 640, 1909.
Occ. of monazite sands in Madagascar; Lacroix, Bull. Soc. Min., **32**, 313, 1909.

MONTMORILLONITE, Min., p. 690; App. II, p. 71. — Anal. of variety, *stolpenite*, from Nordheim, Rhön district, Germany; Fersmann, Bull. Ac. St. Pet., **1**, 168, 1907; Zs. Kr., **50**, 61, 1911. Description with anal. from Cala Francese, Maddalena Island, Sardinia; Lovisato, Rend. Acc. Linc., **22**, (2), 670, 1913.

Chem. comp.; Thugutt, Centralbl. Min., **97**, 276, 1911; Stremme, *ibid.*, 205; Thugutt, *ibid.*, 35, 1912.

Occ. at Bordes, Tremouille, Vienne, France; Azéma, Bull. Soc. Min., **36**, 111, 1913.

MONTROYDITE. App. II, p. 71. — Detailed description; Hillebrand and Schaller, Zs. Kr., **47**, 433, 1909; U. S. G. S., Bull., **405**, 1909; see App. II.

MORDENITE, Min., p. 573; App. I., p. 47. — Anal. from Seiseralpe, Tyrol, and Osterö, Färoë Islands; Thugutt, C. R. Soc. Sc., Varsovie, **5**, 74, 76, 1912.

Morganite. See under *Beryl.*

MORINITE, Min., p. 1042; App. II, p. 72. — Relation to *ježekite*, which see.

MOSANDRITE, Min., p. 721. — Anal. of material from a Norwegian locality, probably Langesundfjord; Tschernik, Bull. Ac. St. Pet., **3**, 903, 1909; Zs. Kr., **51**, 97, 1912.

Mosesite. *F. A. Canfield, W. F. Hillebrand, W. T. Schaller*, Am. J. Sc., **30**, 202, 1910; Zs. Kr., **49**, 1, 1910; U. S. G. S., Bull., **509**, 104, 1912.

Isometric. Minute octahedrons. Twinned according to spinel law. Poor octahedral cleavage, uneven fracture. Brittle. H. = 3 +. Adamantine luster. Color lemon- to canary-yellow. Streak pale yellow. Color apparently unchanged by exposure to light. Translucent. Doubly refracting at ordinary temperatures but becomes isotropic above 186°.

Comp. — A mercury ammonium compound containing chlorine, sulphur trioxide, and water. A partial anal. on very small amount of material gave: Cl, 5·0 and SO_3, 3·5. Near *kleinite* in composition, but distinct from that mineral in certain reactions.

Pyr. — Heated slowly in C. T. turns dark reddish brown and then at higher temperature to white. Fumes of calomel are given off and condense in tube. Globules of mercury also formed. If heated rapidly in C. T. decrepitates violently, then fuses and volatilizes. In hydrochloric acid is changed to a white substance which retains the original form.

Obs. — Found very sparingly at Terlingua, Texas.

Name. — After Prof. A. J. Moses of New York City.

MOSSITE, App. I, p. 48. — Discussion of composition and relation to other members of the *rutile group*. Suggested that it had better be called a *niobium tapiolite*. Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

MÜLLERITE, App. II, p. 72. — Proposed that this mineral be named *zamboninite*, in order to avoid confusion; Bauer, N. Jb. Min., **1**, *ref.* 200, 1901.

MUSCOVITE, Min., p. 614; App. I, p. 48; II, p. 72. — **Anal.** — From Variney, Valle d'Aosta, Italy; Piolti, Riv. Min., **39**, 47, 1909; from near Olliergues, Puy-de-Dôme; Barbier and Gonnard, Bull. Soc. Min., **33**, 74, 1910; from various localities in Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 99, 1914; of *oncosine* from near Variney, Valle d'Aosta, Italy; Piolti, Att. Acc. Sc. Torino, **44**, 513, 1909; of *gilbertite* from Epprechtstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; of *fuchsite* from Lengenbach, Binnental; Prior, Min. Mag., **15**, 385, 1910; of *sericite* from near Tan-y-Bwlch, Merioneth, North Wales; Hutchinson and Smith, Min. Mag., **16**, 264, 1912; of *damourite* and *margarodite* from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913.

Zonal structure; Tronquoy, Bull. Soc. Min., **34**, 252, 1911; **35**, 101, 1912. Parallel growth with lepidolite; Baumhauer, Zs. Kr., **51**, 344, 1912.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

Muthmannite. *F. Zambonini*, Zs. Kr., **49**, 246, 1911; Rend. Acc. Napoli, **17**, 24, 1911.

Tabular crystals, usually elongated in one direction. Cleavage perfect parallel to elongation. H. = 2·5. Color bright brass-yellow, on fresh fracture gray-white. Powder iron-gray.

Comp. — Silver-gold telluride, (Ag,Au)Te.

Anal. — By Gastaldi.

Au	Ag	Pb	Te	Cu,Fe	Total
22·90	26·36	2·58	46·44	undet.	98·28

For discussion of distinction from *krennerite* see under that mineral.

Pyr. — B. B. similar to *sylvanite*. Mostly soluble in nitric acid, leaving residue of gold. With hydrochloric acid gives precipitate of silver chloride.

Obs. — Locality not stated, presumably from Nagyág.

Name. — Named in honor of Prof. W. Muthmann.

See also under *Empressite.*

NASONITE, App. I, p. 48; II, p. 73. — Crystals from Franklin Furnace, N. J., proved to be hexagonal. $c = 1 \cdot 3167$. Forms: $a(11\bar{2}0)$, $m(10\bar{1}0)$, $p(10\bar{1}1)$, $x(90\bar{9}2)$. $c : p = 56° 40'$ *. $c : x = 81° 41'$. Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909.

Natramblygonite. See under *Fremontite.*

NATROALUNITE, App. II, p. 73. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite.*

Natrodavyne. See under *Davyne.*

NATROJAROSITE, App. II, p. 73.—Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite.*

NATROLITE, Min., pp. 600, 1042; App. I, p. 49; II, p. 73. — **Cryst.** — From the benitoite locality, San Benito Co., Cal.; Hlawatsch, Min. Mitt., **28**, 293, 1909; with new form and anal. from same locality; Ježek, [" Rozpravy " Böhm. Ak., **18**, No. 26, 1909], Zs. Kr., **50**, 638, 1912; from Puy-de-Dôme, France; Gonnard, Bull. Soc. Min., **33**, 279, 1910; from Oberschaffhausen, Kaiserstuhl, Baden; Dürrfeld, Zs. Kr., **50**, 586, 1912; from Mt. Kara-Dagh in the Crimea; Brincken, Bull. Ac. St. Pet., **8**, 479, 1914. Discussion of crystal forms; Gonnard, Bull. Soc. Min., **37**, 180, 1914.

Anal. — With alteration product from Zehra-Zkaro; Glinka, Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906; Zs. Kr., **46**, 283, 1909; from benitoite locality, San Benito Co., Cal.; Louderback, Bull. Uni. Cal., Geol. Dept., **5**, 331, 1909; from Leitmeritz, Bohemia; Thugutt, Centralbl. Min., 677, 1909; from Lenni, Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914.

Comp., crystallization, and optical character discussed; Cesàro, Bull. Ac. Belg., No. 4, 435, 1909.

Regular intergrowth with *thomsonite* from Jakuben, Bohemia; Scheit, Min. Mitt., **31**, 495, 1912.

Microchemical tests on variety *galactite*; Thugutt, C. R. Soc. Sc. Varsovie, **5**, 93, 100, 1912.

Relations between *natrolite* and its modification, *epinatrolite* or *metanatrolite*; Thugutt, Centralbl. Min., 405, 1911; various occurrences; *idem*, C. R. Soc. Sc. Varsovie, **5**, 69, 72, 1912; [Ber. Ges. Wiss. Warsaw, 409, 1910; 77, 1911], Zs. Kr., **54**, 196, 198, 1914.

Natronsanidine. See under *Orthoclase.*

Nauruite. *C. Elschner*, [Sep. Pub., Korallogene Phosphatinseln Austral-Oceaniens und ihre Produkte, Lubek, 1913]; Centralbl. Min., 543, 1914; Fortschr. Min., **4**, 167, 1914.

An amorphous colloidal calcium phosphate, $3(Ca_3P_2O_8) + (Ca(OH)_2.CaF_2)$, occurring in phosphorites of Island Nauru. When pure is brittle, friable, transparent, white, blue, yellow or brown. Resinous appearance.

Neocolemanite. See under *Colemanite.*

NEFEDIEFFITE, Min., p. 708. Occ. near Troickosavsk, Siberia, with anal.; Fersmann and Citlladzev, Bull. Ac. Sc. St. Pet., **7**, 677, 1913.

NEPHELITE, Min., pp. 423, 1042; App. I, p. 49; II, p. 74. — Crystals from Podhorn, Marienbad, Bohemia; Himmelbauer, Min. Mitt., **31**, 324, 1912.

Anal. of material from a Norwegian locality, probably Langesundfjord; Tschernik, Bull. Ac. St. Pet., **3**, 903, 1909; Zs. Kr., **51**, 97, 1912; from nepheline syenite from Ditró, Hungary; Mauritz, [Földt. Közl., **40**, 541, 581, 1910], Zs. Kr., **53**, 67, 1913; from extrusive rocks in the Laacher See district, Prussia, with discussion of chem. comp.; Brauns and Uhlig, N. Jb. Min., Beil.-Bd., **35**, 723, 1913.

Chem. Comp. — New anal. from Wikaholmen, Norway, with discussion of chem. comp. Suggestion made that the excess of silica shown by most anal. is due to solid solution; Foote and Bradley, Am. J. Sc., **31**, 25, 1911; discussion of various theories as to chemical composition with suggestion that the mineral, in analogy to a similar series in the feldspars, may consist of isomorphous mixtures of the following compounds, $NaAlSiO_4$ (chief constituent which has been prepared artificially), $KAlSiO_4$ (*kaliophilite*) and $NaAlSi_3O_8$ (*albite* in hexagonal modification); Schaller, J. Wash. Ac. Sc., **1**, 109, 1911; Zs. Kr., **50**, 343, 1911. See also Bowen, Am. J. Sc., **33**, 49, 1912, and Foote and Bradley, *ibid.*, 439. Discussion of chemical constitution of nephelite and related silicates; Clarke, U. S. G. S., Bull., **588**, 1914. See also Hillebrand, Ber. Ak. Wien, **119**, 775, 1910; Thugutt, C. R. Soc. Sc. Varsovie, **6**, 849, 1913; Karandlev, Bull. Ac. St. Pet., **7**, 267, 1913; Zambonini, Mem. Acc. Sc., Napoli, **116**, 1914.

Artif. formation; Ginsberg, [Ann. Inst. Polytech. St. Pet., **16**, 1, 1911], Zs. Kr., **53**, 617, 1914; Zs. Anorg. Chem., **73**, 277, 1912; of the *potassium nephelite* with discussion of chem. comp. of natural mineral; Friedel, Bull. Soc. Min., **35**, 471, 1912; of *barium* and *strontium* *nephelites*; Weyberg, [Trav. Soc. Nat. Varsovie, Nos. 14 and 15, 1903–1904], Zs. Kr., **46**, 302, 1909.

NEPHRITE. See under *Amphibole*.

Nephritoid. See under *Amphibole*.

NEPTUNITE, App. I, p. 49; II, p. 75. — Discussion of crystal orientation; Federov, [Vh. Min. Ges., **44**, 299, 1906], Zs. Kr., **46**, 213, 1909. Crystals from San Benito County, Cal., with new form; Hlawatsch, Min. Mitt., **28**, 293, 1909; from same locality with Goldschmidt table of angles of known forms; Schaller, Zs. Kr., **48**, 556, 1910; U. S. G. S., Bull., **490**, 55, 1911; also (with anal.). G. = 3·18–3·19. Louderback, Bull. Uni. Cal., Geol. Dept., **5**, 331, 1909; anal. by Bradley, see App. II, published in Zs. Kr., **46**, 516, 1909.

NESQUEHONITE, Min., pp. 300, 1042. — Artif. formation; Cesàro, [Bull. de la Classe des Sc., Bruxelles, 749, 844, 1910], Zs. Kr., **52**, 205, 1912.

NEWBERYITE, Min., p. 830; App. II, p. 75. — Occ. at Réunion Island; Lacroix, Bull. Soc. Min., **35**, 114, 1912.

New Minerals. — Below are given brief accounts of a series of incompletely described minerals which are considered new, but to which no names have been assigned.

Three new isometric minerals from the cryolite locality, Ivigtut, Greenland, partially described by Böggild, Zs. Kr., **51**, 591, 1912, as follows:

First Mineral. Occurs intimately associated with *thomsenolite*, often as a thin crystalline coating. Crystals are small cubes with at times subordinate octahedral faces. Perfect octahedral cleavage. Colorless. G. = 2·676. Refractive index, n = 1·3852. Optical anomalies shown, each cube being composed of six pyramidal sections, with cube faces as bases, which are optically uniaxial, −. B. B. reacts similar to *ralstonite*.

Second Mineral. Occurs associated with *gearksutite* in openings of the fine-grained yellow rock found on the south side of the deposit. Crystals are combinations of cube and octahedron. No cleavage observed. Smaller crystals clear and colorless; often more or less opaque, white, yellowish or brownish. G. = 2·377. Refractive index, n = 1·4420. Shows optical anomalies, octahedral faces often acting as bases of birefringent sectors. Very easily fusible. Reacts for water, fluorine, aluminium, calcium and sodium.

Third Mineral. Found only as artif. product in steam boilers as deposit from waters containing *cryolite*. Assoc. with *cryolite* and *chiolite* formed in the same manner. In small dodecahedrons. Refractive index, n = 1·3632. Completely isotropic.

Aluminum Silicate. A. Haas, N. Jb. Min., **1**, 1, 1912.

Earthy, compact. Color dull green to brown. H. = 1. Low birefringence.

Comp. — A hydrous silicate of alumina, ferric iron and magnesia; lying between *pyrophyllite* and *gümbelite*.

Anal. — SiO_2, 52·99; Al_2O_3, 32·88; Fe_2O_3, 2·45; MgO, 4·06; H_2O, 7·75; Total, 100·13.

Pyr. — B. B. becomes harder, brittle and of a light brown color. Insoluble in acids except hydrofluoric.

Obs. — Found in small amount in the limestone of northern Tyrol.

Magnesium Titanate. V. Dürrfeld, Zs. Kr., **47**, 246,1909. A mineral thought to be new and which qualitatively showed the presence of magnesia and titanic acid, was observed in minute black, briliant crystals on the feldspars and quartz found in the granite druses at Epprechtstein, Fichtelgebirge. The crystals showed a pitchy luster on fresh fracture. H. = about 6. G. > 3·196. Measurement of one crystal showed the symmetry of the clinohedral class, monoclinic system. Forms present: $(\bar{1}10)$, (011), (21·20·1), $(\bar{1}6\bar{6})$. Elements: $a : b : c$ = 0·60560 : 1 : 0·61046; β = 74° 46′ 48″. The agreement between observed and calculated angles is poor.

Yttrium Niobate. O. Hauser, [Ber. Chem. Ges., **40**, 3118, 1907], Zs. Kr., **47**, 690, 1909. Anal. of material resembling *fergusonite*.

Manganese Phosphate. L. L. Fermor, Mem. Geol. Sur. India, **37**, 1909.

Forms flakes in a spessartite-rhodonite rock from Chárgáon, District Nágpur, India. Color green. Uniaxial. H. = 5–5·5. G. = 3·40–3·41.

Aluminium Phosphate. K. Zimányi, Zs. Kr., **47**, 53, 1909. A new mineral associated with *vashegyite* (which see) incompletely determined. Yellow-white color. Friable. Easily soluble in acids leaving large amount of residue, mostly quartz. An incomplete anal. by Loczka gave: $Al_2O_3(Fe_2O_3)$, 29·44; CaO, *tr.*; P_2O_5, 27·28; H_2O, 29·15; Insol., 14·62; Total, 100·49. Formula perhaps $3Al_2O_3(Fe_2O_3).2P_2O_5.17H_2O$.

Hydrous Potassium and Ammonium Sulphate. A. Lacroix, Bull. Soc. Min., **35**, 114, 1912.

In small nodules. Colorless. Biaxial, positive. Small axial angle. Preliminary anal. shows approx.: K_2SO_4, 45·7; $(NH_4)_2SO_4$, 28·1; H_2O, 25·0. Found in guano deposits on Réunion Island.

NICCOLITE. Study of crystals from Riechelsdorf, Hesse, Germany, were considered to belong to ditrigonal-pyraminal symmetry class. $c = 0 \cdot 9508$. Forms: $r(10\bar{1}0)$, $n(17\bar{8}0)$, $x(30\bar{3}4)$, $\xi(03\bar{3}4)$, $y(90\bar{9}2)$, $v(09\bar{9}2)$, $\zeta(03\bar{3}2)$. Dürrfeld, Zs. Kr., **49**, 477, 1911; from Frieberg, Saxony, *idem*, *ibid.*, **49**, 480, 1911.

Nicholsonite. See under *Aragonite.*

NIGRINE. See under *Rutile.*

OCTAHEDRITE, Min., pp. 240, 1043; App. I, p. 50; II, p. 76. — **Cryst.** — From Beaume, Oulx, Valley of Dora Riparia; with new form; Colomba, Riv. Min., **38**, 35, 1909; from an albite syenite from near Ernée, Mayenne, France; Vandernotte, C. R., **151**, 151, 1910; from Alpe Veglia, near Varzo, Piedmont; Lincio, Att. Acc. Torino, **45**, 728, 1910; from Fallon granite pegmatite, Quincy, Mass., with (1) prismatic habit, (2) twinned with (101) as tw. pl.; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Proc. Am. Ac., **47**, 125, 1911; Zs. Kr., **49**, 332, 1911; from the Binnental; Desbuissons, Bull. Soc. Min., **34**, 242, 1911; Smith, Min. Mag., **16**, 290, 1912; from Mutendele, Congo Free State, with new forms; Buttgenbach, Ann. Soc. Geol. Belgique, 83, 1912; from the Virtuous Lady mine, near Tavistock; Russell, Min. Mag., **17**, 1, 1913. Blue crystals with a large number of planes and reaching a centimeter in greatest diameter have been found in narrow veinlets in a diorite dike on Beaver Creek, Gunnison Co., Col.; Larsen and Hunter, J. Wash. Ac. Sc., **4**, 473, 1914.

Refractive indices on crystal from the Binnental; Baumhauer, Zs. Kr., **47**, 1, 1909.

OFFRÉTITE, Min., p. 1043. — Zeolite from druses in a basalt on Pelew Islands, Caroline Islands, near *offrétite* in character; Dürrfeld, Zs. Kr., **49**, 200, 1910.

OKENITE, Min., p. 565. — Occurs at Crestmore, Riverside Co., Cal., as alteration product of *wilkeite*; Eakle and Rogers, Am. J. Sc., **37**, 262, 1914.

OPAL, Min., pp. 194, 1038; App. I, p. 50; II, p. 76. — From near Karajnandjik, Asia Minor; Leitmeier, Centralbl. Min., 561, 1910.

Refractive indices with varying temperatures; Rinne, N. Jb. Min., Beil.-Bd., **39**, 388, 1914.

Description of French occurrences of *tripolite* under the name of *zeyssatite*; Gonnard, Bull. Soc. Min., **37**, 136, 1914.

A porous variety derived from the action of volcanic fumes of sulphur dioxide upon lavas in Virunga district, German East Africa, called *schaumopal*; Hauser, Centralbl. Min., 436, 1911.

OLIGOCLASE, Min., p. 322; App. I, p. 50; II, p. 76. — **Anal.** — From the erruptive rocks of Loh oelo, Java; Niethammer, Min. Mitt., **28**, 205, 1909; from pegmatite from Ditró, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from basalt of Medves near Salgó-Tárján, Comitat Nógrád, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; from pegmatite at Ytterby, Sweden; Nordenskjöld, [Bull. Geol. Inst. Upsala, **9**, 183, 1910], Zs. Kr., **53**, 406, 1914; from Kellyville and Media, Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 96, 1914.

Behavior of mixtures of *oligoclase* and *enstatite*, and of *oligoclase* and *augite* when melted together; Schmidt, N. Jb. Min., Beil.-Bd., **27**, 604, 1909. Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

OTTRELITE, Min., pp. 642, 1043; App. I, p. 50. — Anal. from southern Yenisei district, Siberia; Meister, *ref.* Zs. Kr., **53**, 595, 1914. See also under *Chloritoid.*

ORTHOCLASE, Min., p. 315; App. I, p. 50; II, p. 77. — Crystals from the Fichtelgebirge, Bavaria; Welzel, [Programm Gymnasiums in Hof, 1907–1908], Zs. Kr., **49**, 509, 1911; of *adular* from Val Giuf, Isivzzera; Ranfaldi; Mem. Acc. Linc., **9**, 438, 1913.

Twins. — Hetero-twin from Hoppenstein near Karlsbad, Bohemia; Paul and Goldschmidt, Zs. Kr., **46**, 471, 1909; from Mouédat, Issoire, Puy-de-Dôme, France; Vigier, Bull. Soc. Min., **32**, 155, 1909; from Four-la-Brouque, Puy-de-Dôme, France; Gonnard, *ibid.*, **32**, 11, 1909; **34**, 48, 1911; from Baveno; *idem*, *ibid.*, **33**, 251, 276, 1910.

Crystallographic and optical study of a soda-rich orthoclase from Porto-Scuso, Sardinia; Cesàro, Bull. Ac. Belg., Nos. 9–10, 553, 1912. Birefringence of *adular* and *sanidine* (Vesuvius); Cesàro, Bull. Ac. Belg., No. 7, 619, 1908.

Anal. — From augen-gneiss from southern Schnalsertal, Tyrol; Petrascheck, [Jb. G. Reichs., 427, 1909], Zs. Kr., **50**, 630, 1912; from magnetic ore, Goroblagodat, Ural Mts.; Loewinson-Lessing, [Bull. Polytech. Inst. St. Pet., **7**, 1, 1907], Zs. Kr., **47**, 288, 1909; from Epprechtstein and Grossen Waldstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; **47**, 242, 1909; from Pardines and Montaudou, France; Gonnard and Barbier, Bull. Soc. Min., **34**, 235, 1911; of *sanidine* from leucite basanite from near Leitmeritz, Bohemia, with optical study; Hilsch and Scheit, Min. Mitt., **30**, 459, 1911; from Lenni, Delaware Co., and Rockville, Bucks Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 96, 1914; of potassium-sodium feldspar from Ilmen Mts., Russia; Arschinov, Sep. Pub., Moscow, 1911; *ref.* Zs. Kr., **53**, 603, 1914; containing barium; Tschermak, Min. Mitt., **32**, 543, 1914.

Occ. of calcium in; Schwantke, Centralbl. Min., 311, 1909. Spectroscopic study of a series of *orthoclase* and *microcline* specimens showed that the former always contained small amounts of either lithium or rubidium or both, while those elements were not present in microcline; Barbier, C. R., **146**, 1330, 1908; Bull. Min. Soc., **31**, 152, 1908; Zs. Kr., **48**, 215, 1910; these conclusions questioned; Vernadsky and Revutzky, C. R., **151**, 1372, 1910; see also Barbier, Bull. Soc. Min., **34**, 117, 1911.

Behavior under pressure; Adams, J. Geol., **18**, 489, 1910. Determination by grinding methods of the hardness of orthoclase in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911. Mean specific heat of *adular;* Schulz, Centralbl. Min., 632, 1911. Change on heating; Merwin, J. Wash. Ac. Sc., **1**, 59, 1911.

Description of *sanidine* from Leilenkopf near Niederlützingen, Laacher See district, Prussia; with anal.; Brauns, N. Jb. Min., **1**, 43, 1909. From Podhorn, Marienbad, Bohemia; Himmelbauer, Min. Mitt., **31**, 326, 1912. Occ. in crystals of gem quality from Itrongahy in southern Madagascar; Lacroix, C. R., **155**, 672, 1912.

Analogy between *orthoclase-microcline* and *enstatite-clinoenstatite*; Wahl [Öfvers. Finska Vetenskaps-Soc. Förh., Helsingfors, **50**, No. 2, 1908], Zs. Kr., **49**, 303, 1911.

Description and anal. of pseudomorphs after orthoclase occurring in granite near Tirschenreuth, Bavaria; Hezner, Centralbl. Min., 607, 1914.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911; Schlaepfer and Niggli, *ibid.*, **87**, 52, 1914.

Variety showing blue reflection from a quartz-porphyry at Teplitz, Bohemia, called *aglaurite*; Handmann, [Zs. Min. Geol., Stuttgart, **1**, 78, 1907], Min. Mag., **15**, 415, 1910.

A feldspar occurring as phenocrysts in a soda liparite from Mitrowitza, Servia, has been described under the name of *natronsanidine*. Anal. shows the composition to be $8KAlSi_3O_8.9NaAlSi_3O_8$. G. = 2·571. Crystals show prominent development of $c(001)$ and $b(010)$. Extinction on $c(001)$ is parallel and on $b(010)$ makes an angle of 2° 52′. 2E was measured as 37° 55′. Ax. pl. is normal to $b(010)$. Optically −. The name *natronsanidine* is used, since optically it has much the same relations to soda-orthoclase as sanidine has to orthoclase. Angel, N. Jb. Min., Beil.-Bd., **30**, 254, 1910; Centralbl. Min., 424, 1911.

Oxykertschenite. *S. P. Popov*, Bull. Ac. Sc. St. Pet., **1**, 127, 1907; Zs. Kr., **47**, 284, 1909.

An alteration product of *kertschenite* and *paravivianite*, often pseudomorphous after the latter. Color brown. Streak light brown. H. = 3·5. G. = 2·65.

Comp. — $(Mn,Mg,Ca)O.4Fe_2O_3.3P_2O_5.21H_2O$.

Anal. — P_2O_5, 28·04; Fe_2O_3, 41·82; MnO, 2·57; MgO, 1·22; CaO, 0·79; H_2O, 24·98; Total, 99·42.

Obs. — On the shore of the straits of Kertch, Crimea, Russia.

For relations to *kertschenite*, *vivianite*, etc., see under *Vivianite*.

Pachnolite, Min., p. 179. — Mineral from Ivigtut, Greenland, gave, G. = 2·976. Intergrowths with *thomsenolite* described; Böggild, Zs. Kr., **51**, 591, 1912; in stalactitic form from same locality; *idem*, *ibid.*, **51**, 614, 1912.

Paigeite, App. II, p. 78. — Analyses go to show that it is probably distinct from *hulsite* with the formula, $30FeO.5Fe_2O_3.1SnO_2.6B_2O_3.5H_2O$; Schaller, Am. J. Sc., **29**, 543, 1910; U. S. G. S., Bull., **490**, 8, 1911; with description; Knopf and Schaller, Zs. Kr., **48**, 1, 1910.

Palaite. *W. T. Schaller*, J. Wash. Ac. Sc., **2**, 143, 1912; (also priv. contr.; complete description to be published in U. S. G. S., Prof. Paper, **92**).

Monoclinic? In crystalline masses. G. = 3·14–3·20. Color flesh-pink. Refractive indices, α = 1·652, β = 1·656, γ = 1·660. 2V = nearly 90°. Optically −.

Comp. — Hydrous manganese phosphate; $5MnO.2P_2O_5.4H_2O$.

Anal. — FeO, 7·48; MnO, 40·87; CaO, 1·77; Fe_2O_3, 0·16; P_2O_5, 39·02; H_2O, 10·43; Insol., 0·89; Total, 100·62.

Obs. — Found at Pala, San Diego, Co., Cal. Derived from the alteration of *lithiophilite* and alters into *hureaulite*.

Paligorskite, Min., p. 398. — Study of analyses of asbestiform minerals called by such names as *paligorskite*, *pilolite*, *lassallite*, *mountain cork*, *mountain leather*, etc., leads to the conclusion that they are all members of a mineral group, called the *paligorskite group*. Their composition is explained by assuming various mixtures of a molecule, called *parasepiolite*, having the composition $H_8Mg_2Si_3O_{12}$ with another, called *paramontmorillonite*, having the composition, $H_2Al_2Si_4O_{12}.5H_2O$. The name *calciopaligorskite* is proposed for a member rich in lime. Fersmann, Bull. Ac. Sc. St. Pet., **2**, 255, 637, 1908.

Analyses of material called *β-paligorskite* from Stausvik, Helsingfors, Finland, and Chabarskaja, Gorbatof, Gouv. Nijni-Novgorod, Russia, leads to formula $H_{20}Mg_3Al_2Si_7O_{29}$; Kasakov, Bull. Ac. St. Pet., **5**, 679, 1911; Zs. Kr., **53**, 601, 1914.

Paracelsian. See under *Celsian.*

Paragonite, Min., p. 623; App. II, p. 78. — Optical study; Johnsen, Centralbl. Min., 33, 1911.

Paralaurionite, App. I, p. 50; II, p. 79. — Relation to *laurionite*, see under the latter.

Paramontmorillonite. See under *Paligorskite.*

Parasepiolite. See under *Paligorskite.*

Paratacamite, App. II, b. 79. — Shown to be a twinned *atacamite.* See under *Atacamite.*

Paravivianite. *S. P. Popov*, Bull. Ac. Sc. St. Pet., **1**, 127, 1907; Zs. Kr., **47**, 284, 1909.
In crystalline aggregates. Forms present: (401), ($\bar{4}$01), (110). Color bright blue in reflected light to almost steel-gray in thick masses. Streak white or pale blue. H. > 2. G. = 2·66.
Comp. — $(Fe,Mn,Mg)_3P_2O_8.8H_2O$.
Anal. of crystals from Janisch-Takil mine, 25 km. south of Kertch, Crimea, Russia, gave: P_2O_5, 27·01; FeO, 39·12; MnO, 2·01; MgO, 1·92; CaO, 0·48; H_2O, 28·75; Total, 99·29.
See also under *Vivianite.*

Parisite, Min., p. 290; App. I, p. 50; II, p. 79. — Anal. of material from granite boulder, near Mukden, Manchuria, with discussion of chem. comp.; Tschernik, [Vh. Min. Ges., **44**, 507, 1906], Zs. Kr., **50**, 57, 1911.
Study of crystals from the granite pegmatites of Quincy, Mass.; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Proc. Am. Ac., **47**, 125, 1911; Zs. Kr., **49**, 332, 1911; gave the following. Crystals are rhombohedral. Orientation chosen makes the pyramid *g*(11$\bar{2}$3) (see Sys., p. 290) the unit positive rhombohedron (10$\bar{1}$1). *c* = 1·9368. Crystals are small and slender. Basal plane usually present. Appearance is prismatic, produced largely through the oscillatory combination of steep rhombohedrons or pyramids. Three general habits: rhombohedral; pyramidal caused by equal development of both orders of rhombohedrons; pyramidal caused by presence of second order pyramids. 56 forms present, of which the most prominent are *c*(0001), *a*(11$\bar{2}$0), *i*(11$\bar{2}$3), *l*(11·11·$\overline{22}$·27), *n*(5·5·$\overline{10}$·12), *t*(44$\bar{8}$9), *r*(22$\bar{4}$3), *w*(44$\bar{8}$3), *B*(4·0·$\bar{4}$·15), *c*(3·0·$\bar{3}$·11), *E*(5·0·$\bar{5}$·16), *H*(20$\bar{2}$5), *L*(50$\bar{5}$4), *h*(30$\bar{3}$2), *k*(20$\bar{2}$1), *R*(40$\bar{4}$1), *T*(50$\bar{5}$1), *V*(60$\bar{6}$1), β(0·4·$\bar{4}$·15), γ(02$\bar{2}$7), δ(0·3·$\bar{3}$·10), ε(0·9·$\bar{9}$·25), μ(02$\bar{2}$1), π(05$\bar{5}$2), σ(03$\bar{3}$1).
The absorption is ω > ε slight. Dichroism feeble, ω bright yellow, ε golden yellow. Refractive indices, ω = 1·676, ε = 1·757. (Tests on parisite from Muso and Montana confirmed these results.)
Anal. by Warren:

	CO_2	F	Ce_2O_3	$(LaDi)_2O_3$	Yt_2O_3	Fe_2O_3	CaO	SrO
G. = 4·320	24·16	6·56	30·91	27·31	*tr.*	0·32	11·40	*tr.*
	Na_2O	K_2O	H_2O	Gangue		O = 2F	Total	
	0·30	0·20	*tr.*	1·02	102·21	2·76	99·45	

It is thought because of close crystallographic symmetry between them that *parisite* is identical with *synchisite*. It has been shown that both minerals show the basal cleavage only when altered. It is thought probable that the differences in chem. comp. are due to the impurity of the *synchisite* material analyzed.
Identity of *synchisite* with *parisite* shown by comparison of their respective indices of refraction; Quercigh, Rend. Acc. Linc., **21**, (1), 581, 1912.

Pascoite. *W. F. Hillebrand, H. E. Merwin,* and *F. E. Wright*, Proc. Am. Phil. Soc., **53**, 31, 1914; Zs. Kr., **54**, 209, 1914.
Monoclinic. In grains. Cleavage poor, probably parallel to (010). Fracture conchoidal. H. = 2·5. G. = 2·46. Color dark red-orange to yellow-orange. Streak cadmium-yellow. Luster vitreous to sub-adamantine. Pleochroism noticeable, 𝔞 = light cadmium-yellow, 𝔟 = cadmium-yellow, 𝔠 = orange. Absorption 𝔠 > 𝔟 > 𝔞. Refractive indices, α = 1·775, β = 1·815, γ = 1·825. $2V_{Na}$ = 50°. Dispersion strong and crossed. Optically −. Ax. pl. ⊥ (010).
Comp. — Hydrous calcium vanadate, possibly $Ca_2V_6O_{17}.11H_2O$.
Anal. — V_2O_5, 64·6; MoO_3, 0·3; CaO, 12·6; H_2O, 21·6; Undet., 0·9; Total, 100·00.
Pyr. — Easily fusible to a deep red liquid. Easily soluble in water. Loses water readily on heating.
Obs. — Found at Minasragra, Peru, as a coating formed on the walls of a mine tunnel.
Name. — After Pasco, the province in which the locality of occurrence lies.

Pastreite, Min., p. 969. — See under *Carphosiderite* and *Jarosite.*

Patronite, App. II, p. 79. — Occ., etc., at Minasragra, Peru; Hewett, Trans. Am. Inst. Min. Eng., 291, 1909.

PEARCITE, App. I, p. 50. — Twin crystal with anal. from Veta Rica mine, Sierra Mojada, Coahuila, Mexico; van Horn and Cook, Am. J. Sc., **31**, 518, 1911; suggested that correct formula should be $8(Ag,Cu)_2S.As_2S_3$; van Horn, *ibid.*, **32**, 40, 1911.

PECTOLITE, Min., p. 373; App. I, p. 51; II, p. 79. — Anal. from Haslach, Baden; Dürrfeld, Zs. Kr., **53**, 182, 1913. Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911.

PENNINITE, Min., p. 650; App. I, p. 51; II, p. 80. — Anal. from Recess, County Galway, Ireland; Hutchinson and Smith, Min. Mag., **16**, 264, 1912.

Pentahydrocalcite. *P. N. Tschirwinsky*, [Ann. Geol. Min. Russ., **8**, 238, 245, 1906], Zs. Kr., **46**, 302, 1909. Name proposed for a hydrous calcite, $CaCO_3.5H_2O$, described by Iwanov, [Ann. Geol. Min. Russ., **8**, 1906], from near Nowo-Alexandria, Russia.

PERICLASE, Min., p. 207; App. I, p. 52. — Anal. of artif. material from Stassfurt gave: MgO, 99·25; Ign., 0·99; Insol., 0·31; Total, 100·55. This gave the following indices of refraction at 24° C.: red, 1·7313; yellow, 1·7378; green, 1·7454; blue, 1·7494. There was a steady rise in the indices with increase of temperature. Westphal, Centralbl. Min., 516, 1913. Artif. formation; Shepherd, Rankin, and Wright, Am. J. Sc., **28**, 293, 1909; Zs. Anorg. Chem., **68**, 370, 1910.

PEROVSKITE, Min., p. 722; App. I, p. 52; II, p. 80. — Study of structure, crystal character and relation of twinning laws to those of *cryolite* and *boracite*; Böggild, Zs. Kr., **50**, 349, 1911. Found as constituent of igneous rocks on Beaver Creek, Gunnison County, Col. Refractive index = 2·34. Larsen and Hunter, J. Wash. Ac. Sc., **4**, 473, 1914.

PETALITE, Min., p. 311; App. I, p. 52. — Crystal from Elba described; Vogt, Norsk Geol. Tidsskrift, **2**, No. 3, 1, 1910; with new forms from Elba; Millosevich, Ist. Firenze, Sep. Pub., "Contributo alla Conoscenza della Mineralogia dell'Isola d'Elba," 1914.
Artif. formation and thermal relations; Balló and Dittler, Zs. Anorg. Chem., **76**, 39, 1912.

PHARMACOLITE, Min., p. 827; App. I, p. 52; II, p. 80. — Crystals from Markirch, Alsace; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, No. 3, 293], Zs. Kr., **53**, 569, 1914.

PHARMACOSIDERITE, Min., p. 847; App. II, p. 80.— Occ. at the Gabriel mine in Einbachtal, Schwartzwald; Dürrfeld, Zs. Kr., **50**, 582, 1912.

PHENACITE, Min., p. 462; App. I, p. 52; II, p. 80. — Crystals from San Miguel di Piracicaba, Minas Geraes, Brazil, with new forms; refractive indices given: Slavík, Bull. Ac. Sc. Bohême, **14**, 1908; ["Rozpravy" Böhm. Ak., **18**, No. 10, 1909], Zs. Kr., **50**, 647, 1912; from same locality with new form; $c = 0·6611$; G. = 2·964; Goldschmidt and Schröder, Zs. Kr., **46**, 465, 1909; also with new forms; Zimányi, Zs. Kr., **47**, 97, 1909; Ann. Mus. Nat. Hung., **7**, 347, 353, 1909, and Slavík, Centralbl. Min., 264, 1909; Hussak, *ibid.*, 268. Crystals from Chatham, N. H., with Goldschmidt table of angles of all known forms; Schaller, Zs. Kr., **48**, 554, 1910; U. S. G. S., Bull., **490**, 53, 1911; from five localities in Cornwall; Russell, Min. Mag., **16**, 55, 1911; from Framont, Vosges Mts., Alsace; Dürrfeld, Zs. Kr., **50**, 582, 1912.
Artif. formation; Doelter, Min. Mitt., **32**, 129, 1913; Ber. Ak. Wien, **122**, (1), 1, 1913; Michel, Zs. Kr., **53**, 538, 1914.

PHILLIPSITE, Min., p. 759; App. I, p. 53; II, p. 80. — Anal. of material from Mont Simiouse, near Montbrison, Loire, France; Barbier, Bull. Soc. Chim. France, **3**, 822, 1908; from basalt of Sirgwitz near Löwenberg, Silesia; Barbier and Gonnard, Bull. Soc. Min., **33**, 79, 1910; from leucite basanite from near Leitmeritz, Bohemia; Hibsch and Scheit, Min. Mitt., **30**, 459, 1911.

PHLOGOPITE, Min., p. 632; App. II, p. 80. — Crystals from glacial gravels found in the government of Moscow, Russia; Fersmann, Bull. Ac. St. Pet., **4**, 733, 1910.
Anal. of material from near Povienetz, Olonetz, Russia; Borisov, [Trav. Soc. Nat. St. Pet., **40**, 23, 1909], Zs. Kr., **51**, 286, 1912.
Parallel growth with *biotite* and with *rutile* inclusions from Ottawa, Canada; Pogue, Zs. Kr., **49**, 455, 1911.

PHOSGENITE, Min., p. 292; App. I, p. 53; II, p. 81. — Crystals from Mte. Poni, Sardinia, with new and rare forms; Millosevich, Rend. Acc. Linc., **18**, (2), 116, 1909; from Broken Hill, N. S. W.; Anderson, Rec. Austral. Mus., **7**, 274, 1909; with new forms from San Giovanni, Sardinia; Cesàro, Bull. Ac. Belg., No. 6, 381, 1912.
Refractive indices; Baumhauer, Zs. Kr., **47**, 1, 1909.
Gliding planes; Taricco, Rend. Acc. Linc., **19**, (2), 278, 1910; Mügge, N. Jb. Min., **1**, 43, 1914.

Phosphosiderite, Min., p. 823. — Crystals from S. Giovanneddu near Gonnesa, Sardinia; Pelloux, Ann. Mus. Genova, **6**, 46, 1913.
Crystallographic and optical relation to *variscite*, see under *Variscite*.

Pickeringite, Min., p. 953. — Anal. from near Lehesten, Thuringia; von Wichdorff, Centralbl. Min., 42, 1912; from the Šċurovskij glacier; Silberminc, Bull. Ac. St. Pet., **7**, 997, 1913.
A new anal. of the material called *picroallumogene* from Vigneria Elba, shows it to be identical with *pickeringite*; d'Achiardi, Proc. Soc. Tosc., **19**, 23, 1910.

Picroallumogene. See under *Pickeringite*.

Piedmontite, Min., p. 521; App. I, p. 53; II, p. 81. — Crystals from Jothvád in Nárukot, India; Fermor, Mem. Geol. Sur. India, **37**, 1909.

Pilbarite. *E. S. Simpson*, Chem. News, **102**, 283, 1910; [J. Nat. Hist. Soc. Western Australia, **3**, 130, 1911], Min. Mag., **16**, 368, 1913.
In nodules. Earthy. Amorphous. Color canary-yellow. Hydrous silicate of thorium, uranium, and lead. Occurs in the Pilbara goldfield, Western Australia.

Pilolite, Min., p. 709. — Anal. of material from Süchwan Province, China; Stafford, Min. Mag., **15**, 294, 1910.
See also under *Paligorskite*.

Pinite, Min., p. 621; App. I, p. 53. — Pseudomorphous after *iolite* from Düllenberg near Neualbenreuth in Eastern Bavaria; Laubmann and Cathrein, N. Jb. Min., **2**, 11, 1911.

Pinnoite, Min., p. 884; App. II, p. 81. — Study of material from Stassfurt gave: $\omega = 1{\cdot}565$, $\epsilon = 1{\cdot}575$. G. = 2·292. Boeke, Centralbl. Min., 521, 1910.

Pintadoite. *F. L. Hess* and *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 576, 1914.
As an efflorescence. Color from rich dark green to lighter green. Slightly pleochroic in yellow-green. Moderate to high birefringence.
Comp. — Hydrous calcium vanadate, $2CaO.V_2O_5.9H_2O$; CaO, 24·56; V_2O_5, 39·91; H_2O, 35·53.
Anal. — After deduction of insol. and *gypsum*; CaO, 22·6; V_2O_5, 42·4; H_2O, 35·0.
Obs. — Found coating the surfaces of the sandstone rocks forming the walls of Canyon Pintado, San Juan Co., Utah.

Pirssonite, App. I, p. 53. — Pseudomorphs thought to be after *pirssonite* found in Cambrian alum schist from Bornholm Island, Denmark; Stolley, [Medd. Dansk. Geol. For., **3**, 351, 1909], Zs. Kr., **50**, 282, 1911; later shown to be pseudomorphs after *barite*, which see.

Pisanite, Min., p. 943; App. II, p. 81. — Anal. by Hillebrand, from Bingham, Utah; Clarke, U. S. G. S., Bull., **419**, 1910; of blue and green varieties from Isabella, Ducktown District, Tenn.; Van Horn, Am. J. Sc., **38**, 40, 1914.

Pitticite, Min., p. 867; App. II, p. 81. — A hydrated arsenate of iron and calcium found in Mariinsk District, Tomsk, Siberia, is provisionally placed here. Color chestnut-brown to pitch-black, in thin splinters transparent blood-red. Pitchy luster. Conchoidal fracture. Streak ochre-yellow. H. = 2–3. G. = 2·383. Loses water on exposure. Under microscope amorphous. Three anal. given with varying composition. Alteration product of *arsenopyrite*. Pilipenko, [Bull. Uni. Tomsk, **28**, 1, 1907], Zs. Kr., **47**, 289, 1909.

Placodine. See under *Maucherite*.

Plagioclase Feldspars, Min., p. 325. — Anal. from andesite found on Commander Island, Behring Sea; Starzyński, Bull. Ac. Sc. Cracovie, 675, July, 1912.
Influence of twinning upon development of crystals; Becke, Min. Mitt., **29**, 445, 1910.
Zonal structure in mineral from andesite found in western Müller Mts., Central Borneo; Schmutzer, Centralbl. Min., 389, 1910.
Analogy between *plagioclase feldspars* and *pyroxene group*; Wahl, [Öfvers. Finska Vetenskaps-Soc. Förh., Helsingfors, **50**, No. 2, 1908], Zs. Kr., **49**, 303, 1908.

Plagionite, Min., p. 118; App. I, p. 54; II, p. 81. — Critical discussion of crystals with relations to *heteromorphite* and *semseyite*; Zambonini, Riv. Min., **41**, 1, 1912.

Platinum, Min., pp. 25, 1044; App. I, p. 54; II, p. 82. — From Ural Mts.; anal.; Duparc and Holtz, Min. Mitt., **29**, 498, 1910; occ.; Duparc, Arch. Sc. Genf., **30**, 379, 1910; structure; Beck, [Leipz. Nachr., **59**, 387, 1907], Zs. Kr., **47**, 172, 1909.

Platynite. *G. Flink*, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.
Rhombohedral. Good cleavage parallel to base and less perfect parallel to rhombohedron. Base : rhombohedron = 54° 46′. $c = 1.226$. H. = 2–3. G. = 7·98. Color like graphite. Streak shining.
Comp. — $PbS.Bi_2Se_3$.
Anal. — By Mauzelius: Bi, 48·98; Pb, 25·80; Cu, 0·32; Fe, 0·30; S, 4·36; Se, 18·73; Insol., 0·36; Total, 98·35.
Obs. — In small lamellæ inclosed in quartz at Falun, Sweden.
Name. — Derived from πλατύνειν, *to spread out*.

PLUMBOGUMMITE, Min., p. 855; App. II, p. 82. — Comp. and chem. relations, see under *Alunite*.

PLUMBOJAROSITE, App. II, p. 82. — Anal. and description of material found at American Fork, Utah; Hillebrand and Wright, Am. J. Sc., **30**, 191, 1910. Occ. with anal. at various mines in Beaver County, Utah; Butler and Schaller, Am. J. Sc., **32**, 418, 1911; Zs. Kr., **50**, 114, 1911; U. S. G. S., Bull., **509**, 81, 1912. Occ. in various places in Utah with analyses; Butler, Econ. Geol., **8**, 311, 1913.
Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite*.

Plumboniobite. *O. Hauser* and *L. Finkh*, Ber. Chem. Ges., **42**, 633, 1909; **43**, 417, 1910.
Amorphous. Conchoidal fracture. H. = 5–5·5. G. = 4·801–4·813. Color dark brown to black. Streak leather-brown.
Comp. — A niobate of yttrium, uranium, lead, iron, etc.
Anal. —

Nb_2O_5	Ta_2O_5	TiO_2	UO_3	Y_2O_3	PbO	FeO	CaO	H_2O	N_2,He	CO_2	Total
46·15	1·18	1·20	13·72	14·26	7·62	5·70	3·05	6·38	9·22	0·19	99·67
47·00		1·42	13·74	14·51	7·08	6·33	3·11	....	5·51	....	99·70
46·03	1·20	0·90	13·60	14·12	7·55	5·15	2·84	....	6·23	....	97·62

Obs. — Found in the mica mines at Morogoro, German East Africa.

PLUMOSITE. See under *Jamesonite*.

Pöchite. *F. Katzer*, [Oesterreich. Zs. Berg- und Hüttenwesen, **59**, 229, 1911], Zs. Kr., **54**, 408, 1914.
Amorphous. H. = 3·5–4. G. = 3·695. Conchoidal fracture. Color reddish brown. Streak brown. Opaque. Luster dull to greasy.
Comp. — $H_{16}Fe_8Mn_2Si_3O_{29}$.
Anal. — SiO_2, 15·28; Al_2O_3, 3·66; Fe_2O_3, 49·50; MnO, 14·77; CaO, 1·96; MgO, 0·84; $BaSO_4$, 0·86; P, 0·42; S, 0·03; H_2O, 12·06; Total, 99·38.
Obs. — Found in the iron-ore deposits near Vareš in Bosnia.
Name. — After Franz Pöch, Chief of the Dept. of Mines, Bosnia-Herzegovina.

PODOLITE, App. II, p. 82. — Probably identical with *dahllite*; Schaller, Am. J. Sc., **30**, 309, 1910; Zs. Kr., **48**, 559, 1910; U. S. G. S., Bull., **509**, 96, 1912. A distinct difference between *podolite* and *dahllite* maintained and the following new analysis of *podolite* given: Hydroscopic water, 0·37; Water of crystallization, 1·16; CaO, 50·72; P_2O_5, 37·08; CO_2, 4·32; F, 0·29; SiO_2, 4·18; Organic, 0·52; Total, 98·64. Tschirwinsky, Centralbl. Min., 97, 1913.

POLIANITE, Min., p. 236; App. I, p. 54. — Pseudomorphs from Platten, Bohemia, after *manganite* composed of small crystals of polianite with cleavage faces parallel to the prism faces of the original manganite. From angle $s(111) : m(110) = 46° 53'$, the value $c = 0.6621$ was calculated. Twins from the same locality showing rosette of tabular crystals with (301) and (032) as twinning planes also described; Rosati and Steinmetz, Zs. Kr., **53**, 394, 1914.

POLYBASITE, Min., pp. 146, 1045; App. I, p. 54. — Crystals from Sarrabus, Sardinia, with new forms; Pelloux, Ann. Mus. Genova, **4**, 194, 1909.
Anal. of material from Las Chipas, Sonora, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910.
Suggested that correct formula should be $8(Ag,Cu)_2S.Sb_2S_3$; Van Horn, Am. J. Sc., **32**, 40, 1911.

POLYCRASE, Min., p. 744; App. I, p. 55; II, p. 82. — Anal. from Sätersdal; Hauser and Wirth, Ber. Chem. Ges., **42**, 4443, 1909.

POLYMIGNITE, Min., p. 743. — Anal. of material from an unknown locality in Siberia; Tschernik, Bull. Ac. St. Pet., **2**, 75, 1908; Zs. Kr., **50**, 66, 1911.

Ponite. See under *Rhodochrosite*.

POWELLITE, Min., p. 989; App. I, p. 55; II, p. 82. — Anal. of material from Karysch mines, Minissinsk, Gouv. Yeniseisk, Siberia; Nenadkewitsch, Trav. Mus. Geol., Ac. Sc., St. Pet., **5**, 37, 1911; Zs. Kr., **53**, 609, 1914; from the gold washings from Nishe-Borsinky, Transbaikalia, Siberia; Kusnetzov, Bull. Ac. St. Pet., **5**, 897, 1911; Zs. Kr., **53**, 601, 1914.

PREHNITE, Min., p. 530; App. I, p. 55; II, p. 82. — **Cryst.** — From Guanajuato, Mexico; Hlawatsch, Min. Mitt., **29**, 249, 1910; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 385, 1911; from the Lizard district, Cornwall; Russell, Min. Mag., **16**, 217, 1912; from Tafatal, near Horn, Lower Austria, with new form; Himmelbauer, Min. Mitt., **32**, 140, 1913.

Anal. — By Schaller from Lower Cal.; Clarke, Bull. U. S. G. S., **419**, 1910; from Rockhill, Bucks, Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from Tiriolo, Catanzaro, Italy; Panichi, Rend. Acc. Linc., **20**, (2), 421, 518, 1911; from Helsingfors, Finland, with determination of optical properties; Laitakari, G. För. Förh., **36**, 432, 1914.

Occ. at Koundidi Pass in French Guinea; Azéma, Bull. Soc. Min., **36**, 127, 1913; at Djebel-Melah, Algeria; *idem, ibid.*, **37**, 124, 1914.

Anal. and description of an iron-rich prehnite ($Fe_2O_3 = 6{\cdot}58\%$) from Adams Sound, Admiralty Inlet, Baffin Island, Franklin. Suggestion made that the name, *ferroprehnite*, be given to such varieties. Johnston, Canada Geol. Sur., Victoria Memorial Mus., Bull., **1**, 95, 1913.

Preslite. See under *Tsumebite.*

PROUSTITE, Min., p. 134; App. II, p. 83. — Crystals from Markirch, Alsace; Dürr, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 183, 1907], Zs. Kr., **47**, 303, 1909; from Chihuahua, Mexico, with new form; Ungemach, Bull. Soc. Min., **33**, 375, 1910.

Anal. of material from Veta Rica mine, Sierra Mojada, Coahuila, Mexico; Van Horn, Am. J. Sc., **35**, 23, 1913.

Pseudodeweylite. See under *Deweylite.*

Pseudoheterosite. *A. Lacroix*, Min. de la France, **4**, 469, 1910.

Alteration product intermediate between *triphylite* and *heterosite.* Detected only by difference in optical character. From Huréaux, Haute-Vienne.

Pseudojadeite. *A. W. G. Bleeck*, Rec. Geol. Sur. India, **36**, 254, 1908.

A mineral similar to *jadeite* with G. = 2·577, occurring at Taumaw, Kachin Hills, Upper Burma.

Pseudo-låvenite. *A. Lacroix*, [Arch. Mus. Paris, **3**, 60, 1911], Min. Mag., **16**, 370, 1913.

Resembles *låvenite*, but differs in optical orientation. Detected in thin section of nepheline-syenite from Los Islands, West Coast of Africa.

PSEUDONEPHELITE. Zambonini, Rend. Acc. Napoli, **83**, 1910; Zs. Kr., **52**, 313, 1913; studying the nepheline-like mineral occurring in the druses of the leucitite from Capo di Bove near Rome, which was originally called *pseudonephelite*, concludes it is a definite species and gives the following description. Hexagonal, hemimorphic (hemimorphic character determined by etching). $c = 0{\cdot}8368$. Forms observed: $(10\bar{1}0)$, $(11\bar{2}0)$, $(10\bar{1}1)$, (0001). (0001) : $(10\bar{1}1) = 44° 1'$. Crystals usually elongated || *c*-axis, and showing only prism and base. Optically −. $\omega = 1{\cdot}5472$, $\epsilon = 1{\cdot}5435$. H. = 6. G. = 2·68.

Comp. — $(Na,K)AlSiO_4$.

Anal. — SiO_2, 39·91; Al_2O_3, 33·04; Fe_2O_3, 2·14; CaO, 2·55; Na_2O, 12·75; K_2O, 10·06; Total, 100·45.

PSILOMELANE, Min., p. 257; App. II, p. 83. — Anal. from peninsulas of Kertch and Taman, Crimea; Popov, Trav. Mus. Geol. Ac. Sc. St. Pet., **4**, 99, 1910; Zs. Kr., **52**, 606, 1913; from different occurrences in India; Fermor, Mem. Geol. Sur. India, **37**, 1909.

PUCHERITE, Min., p. 755; App. II, p. 83. — Occ. in pulverulent form from San Diego Co., Cal., with anal.; Schaller, Zs. Kr., **49**, 229, 1911; J. Am. Chem. Soc., **33**, 162, 1911.

PURPURITE. See under *Heterosite.*

PYRARGYRITE, Min., p. 131; App. I, p. 56; II, p. 84. — Crystals from La Luz, Guanajuato, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from various Hungarian localities with new form; Toborffy, Földt. Közl., **40**, 360, 435, 1910; from Nagybánya, Hungary, with new forms; Zimányi, Ann. Mus. Nat. Hung., **9**, 251, 259, 1911; anal. from same locality; Loczka, [Ann. Mus. Nat. Hung., **9**, 318, 320, 1911], Zs. Kr., **54**, 185, 1914.

PYRITE, Min., pp. 84, 1045; App. I, p. 56; II, p. 84. — **Cryst.** — The following descriptions give new forms: from Porkura, Comitat Hunyad, Hungary; Rosický, [Bull. Ac. Sc. Bohême, **8**, (37), 1, 1903], Zs. Kr., **47**, 294, 1909; from Nagolnij Krjasch, Province of Don Cossacks, Russia, with anal.; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Cornwall, Lebanon County, Pa.; Travis, [Inaug. Diss., Proc. Am. Phil. Soc., **45**, No. 183, 131, 1906], Zs. Kr., **47**, 302, 1909; from the Hungarian localities of Csungány (with anal.) and Almásel, near Kazanesd and Porkura, Comitat Hunyad; Liffa, [Földt. Közl., **38**, 405, 1908], Zs. Kr., **48**, 441, 1910; from Elba; Panichi, Riv. Min., **38**, 12, 1909; from Bingham, Utah; Rogers, Am. J. Sc., **27**, 467, 1909; from Sajóháza, Comitat Gömör, Hungary; Zimányi, Zs. Kr., **48**, 230, 1910; from Dognácska, Banat, Hungary; Zimányi, [Ann. Mus. Nat. Hung., **11**, 1913]; Zs. Kr., **53**, 10, 1913; Földt. Közl., **40**, 550, 591, 1910; [Ak. Értesítö, **24**, 329, 1910], Zs. Kr., **53**, 57, 1913; Földt. Közl., **41**, 616, 1911; from Monzoni, Tyrol; Tacconi, Mem. Acc. Linc., **8**, 736, 1911; from Dognácska, Banat, Hungary, and table of all known forms; Zimányi, Földt. Közl., **42**, 838, 1912.

Crystals from Déva, Comitat Hunyad, Hungary; Maros, [Földt. Közl., **38**, 230, 1908], Zs. Kr., **48**, 445, 1910; from Swedish localities; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908; from Chester, Mass.; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909; from Gavorrano, Tuscany, Italy; Martelli, Rend. Acc. Linc., **18**, (2), 661, 1909; from Beaume near Oulx, Piedmont, Italy; Colomba, Riv. Min., **38**, 35, 1909; from Facebaja, Hungary; Mauritz, [Földt. Közl., **39**, 394, 503, 1909], Zs. Kr., **50**, 634, 1912; from Novi-Seher, near Zepče, Bosnia; Löw, Földt. Közl., **41**, 190, 1911; from Caravaca, Murcia, Spain; Arévalo, [Boll. Soc. Esp. Hist. Nat., Feb., 1911], Zs. Kr., **49**, 303, 1911; from Kingsbridge, New York City; Whitlock, N. Y. State Mus. Bull., **158**, 183, 1912; from Spanish Peaks, Col.; Zimányi, Zs. Kr., **51**, 146, 1912; Ann. Mus. Nat. Hung., **10**, 640, 643, 1912; from Zipaquira, Colombia; Schnaebele, Zs. Kr., **50**, 594, 1912; from Muong-Saï, Indo-China; Tronquoy, Bull. Soc. Min., **37**, 129, 1914.

Critical discussion of twinning laws; Smolař, Zs. Kr., **52**, 461, 1913; a skeleton crystal from Příbram, Bohemia; *idem*, *ibid.*, 501.

Behavior under pressure; Adams, J. Geol., **18**, 489, 1910. Study of crystals of *pyrite* and *marcasite* from various localities show that pyrite is the harder of the two. The hardness of any face does not vary with the direction and the hardness of the different faces of the same crystal is constant. Evidence is found to place pyrite in the tetrahedral-pentagonal-dodecahedral class. Poschl, Zs. Kr., **48**, 572, 1910.

Chem. constitution; Benedik, [Magy. Chem. Folyóirat, **14**, 85, 1908], Zs. Kr., **48**, 447, 1910; Plummer, J. Am. Chem. Soc., **33**, 1487, 1911.

Determination in presence of *marcasite* by the Stokes method; Allen and Crenshaw, Am. J. Sc., **38**, 371, 1914.

Conditions of formation and relation to *marcasite* and thermal relations; Allen, J. Wash. Ac. Sc., **1**, 170, 1911; Allen, Crenshaw, Johnston, and Larsen, Am. J. Sc., **33**, 169, 1912; Zs. Anorg. Chem., **76**, 201, 1912.

PYROAURITE, Min., p. 256; App. I, p. 56; II, p. 84. — Anal. of material from Långban, Sweden; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

PYROCHLORE, Min., p. 726; App. I, p. 56; II, p. 84. — Anal. of material from granite found at the Darjal gorge on the Terek River, Northern Caucasia, Russia; Tschernik, Bull. Ac. St. Pet., **3**, 365, 1909; Zs. Kr., **51**, 93, 1912.

PYROCHROITE, Min., p. 253; App. II, p. 84. — Crystals from Långban, Sweden, show in large development the new form, o(10$\bar{1}$2); Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

PYROLUSITE, Min., pp. 243, 1045; App. I, p. 56; II, p. 84. — Anal. from Calabona, Alghero, Italy; Serra, Rend. Acc. Linc., **20**, (1), 129, 1911. Chem. constitution; Benedik [Magy. Chem. Folyóirat, **14**, 85, 1908], Zs. Kr., **48**, 447, 1910.

PYROMORPHITE, Min., p. 770; App. I, p. 56; II, p. 84. — Crystals from near Rheinbreitbach am Rhein, with anal.; Brauns, Centralbl. Min., 257, 1909; from Society Girl mine, Moyie District, southeastern British Columbia, with new form. Anal. of yellow and green varieties; Bowles, Am. J. Sc., **28**, 40, 1909; from Ems, Nassau, and Broken Hill, N. S. W., with new forms; *idem*, *ibid.*, **32**, 114, 1911; twin with tw. pl., (11$\bar{2}$2), from Ems, Nassau; Goldschmidt and Schröder, Zs. Kr., **51**, 362, 1912; crystals from the Gabriel mine in Einbachtal, Schwartzwald; Dürrfeld, Zs. Kr., **50**, 582, 1912; from Reichenbach, near Lahr, Baden; *idem*, *ibid.*, **50**, 586, 1912.

Anal. from Cosihuiriachic, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Wheatley mine, Chester Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914.

PYROPHYLLITE, Min., p. 691; App. I, p. 56; II, p. 85. — Optical study; Johnsen, Centralbl. Min., 33, 1911.

Anal. of material from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909.

PYROXENE, Min., pp. 352, 1045; App. I, p. 56; II, p. 85. — **Cryst.** — *Diopside.* — Relations between *diopside, enstatite, hedenbergite, ægirite* and *spodumene* discussed; Zambonini, Zs. Kr., **46**, 1, 1909. Crystals from the following localities described: Rotenkopf in Zillertal, Tyrol, with new form; Schwarzen Wand, Hollersbachtal, in the Hohe Tauern, Tyrol, with rare form (Ī12); Wildkreuzjoch, Tyrol, with new form; Kafveltorp, near Nya Kopparberg, Sweden; Achmatovsk, Ural Mts.; Testa Ciarva, Ala valley; Saulera, Ala valley, with new form. A table is given of all previously observed forms with discussion of frequency of occurrence. A list of the various combinations of forms observed is given. Similar tables are given for the iron-rich diopsides. Crystals of *diopside* from lazurite locality south of Lake Baikal, Siberia; Fersmann, Bull. Ac. St. Pet., **4**, 465, 1910; from Ala, Piedmont; Goldschmidt and Schroeder, Zs. Kr., **49**, 135, 1910; from S. Vincent e Chatillon, Valle d'Aosta, Italy; Pelloux, Ann. Mus. Genova, **6**, 25, 1913; from island of Nisi, Ægean Sea; Grill, Mem. Acc. Linc., **10**, 14, 1914; diopside from Vaskö, Comitat Krassószörény, Hungary, with optical study; Toborffy, [Ann. Mus. Nat. Hung., **9**, 278, 281, 1911], Zs. Kr., **54**, 185, 1914. *Augite.* — From Birgaudix, Puy-de-Dôme and from Saint-Paulien, Haute-Loire, France; Gonnard, Bull. Soc. Min., **34**, 16, 1911; containing titanium with new forms from boulder of gabbro found in Waimea Canyon, Hawaii; Schaller, U. S. G. S., Bull., **509**, 85, 1912; from Podhorn Mt., near Marienbad, Bohemia; Himmelbauer, Min. Mitt., **31**, 323, 1912; from a furnace slag; Rüsberg, Centralbl. Min., 689, 1913. Crystals of *pyroxene* from Jerome Park reservoir, New York City, with new forms; Whitlock, N. Y. State Mus., Bull., 183, 1912.

An augite occurring as phenocrysts in a dark glassy magnetite-bearing rock near Pennygael, Island of Mull, was found to be practically uniaxial in character. Refractive indices, $\omega = 1 \cdot 714$, $\epsilon = 1 \cdot 744$. Pleochroism marked, ω smoky brown, ϵ pale yellow. Anal. given. Hallimond, Min. Mag., **17**, 97, 1914.

Anal. — *Diopside.* — Chromiferous from the Colossus diamond mine, South Africa; Mennel, [Rep. So. African Ass. Adv. Sc., 104, 1908], Zs. Kr., **52**, 418, 1913; also from chrysolite bombs found in the basalt tuffs of southern Styria; Schadler, Min. Mitt., **32**, 485, 1914; from Unionville, Chester Co., and Bucks Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 96, 1914; from volcanic bombs found in the district of Laacher See, Prussia; Brauns, N. Jb. Min., Beil.-Bd., **39**, 79, 1914. *Augite.* — From Gerringong, N. S. W.; Foxall, J. Roy. Soc. N. S. W., **38**, 402, 1904; in augite-andesite and its alteration products, from Tschakwa, near Batum on the Black Sea; anal. of alteration product from Frisarka, Gouv. Volhynia, Russia; Glinka, Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906; Zs. Kr., **46**, 283, 1909; from meteorite from Angra, Brazil; Ludwig and Tschermak, Min. Mitt., **28**, 110, 1909; from basalts occurring at the following places in the Rhön district, Liebhards, Sparbrod, Todtenköpfchen, Pferdskopf, Gehülfensberg, with dicussion of chemical constitution; Galkin, N. Jb. Min., Beil.-Bd., **29**, 681, 1910; from rocks of Borschtschowotschny Mt. range, Transbaikalia, Siberia; Kusnetzov, Bull. Ac. St. Pet., **4**, 711, 1910; Zs. Kr., **52**, 518, 1913; from the volcanic region of the Central Plateau, France; Gonnard and Barbier, Bull. Soc. Min., **34**, 228, 1911; from basalt of Medves, near Salgó-Tarján, Comitat Nógrád, Hungary; Mauritz, Földt. Közl., **40**, 541, 581, 1910; of *augite* found as nodules in basalt flows, north of Scano, Sardinia; Washington, J. Geol., **22**, 747, 1914; of the *augites* of the diorite-gabbro of the upper Valtellina, Italy, with optical study; Küchler, Chem. der Erde, **1**, 58, 1914; with optical description and refractive indices of *titaniferous augite* from Bail Hill near Sanquhar, Dumfriesshire; Scott, Min. Mag., **17**, 100, 1914. Anal. of *manganhedenbergite* from Junawáni District, Nágpur, India; Fermor, Mem. Geol. Sur. India, **37**, 1909; of *ægirite-like pyroxenes* from Mooseck near Golling, Salzburg, Austria; Doht and Hlawatsch, Vh. G. Reichs, **79**, 1913; of *salite* from serpentine from Markirch, Alsace; Rhein, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 132], Zs. Kr., **47**, 308, 1909; of *jeffersonite* by Steiger and of *schefferite* by Schaller from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909; of *hedenbergite* from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912. Anal. of *pyroxene* from the Ilmen Mts., Russia; Baljankin, [Ber. Polytech. Inst. St. Pet., **12**, 135, 1909], Zs. Kr., **51**, 283, 1912; from near Reading, Pa.; Smith, Proc. Ac. Nat. Sc., **62**, 538, 1910; of different varieties from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 335, 1911; of material from the Maigelstal, Switzerland; Grubemann, Festschr. Uni. Zürich, 1914.

Discussion of chemical constitution of the *augites* containing alumina; Tschermak, Min. Mitt., **32**, 520, 1914. Study of the variation in chem. comp. of the *augites* containing alumina with tabular review of previous anal.; Boeke, Zs. Kr., **53**, 445, 1913; also Zambonini, Mem. Acc. Sc. Napoli, **16**, 1914. Rôle of water in; Allen and Clement, Zs. Anorg. Chem., **68**, 317, 1910.

Deformation of *diopside* under pressure; Adams, J. Geol., **18**, 489, 1910.

Occ. of *diopside* in crystals of gem quality from Itrongahy in southern Madagascar; Lacroix, C. R., **155**, 672, 1912. *Augite* in dike rocks from Espichel, Portugal; Souza-Brandão, [Ann. Polytech. Ak. Porto, **2**, 1, 1907], Zs. Kr., **49**, 292, 1911; occ. of *violan* in manganese deposits of St. Marcel, Piedmont, Italy. Optical description. Priehäusser, Zs. prakt. Geol., **17**, 396, 1909. Occ. of *fassaite* in limestone at Candoglia, Toce valley, Italy; Tacconi, [Att. Soc. Ital. Sc. Milano, **50**, 55, 1911], Zs. Kr., **54**, 388, 1914.

Analogy between pyroxene and plagioclase feldspar groups; Wahl [Öfversigt Finska Vetenskaps-Soc. Förh., **50**, No. 2, 1908], Zs. Kr., **49**, 303, 1908.

Behavior of mixtures of *oligoclase* and *augite* when melted together; Schmidt, N. Jb. Min., Beil.-Bd., **27**, 604, 1909. Experiments concerning the crystallizing together of *diopside* and *jadeite*; Schumoff-Deleano, Centralbl. Min., 227, 1913. Artif. formation, thermal characters of *diopside* and relation to magnesium and calcium silicates; Allen, White, Wright, and Larsen, Am. J. Sc., **27**, 1, 1909. Experiments with melts containing various mixtures of *diopside* and *chrysolite*; Lebedew, Ann. Inst. Polytech. St. Pet., **15**, 691, 1911. Discussion of various forms of $MgSiO_3$ obtained in silicate melts; Doelter, Ber. Ak. Wien, **122**, (1), 1, 1913. Artificial formation; Zinke, N. Jb. Min., **2**, 117, 1911. *Diopside* in artificial silicate melts in the ternary system, diopside-forsterite-silica; Bowen, Am. J. Sc., **38**, 207, 1914; Zs. Anorg. Chem., **90**, 1, 1914. Artif. formation of a *chrome diopside*; Doelter, Min. Mitt., **32**, 131, 1913; Ber. Ak. Wien, **122**, (1), 1, 1913.

Blanfordite. Description; Fermor, Mem. Geol. Sur. India, **37**, 1909.

Pyroxmangite. *W. E. Ford* and *W. M. Bradley*; Am. J. Sc., **36**, 169, 1913; Zs. Kr., **53**, 225, 1913.

Triclinic. Cleavage parallel to two prism faces, one cleavage being notably more distinct than the other. Angle between two cleavages = 91° 50′. Parting plane parallel to *b*(010) observed. Angle between *b*(010) and better cleavage = 45° 14′. Optically +. *n* between 1·75 and 1·76. 2V = 30°, approx. Extinction on *b*(010) practically parallel to direction of *c* axis. Extinction on artificial plane in prism zone and at right angles to *b*(010) = 45°. H. = 5·5–6. G. = 3·80. Luster vitreous to resinous. Color, amber, yellowish brown, reddish brown to dark brown. Translucent to opaque.

Comp. — A manganese pyroxene.

Anal. —

SiO_2	MnO	FeO	CaO	Al_2O_3	H_2O	Total
47·14	20·63	28·34	1·88	2·38	0·33	100·70

Pyr. — Fuses at 3 to black and magnetic globule. Reacts for manganese with fluxes. Insoluble in acids.

Alteration. — Alters to black manganese oxide, *skemmatite*, which see.

Obs. — Found in intimate association with *skemmatite*, near Iva, Anderson Co., S. C.

Pyrrhite, Min., p. 728. — From Mte. Somma, Vesuvius; Zambonini, Rend. Acc. Linc., **20**, (2), 129, 1911.

Pyrrhotite, Min., p. 73; App. I, p. 57; II, p. 86. — Crystals found in contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 258, 1911. Crystals and pseudomorphs of limonite from near Lairdsville, N. Y.; Smyth, Am. J. Sc., **32**, 156, 1911. Pseudomorphs of *marcasite* after pyrrhotite from Teutoberg Wald near Osnabrück, Hannover; Pogue, Zs. Kr., **49**, 455, 1911.

Anal. of material from various localities in Sardinia; Serra, Rend. Acc. Linc., **16**, (1), 347, 1907; from Homestake mine, Lead, South Dakota; Sharwood, Econ. Geol., **6**, 729, 1911; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

Artif. formation; comp. shown to be ferrous sulphide containing variable amounts of dissolved sulphur; two crystal forms depending upon temperature of formation, the high temperature form, *α-pyrrhotite*, being orthorhombic and the other, *β-pyrrhotite*, being hexagonal; Allen, Crenshaw, Johnston, and Larsen, Am. J. Sc., **33**, 169, 1912.

Quartz, Min., pp. 183, 1046; App. I, p. 57; II, p. 86. — **Cryst.** — From Nagolnij Krjasch, Province of Don Cossacks, Russia, with new forms; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Pisavuori, Nilsiä, Finland; Flink, [G. För. Förh., **30**, 338, 1908], Zs. Kr., **48**, 540, 1910; from the Waldstein granite in the Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; with cubic habit from Schunga and Wolk-Ostrow, Olonetz, Russia; Borisov, [Trav. Soc. Nat. St. Pet., **40**, 14, 1909], Zs. Kr., **51**, 286, 1912; from granite porphyry on Island of Elba; Fersmann, Bull. Ac. St. Pet., **3**, 187, 1909; Zs. Kr., **51**, 91, 1912; from marble of Carrara, Italy, with new forms; Aloisi, Att. Soc. Tosc. Mem., **25**, 1909; from Beaume near Oulx, Piedmont, Italy; Colomba, Riv. Min., **38**, 35, 1909; from various Swedish localities; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910; from Finse, Norway with many rare forms which are thought to have resulted from natural etching; Goldschmidt; Zs. Kr., **51**, 40, 1912; from Alexander Co., N. C., with new forms; Pogue and Goldschmidt, Am. J. Sc., **34**, 414, 1912; Zs. Kr., **51**, 269, 1912. Capped crystals from Usingen and Niederhausen, Taunus District, Nassau; Schneiderhöhn, N. Jb. Min., **2**, 1, 1912. Capped crystals in general; Beck, Centralbl. Min., 693, 1912; crystals from Elba with new forms; Millosevich, Sep. Pub. Ist. Firenze, "Contributo alla Conoscenza della Mineralogia dell'Isola d'Elba," 1914.

Twin with (11$\bar{2}$2) as tw. pl. from Brusson, Piedmont; Zyndel, Centralbl. Min., 356, 1910; with r(10$\bar{1}$1) as tw. pl. from Estérel, near Cannes, France; Drugman, Min. Mag., **16**, 112, 1911; Zs. Kr., **50**, 598, 1912; twins similar to these found in quartz porphyries from four other localities; *idem*, Zs. Kr., **53**, 271, 1913; laws of twinning in which the principal axes are not parallel; Zyndel, Zs. Kr., **53**, 15, 1913.

Pseudomorphs after *calcite* and *barite* from the fluorite vein at Wölsenberg, near Nabburg, in the Oberpfalz, Bavaria; Laubmann, Centralbl. Min., 353, 1913; 385, 1914.

Growth of crystals; Spezia, Att. Acc. Torino, **44**, Nov., 1908.

Thermal Behavior, etc. — Optical and crystallographic changes that occur with change from *α-quartz* to *β-quartz*; Rinne and Kolb, N. Jb. Min., **2**, 138, 1910; Centralbl. Min., 65, 1911; change in crystal angles with lowering of temperature; Goldschmidt, Zs. Kr., **51**, 1, 1912; shown that crystal angles vary with increase of temperature. There is a sharp break in the derived curve at 575° (the transformation point between *α-* and *β-quartz*). Beyond that point the crystal angles are nearly constant. Wright, J. Wash. Ac. Sc., **3**, 485, 1913. At 575° quartz changes from what is known as *α-quartz* into *β-quartz*, which again changes into *tridymite* above 800°. *α-quartz* is apparently hexagonal, trapezohedral-tetratohedral while β-quartz is hexagonal, trapezohedral-hemihedral. *α-quartz* is found in veins and geodes and large pegmatites while *β-quartz* occurs in graphic granite, granite pegmatites and porphyries. From this it follows that vein and geode quartzes and quartzes in certain large pegmatite masses and veins were formed below 575°, while graphic granites, granite pegmatites and prophyry quartzes were formed above 575°. Wright and Larsen, Am. J. Sc., **27**, 421, 1909; Zs. Anorg. Chem., **68**, 338, 1910. Study of the variation of indices of refraction, and of birefringence for light of varying wave-lengths over a range of temperature from + 150° to + 750°. There is a gradual slow decrease in the values up to about 400°, when the change becomes more rapid. At 570° the *α-quartz* changes to its β modification with a sudden marked lowering of the indices and birefringence. From this point on the indices rise again while the birefringence remains nearly constant. Rinne and Kolb, N. Jb. Min., **2**, 138, 1910. Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911; detailed study of the artificial formation of *quartz*, *tridymite* and *cristobalite*, their stability relations, the temperatures of their inversion into each other, etc., have been made by Fenner, J. Wash. Ac. Sc., **2**, 471, 1912; Am. J. Sc., **36**, 331, 1913; formation and thermal relations; Smits and Endell, Zs. Anorg. Chem., **80**, 176, 1913; see also Schlaepfer and Niggli, *ibid.*, **87**, 52, 1914; relations between *quartz*, *quartzine*, and *chalcedony* discussed; Wetzel, Centralbl. Min., 356, 1913.

Dispersion in ultra-red light; Paschen, Ann. Phys., **35**, 1005, 1911. Study of origin of light circles and spots seen on sphere of rose quartz from Brazil; Goldschmidt and Brauns, N. Jb. Min., Beil.-Bd., **31**, 220, 1911.

Causes of the blue color in quartz; Wetzel, Jb. Min., **2**, 117, 1913.

Behavior under pressure; Adams, J. Geol., **18**, 489, 1910. Determination by grinding methods of the hardness of quartz in relation to that of other minerals and upon different crystal faces; Holmquist, G. För. Förh., **33**, 281, 1911. Mean specific heat; Schulz, Centralbl. Min., 481, 1912.

In screw-like intergrowths; Riv. Min., **37**, 3, 1909.

Origin of *agate*; Liesegang, Centralbl. Min., 593, 1910; 497, 1911; origin of the transparent quartz from Madagascar; Lacroix, C. R., **155**, 491, 1912.

Thermal study of *chalcedony* shows that it does not behave in the same manner as quartz and is therefore probably a distinct species. Fenner, Am. J. Sc., **36**, 341, 1913.

Quartzine, App. I, p. 58; II, p. 87. — Relations to *quartz* and *chalcedony*; Wetzel, Centralbl. Min., 356, 1913.

Quercyite. *A. Lacroix*, C. R., **150**, 1213, 1388, 1910; Min. de la France, **4**, 579, 1910. *W. T. Schaller*, U. S. G. S., Bull., **509**, 89, 98, 1912.

A mixture of amorphous *collophanite* with optically negative fibrous phosphates corresponding to *dahllite*, *staffelite*, and *francolite*, has been called *α-quercyite* and a similar mixture with optically positive but unknown mineral fibers has been called *β-quercyite*. From Quercy and other French phosphate deposits.

Quisqueite, App. II, p. 87. — Occ., etc., at Minasragra, Peru; Hewett, Trans. Am. Inst. Min. Eng., 291, 1909.

Raimondite, Min., p. 969. — Comp., see under *Carphosiderite*.

Ralstonite, Min., p. 181. — Greenland mineral gave G. = 2·614; for Na-light, *n* = 1·4267. Böggild, Zs. Kr., **51**, 591, 1912.

Rammelsbergite, Min., p. 101. — Crystals from Riechelsdorf, Hesse, Germany, gave axial ratio, $a : b : c = 0{\cdot}6798 : 1 : 1{\cdot}1622$. G. = 7·14; Dürrfeld, Zs. Kr., **49**, 199, 1910.

RATHITE, App. I, p. 58; II, p. 88. — Close similarity between crystal angles of *rathite*, the material which has been called *rathite-α* and *wiltshireite* pointed out; Solly, Min. Mag., **16**, 121, 1911. Later shown that mineral from the Binnental originally described as a new species and named *wiltshireite*, Lewis, Zs. Kr., **49**, 514, 1910, in honor of the late Prof. Thomas Wiltshire is identical with *rathite*; Lewis, Min. Mag., **16**, 197, 1912. At the same time *rathite* is shown to be monoclinic in symmetry, the crystals of the previous descriptions being pseudo-orthorhombic, due to twinning; tw. pls. being (100) and (101) of monoclinic orientation. Axial ratio, $a : b : c = 1\cdot5869 : 1 : 1\cdot0698$; $\beta = 79° 16'$. The correspondence of forms in the three orientations being as follows:

Lewis..................	(100)	(010)	($\bar{1}$04)	(110)	(201)
Solly (App. II, p. 88).....	(010)	(100)	(001)	(340)	(07$\bar{3}$)
Baumhauer (App. I, p. 58)	(001)	(100)	(010)	(101)	(0$\bar{4}$5)

REALGAR, Min., pp. 33, 1046; App. I, p. 59; II, p. 88. — Crystals from Felsöbánya, Hungary, with new forms; Löw, Zs. Kr., **51**, 132, 1912.

REFDANSKITE, Min., p. 678. — Anal. and description of material provisionally placed here from chromite deposit in Northern Caucasia; Besborodko, N. Jb. Min., Beil.-Bd., **34**, 783, 1912.

RHABDITE, Min., p. 31, App. I, p. 59. — From Commentry, Allier, France, proved to be a mixture; Oswald, Bull. Soc. Min., **33**, 88, 1910.

RHODIZITE, Min., p. 880. From Madagascar localities; at Antandrokomby, with anal.; Lacroix, Bull. Min. Soc., **33**, 37, 1910; anal. and optical study from Ampakita; Duparc, Wunder, and Sabot; *ibid.*, **34**, 131, 1911; in pegmatites of Vakinankaratra; Lacroix, *ibid.*, **35**, 76, 1912.

RHODOCHROSITE, Min., p. 278; App. I, p. 59; II, p. 88. — Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of *calcite group*; Rinne, Centralbl. Min., 705, 1914.

A rhodochrosite containing 45% of zinc carbonate from Rosseto, Elba, called *zincorodocrosite*; Manasse, Mem. Soc. Tosc., **27**, 76, 1911.

A ferriferous var. of rhodochrosite from Roumania named *ponite* after Prof. Poni, of Jassy; V. C. Butureanu, [Ann. Sc. Uni. Jassy, **7**, 185, 1912], Min. Mag., **16**, 369, 1913.

RHODONITE, Min., pp. 378, 1046; App. I, p. 59; II, p. 88. — Crystals from Broken Hill, N. S. W., with new forms and calculation of new elements; Anderson, Zs. Kr., **47**, 209, 1909; from Franklin, N. J., with new form; Ford and Crawford, Am. J. Sc., **32**, 287, 1911; from Adervielle, Hautes Pyrénées, France; Ungemach, Bull. Soc. Min., **35**, 526, 1912; of artif. iron-bearing rhodonite from slags of Porto Ferrajo, Elba; Tacconi, [Rassegna Min., Met., Chim., **34**, No. 9, 1911], Zs. Kr., **54**, 392, 1914.

Anal. from Radautal, Harz Mts.; Fromme, Min. Mitt., **28**, 305, 1909.

Artif. formation and behavior of the series $CaSiO_3$-$MnSiO_3$; St. Kallenberg, Centralbl. Min., 388, 1914.

Rhomboclase. *J. A. Krenner*, [Ak. Ert., **2**, 96, 1891], [Földt. Közl., **37**, 204, 205, 1907], Min. Mag., **15**, 429, 1910.

In rhombic plates. Colorless. Cleavage basal. Comp. — A hydrated acid ferric sulphate; $Fe_2O_3.4SO_3.9H_2O$. Occurs with other iron sulphates at Szomolnok, Hungary. The same compound has been artif. prepared; Scharizer, Zs. Kr., **35**, 345, 1901; **43**, 113, 1907.

RHÖNITE, App. II, p. 88. — Anal. and description of material from the Puy de Barneire, Saint-Sandoux, Puy-de-Dôme; Lacroix, Bull. Soc. Min., **32**, 325, 1909.

RIEBECKITE, Min., pp. 400, 1047; App. I, p. 59; II, p. 89. — From pegmatite, Quincy, Mass., with anal. and optical description; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Proc. Am. Ac., **47**, 125, 1911; Zs. Kr., **49**, 332, 1911. Anal. of material from near Gloggnitz, Lower Austria; Schierl, Centralbl. Min., 604, 1914.

RINNEITE, App. II, p. 89. — Occ. at Wolkramshausen, Saxony, and at Diekholzen, near Hildesheim, Hannover. Proven to be hexagonal, rhombohedral. $c = 0\cdot5757$ or $0\cdot5766$ (artif. crystals). Forms observed: (11$\bar{2}$0), (10$\bar{1}$1), and rarely (0001). Refractive indices, Na-light: $\omega = 1\cdot5886$, $\epsilon = 1\cdot5894$. G. $= 2\cdot3474$. Anal. from Nordhausen, Saxony, and Hildesheim show marked differences in the amount of sodium chloride present but in both cases have $KCl : FeCl_2 = 3 : 1$. It is thought that the NaCl is not a part of the compound, but present as a mechanical mixture. Boeke, N. Jb. Min., **2**, 19, 1909; Schneider, Centralbl. Min., 415, 1909. Later anal. of pure material from Hildesheim confirms original formula; Rinne and Kolb, Centralbl. Min., 337, 1911.

Artif. formation; Boeke, Ber. Ak. Wiss., 632, 1909.

Risörite. *O. Hauser*, Zs. Anorg. Chem., **60**, 1, 1908.
Isotropic. Color yellow-brown. H. = 5·5. G. = 4·179. Fracture conchoidal.
Comp. — A niobate of the yttrium metals.
Anal. — Nb_2O_5, 36·21; Ta_2O_5, 4·00; TiO_2, 6·00; $(Y,Er)_2O_3$, 36·28; $(Ce,La,Nd)_2O_3$, 2·88; CaO, 1·93; FeO, 2·61; Fe_2O_3, 1·20; Al_2O_3, 0·81; N_2,He, 0·90; H_2O, 7·11; SnO_2, ThO_2, UO_2, PbO, CO_2, present in small amounts, but undetermined.
Pyr. — Soluble in hot concentrated sulphuric acid.
Obs. — Occurs in granite pegmatite at Risör, Southern Norway.

Rivaite. *F. Zambonini*, Rend. Acc. Napoli, **18**, 223, 1912; Riv. Min., **41**, 94, 1912; Mem. Acc. Napoli, **15**, No. 12, 16.
Monoclinic? In irregular fibrous aggregates. H. = 5. G. = 2·55–2·56. Color pale lavender-blue to dark blue; the single fibers, pale blue to colorless. Fibers show parallel extinction with positive elongation. An optical axis emerges at edge of field when fibers are examined in convergent light. Weak birefringence.
Comp. — $(Ca,Na_2)Si_2O_5$.
Anal. — SiO_2, 66·38; TiO_2, 0·10; Al_2O_3, 0·79; FeO, 0·30; CoO, 0·38; NiO, *tr.*; MnO, *tr.*; CaO, 18·45; MgO, 0·74; Na_2O, 10·96; K_2O, 1·20; Ign., 1·39; Total, 100·69.
Pyr. — B. B. easily fusible to a glass with yellow flame color. Not attacked by hydrochloric acid.
Obs. — Found in loose nodules on Vesuvius.
Name. — In honor of the mineralogist, Dr. Carlo Riva, (1872–1902).

RIVOTITE, Min., p. 203. — Shown to be a mixture of *malachite* and *stibiconite*; Lacroix, Bull. Min. Soc., **33**, 190, 1910.

Rizopatronite. A pseudonym for *patronite*; Bravo quoted by Hillebrand, Am. J. Sc., **24**, 144, 1907; J. Am. Chem. Soc., **29**, 1022, 1907.

ROEMERITE, Min., p. 959; App. II, p. 89. — For relations to *botryogen* see under the latter.

ROMEITE, Min., p. 862. — Crystals from S. Marcel, Valle d'Aosta, Italy; Pelloux, Ann. Mus. Genova, **6**, 22, 1913.
Investigation by Schaller, J. Wash. Ac. Sc., **4**, 359, 1914; (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**) of material from Italy and of the so-called *atopite* from Brazil, which was shown to be identical with the Italian *romeite*, led to the following facts. Measurement of crystals from Brazil proved its isometric character. Cleavage octahedral. G. = 5·074 (Italy); = 5·044 (Brazil). Color old gold (Italy) to russet (Brazil). Weak double refraction. Refractive index = 1·87 (Italy); = 1·83 (Brazil). Anal. of material from Italy: Sb, 56·15; O, 18·57; FeO, 1·12; MnO, 6·27; CaO, 15·81; Na_2O, 0·81; H_2O, 1·39; Total, 100·12. Material called *atopite* from Brazil: Sb, 56·02; O, 18·70; FeO, 1·29; MnO, 2·62; CaO, 14·81; Na_2O, 5·08; H_2O, 1·12; Total, 99·64. Both analyses yield the formula $R''_5Sb_6O_{20}$, or $5RO.3Sb_2O_5$.

Roschérite. A new species mentioned by Slavík, Bull. Soc. Min., **37**, 162, 1914, as having been described by K. Preis (original reference not given). Monoclinic.
Comp. — $(Mn,Fe,Ca)_2Al(OH)(PO_4)_2.2H_2O$. Occurs at Ehrensfriedersdorf, Saxony.

ROSCOELITE, Min., p. 635; App. II, p. 90. — Optical study of material from the Stockslager mine, Eldorado Co., Cal., gave the following results. Refractive indices, $\alpha = 1\cdot610$, $\beta = 1\cdot685$, $\gamma = 1\cdot704$. Pleochroic, $\mathfrak{c}$ = green-brown, $\mathfrak{b}$ = olive-green, $\mathfrak{a}$ = olive-green. Absorption fairly strong $\mathfrak{c} > \mathfrak{b} > \mathfrak{a}$. Axial angle varied with Na-light from 2E = 42° to 69°. Strong axial dispersion with $2V_\rho > V_v$. Plane of optic axes perpendicular to symmetry plane. Wright, Am. J. Sc., **38**, 305, 1914.

Rosiérésite. *A. Lacroix*, Min. de la France, **4**, 532, 1910.
In stalactites. G. = 2·2. Color greenish yellow, yellow and light brown. Refractive index about 1·5. Inactive to polarized light.
Comp. — A hydrous phosphate of aluminium with lead and copper.
Anal. — By Berthier, Ann. Mines, **19**, 669, 1841: P_2O_5, 25·5; As_2O_5, *tr.*; Al_2O_3, 23·0; PbO, 10·0; CuO, 3·0; H_2O, 38·0; Total, 99·5.
Pyr. — Water in C. T. B. B. hardens without fusing and becomes black. Easily soluble in nitric acid; dissolves in hydrochloric acid, leaving a residue of lead chloride.
Obs. — Found in the now abandoned copper mine at Rosières, near Carnaux, Tarn.

RUMPFITE, Min., p. 661; App. II, p. 90. — A new anal. of the original material showed that large errors existed in the first analysis, especially in the determinations of magnesia and alumina, and that the mineral could be considered as a variety of *clinochlore*; Tschermak, Min. Mitt., **32**, 542, 1914. Other analyses are as follows: from Häuselberg, near Leoben, Styria; Redlich and Cornu, Zs. prakt. Geol., **16**, 145, 1908; from magnesite deposit at Eichberg, Semmering district, Austria; Grosspietsch, Centralbl. Min., 433, 1911; from Eichberg, Häuselberg and the Veitsch Mts., Styria; Redlich, *ibid.*, 737, 1914.

RUTILE, Min., pp. 237, 1047; App. I, p. 60; II, p. 90. — Crystals from Minas Geraes, Brazil, with new forms; Krizsó, [Földt. Közl., **39**, 388, 497, 1909], Zs. Kr., **50**, 633, 1912; from Chester, Mass.; Palache and Wood, Proc. Am. Ac., **44**, 641, 1909; from Horsjöberg, Sweden, with new form; Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Study of the parallel growth of *rutile* upon *hematite*; Viola, Zs. Kr., **46**, 326, 1909. Needles included in a crystal of *biotite-phlogopite* in parallel growth from Ottawa, Canada; Pogue, Proc. U. S. Nat. Mus., **39**, 571, 1911; Zs. Kr., **49**, 455, 1911.

Small amounts of chromium and vanadium oxides found in the rutile from Käringbricka, Sweden; Quensel, G. För. Förh., **34**, 490, 1912.

Occ. in the eastern United States; Watson, U. S. G. S., Bull., **580**, 385, 1914.

Discussion of composition and relations of the members of the *rutile group*; suggested that *nigrine* be called *iron rutile*; Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

SAFFLORITE, Min., p. 100; App. I, p. 60. — Crystals from Tunaberg, Sweden, gave the axial ratio: $a : b : c = 0 \cdot 59101 : 1 : 1 \cdot 149$; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908.

SAL-AMMONIAC, Min., p. 157; App. I, p. 60; II, p. 90. — Occ. in fumeroles at Mt. Etna, Sicily; *Lacroix*, C. R., **147**, 161, 1908.

Study of the transformation that takes place when ammonium chloride and similar compounds are heated; Wallace, Centralbl. Min., 33, 1910; Sommerfeldt, Zs. Kr., **48**, 515, 1910.

Salmonsite. *W. T. Schaller*, J. Wash. Ac. Sc., **2**, 143, 1912; (also priv. contr.; complete description to be published in U. S. G. S., Prof. Paper, **92**).

Cleavable fibrous masses. G. = 2·88. Color buff. Refractive indices, $\alpha = 1 \cdot 655$, $\beta = 1 \cdot 660$, $\gamma = 1 \cdot 665$. 2V very large. Weakly pleochroic, $\mathfrak{a}$, colorless; $\mathfrak{b}$, yellow; $\mathfrak{c}$, orange-yellow.

Comp. — Hydrous iron-manganese phosphate; $Fe_2O_3.9MnO.4P_2O_5.14H_2O$.

Anal. — FeO, 0·13; MnO, 37·74; CaO, 1·06; Fe_2O_3, 9·53; P_2O_5, 34·86; H_2O, 15·73; Insol., 1·40; Total, 100·45.

Obs. — Occ. at Stewart mine, Pala, San Diego Co., Cal., as alteration of *hureaulite*.

Name. — In honor of Mr. Frank A. Salmon, formerly of Pala.

SAMARSKITE, Min., pp. 739, 1037; App. I, p. 61; II, p. 90. — Anal. from Antanamalaza, Madagascar; Lacroix, Bull. Soc. Min., **34**, 67, 1911; C. R., **152**, 559, 1911.

From Nellore District, Madras; Tipper, Rec. Geol. Sur. India, **41**, 210, 1911.

Samirésite. *A. Lacroix*, Bull. Soc. Min., **35**, 84, 1912; C. R., **154**, 1040, 1912.

Isometric. In octahedrons. G. = 5·24. Color, golden-yellow. Bright luster. Friable.

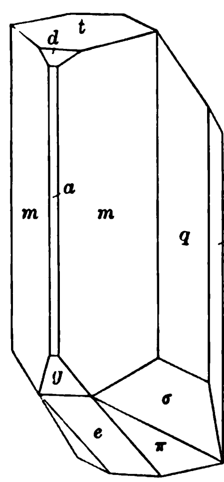
Comp. — A niobate of uranium, etc.

Anal. — Nb_2O_5, 45·80; Ta_2O_5, 3·70; TiO_2, 6·70; SnO_2, 0·10; $(Ce,La,Di)_2O_3$, 0·20; Al_2O_3, 0·74; UO_3, 21·20; PbO, 7·35; FeO, 1·06; K_2O, 0·30; Ign., 12·45; Total, 99·60.

Obs. — With *euxenite* and *bismuthite* in pegmatite east of Antsirabé, on Samiresy Hill, Madagascar.

SAMOITE, Min., p. 693. — Anal. from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

Samsonite. *Werner* and *Fraatz*, Centralbl. Min., 331, 1910; *W. Bruhns*, [4 Jahresber. Niedersachs. Geol. Ver. Hannover, 1911], Zs. Kr., **53**, 424, 1914. *F. Slavík*, Bull. Ac. Sc. Bohême, **16**, 1911; ["Rozpravy" Böhm. Ak., **20**, No. 20, 1911], Zs. Kr., **54**, 193, 1914. *F. Kolbeck* and *V. Goldschmidt*, Zs. Kr., **50**, 455, 1911.



Samsonite (*Slavík*).

Monoclinic. $a : b : c = 1 \cdot 2777 : 1 : 0 \cdot 8192$. $\beta = 87° 18'$, (Kolbeck and Goldschmidt). Following forms observed: $b(010)$, $a(100)$, $l(210)$, $m(110)$, $n(120)$, $q(140)$, $i(011)$, $d(101)$, $f(103)$, $e(\bar{1}01)$, $g(\bar{3}01)$, $h(\bar{5}01)$, $p(111)$, $\pi(\bar{1}11)$, $r(212)$, $\sigma(\bar{4}73)$, and doubtful, $s(130)$. Habit, prismatic, strongly striated in the prism zone. Color steel-black, red in transmitted light.

Comp. — $Ag_4MnSb_2S_6$ or $2Ag_2S.MnS.Sb_2S_3$.

Anal. — By Fraatz:

Ag	Sb	Mn	S	Cu	Fe	$CaCO_3$	$MgCO_3$	Pb,As,SiO_2	Total
45·95	26·33	5·86	20·55	0·18	0·22	0·41	0·46	*trace*	99·86

Pyr. — Easily fusible.
Obs. — Occurs in Samson vein of the silver mines at St. Andreasberg, Harz Mts., with *quartz*, *calcite*, *pyrargyrite*, *pyrolusite*, *galena*, etc.

SAPPHIRINE, Min., p. 561; App. II, p. 91. — Anal. of material associated with *rutile* from St. Urbain, Quebec; Warren, Am. J. Sc., **33**, 263, 1912. Occ. near Betroka, Madagascar, with the following anal.: SiO_2, 14·90; Al_2O_3, 62·55; MgO, 21·20; FeO, 1·78; Total, 100·43. G. = 3·31. Refractive indices, $\alpha = 1{\cdot}7042$, $\beta = 1{\cdot}7074$, $\gamma = 1{\cdot}7097$. Color dark blue. Strongly pleochroic. Lacroix, C. R., **155**, 672, 1912.

SASSOLITE, Min., p. 255; App. II, p. 91. — Occ. in fumeroles at Vesuvius; Lacroix, C. R., **147**, 161, 1908.
Relations to *melilite group*, see under *Melilite*.

SAUSSURITE, Min., p. 515. — See under *Garnet*.

SCAPOLITE, Min., p. 466; App. I, p. 61; II, p. 91. — Detailed chemical (with new anal. of various occurrences), crystallographic, and optical study of the members of the group; Himmelbauer, Ber. Ak. Wien, **119**, 115, 1910. Crystals with anal. and optical study from the Island of Laurinkari, near the Island of Hirvensalo, Finland; Borgström, Bull. Comm. Geol. Finland, No. 41, 1913. Anal. and optical study of a *mizzonite* from Capo d'Arco, Elba; Manasse, Rend. Acc. Linc., **19**, (2), 211, 1910. New anal. given of material from Vesuvius, Pargas and Laurinkari, Finland; Haliburton and Enterprise, Ont. From study of these and a large number of other analyses conclusion reached that the composition of the scapolite minerals may be explained by isomorphous mixtures of the following compounds: *marialite* or *chlormarialite*, $NaCl.3NaAlSi_3O_8$; *sulphatmarialite*, $Na_2SO_4.3NaAlSi_3O_8$; *carbonatmarialite*, $Na_2CO_3.3NaAlSi_3O_8$; *carbonatmeionite*, $CaCO_3.3CaAl_2Si_2O_8$; *sulphatmeionite*, $CaSO_4.3CaAl_2Si_2O_8$; Borgström, Zs. Kr., **54**, 238, 1914. Anal. from volcanic bombs found in the district of Laacher See, Prussia, with discussion of the composition of the mineral. Name *sylvialite*, after Dr. Sylvia Hillebrand, proposed for the sulphate scapolite molecule such as found here. Brauns, N. Jb. Min., Beil.-Bd., **39**, 79, 1914. Discussion of the chemical constitution of the scapolites and related silicates; Clarke, U. S. G. S., Bull., **588**, 1914. Occ. with anal. from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets, Skrifter, No. 1, 307, 1911.
Noted occurring in a pegmatite vein near contact with a limestone in the Walker mine, Buckingham Township, Quebec, Canada; Stansfield, Am. J. Sc., **38**, 37, 1914.

Schaumopal. See under *Opal*.

SCHEELITE, Min., p. 985; App. I, p. 61; II, p. 91. — Crystals from Traversella, Italy; Serra, Rend. Acc. Linc., **18**, (2), 630, 1909.
Anal. of material from Otago, New Zealand; Finlayson, Trans. New Zealand Inst., **40** 110, 1907; from Frankford, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914.

SCHNEEBERGITE, Min., p. 862; App. I, p. 61; II, p. 92. — Investigation by Schaller of material from original locality, J. Wash. Ac. Sc., **4**, 354, 1914, (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**), gave the following facts. Isometric, in octahedral crystals. Under microscope often shows weak double refraction. Distinct octahedral cleavage. G. = 5·41. Color honey-yellow. Adamantine luster. Refractive index = 2·09. Difficultly fusible. Insoluble in acids. Decomposed readily in sodium carbonate fusion. Readily reduced when heated in a current of hydrogen.
Anal. — Sb, 57·40; O, 15·19; FeO, 8·51; CaO, 17·42; Na_2O, 0·10; Insol., 0·30; H_2O, 1·67; Total, 100·79.
The formula derived was $4(Ca,Fe)O.2Sb_2O_4$ or $2(Ca,Fe)O.Sb_2O_3+2(Ca,Fe)O.Sb_2O_5$.

SCHWARTZENBERGITE, Min., p. 170. — Study of crystals from San Rafael mine, Sierra Gorda, Caracoles, Chile, gave the following new facts. Pseudo-tetragonal. Forms: (011), (441) with distinct cleavage parallel to (001). Under microscope each pyramid face gives biaxial interference figure. Optically —. 2E = 38°, approx. Refractive index = 2·35, approx. Anal. by Prior gave: Pb, 75·07; Cu, *tr.*; CaO, 0·67; Cl, 7·96; I, 8·64; SO_3, 0·47; O and loss, 7·19; Total, 100·00. Qualitative tests proved the presence of lead iodate. Formula given, $3(PbCl_2.2PbO)PbI_2O_6$. Smith and Prior, Min. Mag., **16**, 77, 1911.

SCOLECITE, Min., p. 604; App. I, p. 61; II, p. 92. — Composition, crystals, and optical character discussed; Cesàro, Bull. Ac. Belg., No. 4, 435, 1909.
Anal. from near Reading, Pa.; Smith, Proc. Ac. Nat. Sc., **62**, 538, 1910.

SCORODITE, Min., p. 821; App. I, p. 61; II, p. 92. — Crystals from Boko-Songho, Congo Free State; Buttgenbach, Bull. Soc. Min., **36**, 42, 1913; with anal. from Cobalt, Ontario; Graham, Trans. Roy. Soc. Canada, **7**, Sect. IV, 19, 1913.

Occ. at the Gabriel mine in Einbachtal, Schwarzwald; Dürrfeld, Zs. Kr., **50**, 582, 1912. Crystallographic and optical relation to *variscite*; see under *Variscite*.

Searlesite. *E. S. Larsen* and *W. B. Hicks*, Am. J. Sc., **38**, 437, 1914.

Monoclinic? In minute spherulites composed of radiating fibers. Soft. Color white. Approx. refractive indices: $\alpha = 1 \cdot 520$, $\gamma = 1 \cdot 528$. 2E very large. Probably optically −. Extinction angles for fibers vary from zero to very large. Elongation of fibers showing zero or small extinction angles is positive. Optical characters change markedly on treatment with hydrochloric acid.

Comp. — A hydrous borosilicate of sodium, $NaB(SiO_3)_2.H_2O$ = SiO_2, 58·22; B_2O_3, 17·15; Na_2O, 15·20; H_2O, 8·83.

Anal. — By Hicks; 1 containing various impurities; 2 corrected and recalculated.

	Insol.	CO_2	SiO_2	B_2O_3	Na_2O	K_2O	CaO	MgO
1.	11·88	12·84	34·00	9·80	7·70	0·60	12·10	4·20
2.	.....	.....	56·41	16·26	12·78	1·00	.....	1·82

	FeO*	H_2O	Al_2O_3	Total
1.	1·14	6·50	0·22	100·98
2.	1·89	9·47	0·37	100·00

* State of oxidation undetermined.

Pyr. — Fuses below red heat to a nearly clear glass. Readily decomposed by hydrochloric acid and is appreciably soluble in water without decomposition.

Obs. — Found at depth of 540 feet in old Searles well boring at Searles Lake, San Bernardino Co., Cal., associated with *calcite*, *halite*, *pirssonite*, *trona*, and sand grains. Sand made up of fragments of *quartz*, *orthoclase*, *microcline*, *plagioclase*, *chlorite* and green *hornblende*.

Name. — After Mr. John W. Searles.

Sefströmite. Name proposed by Mawson (no description published) for a supposed vanadiferous variety of *ilmenite*. It is shown to be a mixture; Crook, Min. Mag., **15**, 281, 1910.

SELIGMANITE, App. II, p. 92. — Large crystals from Lengenbach, Binnental, with new forms; Solly, Min. Mag., **16**, 282, 1912.

Anal. by Prior, Min. Mag., **15**, 385, 1910, proves the assumption previously made that it is isomorphous with *bournonite* and has the formula, $Cu_2S.2PbS.As_2S_3$. Anal. — Pb, 46·34; Cu, 13·09; Ag, 0·11; Zn, 0·27; Fe, 0·06; As, 16·88; Sb, 0·64; S, 21·73; Total, 99·12. A second anal. on somewhat impure material also given.

SELENIUM, Min., p. 10. — Native selenium thought to occur with *metahewettite*, etc., from Paradox Valley, Col.; Hillebrand, Merwin, and Wright, Proc. Am. Phil. Soc., **53**, 31, 1914; Zs. Kr., **54**, 209, 1914.

SELLAITE, Min., p. 164. — The material described under the name *belonesite* has been proven to be identical in all respects with the earlier described *sellaite*; Zambonini, Rend. Acc. Linc., **18**, (1), 305, 1909.

SEMSEYITE, Min., p. 123; App. I, p. 61; II, p. 93. — See under *Plagionite*.

SENARMONTITE, Min., p. 198; App. I, p. 62; II, p. 93. — From Sardinia; Pelloux, Ann. Mus. Genova, **6**, 19, 1913.

SEPIOLITE, Min., p. 680; App. I, p. 62; II, p. 93. — Anal. from Bosnian localities; Katzer, [Berg- u. Hüttenmannisches Jb. Montanistischen Hochschulen, 65, 1909], Zs. Kr., **50**, 630, 1912.

SERPENTINE, Min., pp. 669, 1047; App. I, p. 62; II, p. 93. — Anal. from Tauerntal, Zirknitztal and Palik in Carinthia; Granigg, Jb. G. Reichs., 367, 1906; from various localities in Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 99, 1914; from Krebet-Salatim, Northern Ural Mts.; Duparc and Wunder, C. R., **152**, 883, 1911; from Dundas, Tasmania; Hezner, Centralbl. Min., 569, 1912.

From chromite ore deposits in Northern Caucasia; Besborodko, N. Jb. Min., Beil.-Bd., **34**, 783, 1912.

Description of a new alteration product of a chromite-bearing serpentine from Macedonia; Hezner, Centralbl. Min., 386, 1914.

A white variety of *chrysotile* from Mt. Troodos, Cyprus, called *lefkasbestos*; Zdarsky, Zs. prakt. Geol.; **18**, 345, 1910.

Shanyavskite. *Schaniawskit*. *T. A. Nikolaevskij*, Bull. Ac. St. Pet., **6**, 715, 1912; Min. Mag., **16**, 371, 1913; Fortschr. Min., **4**, 169, 1914.

Amorphous. Vitreous luster. Transparent. Comp. — Hydrated alumina, $Al_2O_3.4H_2O$.

Anal. — SiO_2, 1·33; Al_2O_3, 53·53; CaO, 2·28; MgO, 0·35; H_2O, 40·95; Total, 100·44. Occurs in crevices on dolomite near Moscow. Named in honor of A. L. Shanyavskij of the University of Moscow.

Shattuckite. *W. T. Schaller*, J. Wash. Ac. Sc., **5**, 7, 1915, and priv. contr.

Compact, massive, granular, spherulitic, fibrous. G. = 3·79. Color light to dark blue. Fibers elongated parallel to c. Refractive indices: $\alpha = 1.730$, $\gamma = 1.796$. Strongly pleochroic; parallel to elongation of fibers, blue to deep blue; perpendicular to fibers, very pale blue.

Comp. — $2CuSiO_3.1H_2O$; CuO, 53·44; SiO_2, 40·51; H_2O, 6·05.

Anal. — All with small amounts of admixed *tenorite*; 1, separated with heavy solution; G. = > 3·5; 2, selected deep blue minute spherulites; 3, pale blue massive material.

	1	2	3
SiO_2	39·68	37·91	39·92
CuO	54·80	55·51	53·20
FeO	0·16	0·43	0·83
CaO	0·05	.....	......
ZnO	*tr.*	.....	......
H_2O	5·94	5·83	6·41
Total	100·63	99·68	100·36

Obs. — Found at the Shattuck Arizona Copper Company's mine at Bisbee, Ariz., forming pseudomorphs after *malachite*.

Sheridanite. See under *Chlorite*.

Sicklerite. *W. T. Schaller*, J. Wash. Ac. Sc., **2**, 143, 1912; (also priv. contr.; complete description to be published in U. S. G. S., Prof. Paper, **92**).

Cleavable masses. G. = 3·45. Color dark brown. Streak light yellow-brown. Refractive indices: $\alpha = 1.715$, $\beta = 1.735$, $\gamma = 1.745$. Optically −. Strong dispersion, $\rho > \upsilon$. Pleochroic, yellow to orange-red. Absorption, $\mathfrak{a} > \mathfrak{b} > \mathfrak{c}$. $Bx_{ac} \perp$ to cleavage.

Comp. — A hydrous iron-manganese phosphate with lithia; $Fe_2O_3.6MnO.4P_2O_5.3(Li,H)_2O$.

Anal. — MnO, 33·60; CaO, 0·20; Fe_2O_3, 11·26; Mn_2O_3, 2·10; P_2O_5, 43·10; Li_2O, 3·80; H_2O, 1·71; Insol., 4·18; Total, 99·95.

Pyr. — Fusible, yielding a lithium flame.

Obs. — Found in the Vanderburg-Naylor mine near Pala, San Diego Co., Cal.

Name. — In honor of the Sickler family, formerly of Pala.

SIDERITE, Min., pp. 276, 1047; App. I, p. 62; II, p. 94. — Crystals from the Virtuous Lady mine near Tavistock; Russell, Min. Mag., **17**, 1, 1913. Study of changes in crystal angles with variation of temperature and comparison with similar changes in other members of the *calcite group*; Rinne, Centralbl. Min., 705, 1914.

Anal. of various types from peninsulas of Kertch and Taman, Crimea; Popov, Trav. Mus. Geol., Ac. Sc. St. Pet., **4**, 99, 1910; Zs. Kr., **52**, 606, 1913.

SILLIMANITE, Min., p. 498; App. I, p. 62; II, p. 94. — Artif. formation; Sustschinsky, [Trav. Soc. Nat. St. Pet. **37**, No. 1, 158, 1906], Zs. Kr., **46**, 295, 1909; Shepherd, Rankin, and Wright; Am. J. Sc., **28**, 293, 1909; Zs. Anorg. Chem., **68**, 370, 1910; Eitel, Zs. Anorg. Chem., **88**, 173, 1914.

SILVER, Min., p. 19; App. I, p. 62; II, p. 95. — Crystals from Kongsberg, Norway; van der Ween, Zs. Kr., **52**, 511, 1913. Origin of the hair-like crystals; Mügge, N. Jb. Min., **2**, 6, 1913.

Sitaparite. *L. L. Fermor*, Rec. Geol. Sur. India, **37**, 199, 1909; Mem. Geol. Sur. India, **37**, 1909.

Not crystallized. Good cleavage, (octahedral?). Brittle. H. = 7. G. = 4·93–5·09. Luster metallic. Color deep bronze. Streak black. Weakly magnetic.

Comp. — $9Mn_2O_3.4Fe_2O_3.MnO_2.3CaO$.

Anal. — By Blyth. G. = 4·93

MnO_2	MnO	Fe_2O_3	Al_2O_3	BaO	CaO	MgO	SiO_2	H_2O	Total
36·79	26·89	27·60	1·02	0·10	6·14	1·02	1·17	0·09	100·82

Obs. — Found at Sitapár, District Chhindwára, India.

Skemmatite. *W. E. Ford* and *W. M. Bradley*, Am. J. Sc., **36**, 169, 1913; Zs. Kr., **53** 225, 1913.

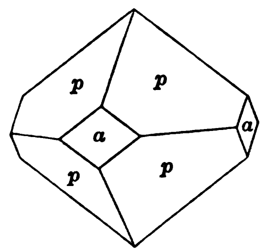
A black hydrous oxide of manganese and ferric iron occurring as alteration product of *pyroxmangite*. Metallic luster. Dark chocolate-brown streak. H. = 5·5–6. Fusible at 4 to black magnetic globule. Heated in closed tube gives abundant water and oxygen gas. Gives strong manganese reactions with the fluxes. Soluble in hydrochloric acid, giving off chlorine gas. Anal. as follows: MnO, 31·84; O, 6·53; Fe_2O_3, 43·95; Al_2O_3, 1·96; H_2O, 15·56; Total, 99·84. This leads to the formula, $3MnO_2.2Fe_2O_3.6H_2O$. Occurs near Iva, Anderson Co., S. C. Name derived from σκέμμα, *a question.*

Skolopsite, Min., p. 432. — By microchemical tests shown to be a mixture; Thugutt, [Ber. Ges. Wiss. Warsaw, 79, 1911], Zs. Kr., **54**, 197, 1914.

Smithsonite, Min., p. 279; App. I, p. 63; II, p. 95. — Anal. from "Sos Enattas" mine, Lula, Sassari, Sardinia; Serra, Rend. Acc. Linc., **18**, (2), 348, 1909; from Calabona, Alghero, Italy; Serra, Rend. Acc. Linc., **20**, (1), 129, 1911.
Artif. formation; Piolti, Att. Acc. Torino, **46**, 783, 1911.

Sodalite, Min., p. 428; App. I, p. 63; II, p. 95. — Chemical constitution; Hillebrand, Ber. Ak. Wien, **119**, 775, 1910; Weyberg, Trav. Mus. Geol., Ac. Sc. St. Pet., **5**, 57, 1911; Zs. Kr., **53**, 610, 1914; with anal. from Mte. Somma, Vesuvius; Starrabba, Riv. Min., **42**, 20, 1913.
Fluorescence in ultra-violet light; Liebisch, Ber. Ak. Wiss., 229, 1912.
A variety containing over 2% of molybdenum trioxide from Mte. Somma has been called *molybdosodalite*; Zambonini, Att. Acc. Napoli, Mem., **14**, No. 6, 214, 1910.

Soumansite. *A. Lacroix*, Min. de la France, **4**, 541, 1910.
Tetragonal. $c = 0·7672$. Forms: (100), (111). Pyramidal in habit. Pyramid faces horizontally striated. H. = 4·5. G. = 2·87. Colorless. Transparent to translucent. Vitreous luster. Refractive index, 1·55–1·56. Optically +. At times shows optical anomalies, a basal section showing four diagonal biaxial sectors.
Comp. — A fluo-phosphate of aluminium and sodium with water.
Anal. — A partial anal. gave, P_2O_5, 31·5; Al_2O_3, 36·5.
Pyr. — Gives water and reactions for fluorine in C. T. Fusible with swelling and colors the flame intensely yellow. Attacked by acids with difficulty.
Obs. — Found in small amount on corroded *amblygonite* from Montebras in Soumans, Creuse.



Soumansite.

Spangolite, Min., p. 919; App. I, p. 63; II, p. 95. — Occ. at Arenas, Sardinia. Crystals small and angles vary considerably from those of original occurrence. Pelloux, Ann. Mus. Genova, **4**, 194, 1909.
Noted in minute crystals from Copper Queen mine, Bisbee, Ariz., and Grand Central mine, Tintic District, Utah; Ford, Am. J. Sc., **38**, 502, 1914.

Sperrylite, Min., p. 92; App. I, p. 63; II, p. 96. — Very small crystals of artificial sperrylite from the San Francisco Mint; Wells, Am. J. Sc., **35**, 171, 1913.

Sphalerite, Min., pp. 59, 1048; App. I, p. 63; II, p. 96. — Crystals from Joplin, Mo., with new form; Rogers, [Uni. Geol. Sur. Kansas, **8**, 445, 1904], Zs. Kr., **49**, 370, 1911; (with anal.) from Nagolnij Krjasch, Province of Don Cossacks, Russia; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; from Nürschan, Bohemia; Angel, Zs. Kr., **54**, 166, 1914.
Occ. of the rare metals in sphalerite; Urbain, C. R., **149**, 602, 1909.
Artif. formation and thermal relations; Allen, Crenshaw, and Merwin, Am. J. Sc., **34**, 341, 1912; Zs. Anorg. Chem., **79**, 125, 1912.

Sphenoclase, Min., p. 562. — Shown by study of thin section of original material to be a rock composed chiefly of *pyroxene* and *grossularite*; Goldschmidt, Centralbl. Min., 35, 1911.

Speziaite. *L. Colomba*, Att. Acc. Torino, **49**, 625, 1914. See under *Amphibole.*

Spinel, Min., pp. 220, 1048; App. I, p. 63; II, p. 96. — Occ. with anal. from S. Piero in Campo, Elba; Viola and Ferrari, Mem. Acc. Linc., **8**, 429, 1911.
Artif. formation; Shepherd, Rankin, and Wright; Am. J. Sc., **28**, 293, 1909; Zs. Anorg. Chem., **68**, 370, 1910.

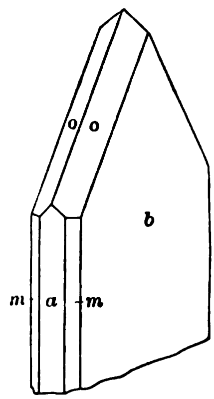
Spodiosite, Min., p. 777; App. I, p. 64. — Artif. formation; Cameron and McCaughey, [J. Phys. Chem., **15**, 463, 1911], Zs. Kr., **54**, 79, 1914.

Spodumene, Min., p. 366; App. II, p. 96. — Analytical and optical study of rose-red, white and green varieties from Maharitra, Madagascar; Duparc, Wunder, Sabot, Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 283, 1910. Green spodumene from pegmatites of Vakinankaratra, Madagascar; Lacroix, Bull. Soc. Min., **35**, 76, 1912.
Relations to *enstatite, diopside, hedenbergite* and *ægirite* discussed with list of known forms; Zambonini, Zs. Kr., **46**, 1, 1909.

Mean specific heat; Schulz, Centralbl. Min., 632, 1911. Fusion point and optical and physical changes on heating; Endell and Rieke, Zs. Anorg. Chem., **74**, 33, 1912; Brun, *ibid.*, **75**, 68, 1912. Artif. formation and thermal relations; Balló and Dittler, *ibid.*, **76**, 39, 1912.

Sporogelite. *M. Kišpatić*, N. Jb. Min., Beil.-Bd., **34**, 513; *Tućan*, *ibid.*, 401; *C. Doelter* and *E. Dittler*, Centralbl. Min., 193, 1913. Name given to the colloidal form of $Al_2O_3.H_2O$ which occurs as a constituent of *bauxite*. Named because it is the gel corresponding to the crystallized material *diaspore*. *Cliachite*, *Kliachite*, and *Kljakite* are names which have also been given to the same substance. See also under *Bauxite*.

STAUROLITE, Min., p. 558; App. I, p. 64; II, p. 97. — **Large crystals from the Ducktown District, Tenn.**; Van Horn, Am. J. Sc., **38**, 46, 1914.



Stellerite.

Stellerite. *J. Morozewicz*, Bull. Ac. Sc. Cracovie, 344, July, 1909.

Orthorhombic. Axes $a : b : c = 0 \cdot 98 : 1 : 0 \cdot 76$ (approx). Forms: *a*(100), *b*(010), *m*(110), *l*(210), *o*(111). Crystals tabular with dull faces. Cleavage, *b* perfect, *a* less so, *c* poor. H. = 3·5–4. G. = 2·124.

Optical orientation, $a = \mathfrak{c}$, $b = \mathfrak{b}$, $c = \mathfrak{a}$. Indices, $\alpha = 1 \cdot 484$; $\gamma = 1 \cdot 495$. 2V = 43° 30′. Dispersion $\rho > v$.

Comp. — $CaAl_2Si_7O_{18}.7H_2O$.

Anal. —

	SiO_2	Al_2O_3	Fe_2O_3	CaO	Na_2O	H_2O	Total
‡	59·23	14·41	0·22	8·23	*tr.*	18·15	100·24

Obs. — Found in cavity in diabase tuff on the N. W. cape of Copper Island, Commander Islands, associated with *calcite*, *quartz*, *analcite*, and *native copper*.

Name. — Named in honor of Wilhelm Steller, the explorer.

STELZNERITE, App. II, p. 97. — Identity with *antlerite*; Schaller, Am. J. Sc., **30**, 311, 1910; Zs. Kr., **49**, 9, 1910; U. S. G. S., Bull., **509**, 114, 1912.

STEPHANITE, Min., pp. 143, 1025, 1048; App. I, p. 64; II, p. 97. — Crystals from La Luz, Guanajuato and from Sonora, Mexico, with new forms; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Příbram, Bohemia; *idem*, Ann. Soc. Geol. Belgique, Mem., **39**, 421, 1912.

Stewartite. *W. T. Schaller*, J. Wash. Ac. Sc., **2**, 143, 1912; (also priv. contr.; complete description to be published in U. S. G. S., Prof. Paper, **92**.)

Triclinic? In fibers or minute crystals. G. = 2·94. Refractive indices: $\alpha = 1 \cdot 63$, $\beta = 1 \cdot 65$, $\gamma = 1 \cdot 69$. Pleochroic; $\mathfrak{a}$ = colorless, $\mathfrak{b}$ = pale yellow, $\mathfrak{c}$ = yellow. Inclined extinction on all crystal edges. Axial angle large. Optically —. Strong dispersion.

Comp. — A hydrous manganese phosphate. Formula suggested as $3MnO.P_2O_5.4H_2O$.

Obs. — Found as an alteration product of *lithiophilite* at Stewart mine, Pala, San Diego Co., Cal. Probably same as unknown mineral "A" described by Lacroix, Min. de la France, **4**, 506, 1910.

Stibiocolumbite. *W. T. Schaller*, (priv. contr.; to be published in U. S. G. S., **Prof.** Paper, **92**).

Name proposed for the *stibiotantalite* from Mesa Grande described by Penfield and Ford, (App. II, p. 98) because the amount of niobium present is greatly in excess of the tantalum.

STIBIOTANTALITE, App. I, p. 64; II, p. 98. — Ungemach, Bull. Soc. Min., **32**, 92, 1909, objects to the theory advanced by Penfield and Ford, (see App. II) that there is an isomorphous relation between *columbite* and *stibiotantalite*. He considers the composition to be that of a complex oxide. He gives a new orientation in which the form (100) of Penfield and Ford becomes (001), and (001) becomes (010) and (4·12·9) becomes (111). The hemimorphic axis is made the vertical axis and the perfect cleavage becomes parallel to the base. The new axial ratio is $a : b : c = 0 \cdot 8879 : 1 : 2 \cdot 1299$. New crystals are described with several new forms.

Anal. of material from Mesa Grande, Cal.; Foote and Langley, Am. J. Sc., **30**, 393, 1910. Correction of anal. given in App. II, p. 98; Ford, Am. J. Sc., **32**, 287, 1911.

STIBNITE, Min., pp. 36, 1048; App. I, p. 64; II, p. 99. — Crystals from Milešov and Příbram, Bohemia, studied with new forms from the latter locality; Jaroš, ["Rospravy" Böhm. Ak., **16**, No. 14, 1907], Zs. Kr., **48**, 541, 1910. Pseudomorphs from Charcas, San Luis Potosi, Mexico; Ford, Am. J. Sc., **34**, 184, 1912.

Stichtite. *W. F. Petterd*, Catalogue of the Minerals of Tasmania, 167, 1910; *L. Hezner*, Centralbl. Min., 569, 1912; *A. Himmelbauer*, Min. Mitt., **32**, 135, 1913. These papers collected in Geol. Sur. Record, No. 2, Department of Mines, Tasmania.

In micaceous scales. G. = 2·16. Color lilac. Cleavage good. Luster somewhat oily. Optically uniaxial or feebly biaxial. Optically —. Refractive index = 1·542. Birefringence = 0·026. Weakly pleochroic.

Comp. — $2MgCO_3.5Mg(OH)_2.2Cr(OH)_3$; like *brugnatellite* with chromium replacing ferric iron.

Anal. — Material included some serpentine and chromite. SiO_2, 3·87; CO_2, 10·45; Cr_2O_3, 20·44; FeO, 1·10; MgO, 37·12; H_2O, 27·26; Total, 100·24.

Obs. — Found forming the chief constituent of a rock mass, associated with serpentine and chromite, from Dundas, Tasmania. Evidently a product of the alteration of the serpentine.

Name. — After Mr. Robert Sticht, general manager of the Mt. Lyell Co.'s mining properties. Called *chrom-brugnatellite* by Hezner.

Stilbite, Min., p. 583; App. I, p. 65; II, p. 99. — Anal. from Obara, Iwaki, Japan; Jimbō, Beitr. Min. Japan, **3**, 115, 1907; from Teigarhorn, Iceland, with discussion of chem. constitution; Baschieri, Mem. Soc. Tosc., **24**, 133, 1908; from near Reading, Pa.; Smith, [Proc. Ac. Nat. Sc., **62**, 538, 1910], Zs. Kr., **52**, 79, 1912; from Rockhill and Germantown, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from Csódiberg, near Dunabogdány, Hungary; Vendl, [Földt. Közl., **41**, 70, 195, 1911], Zs. Kr., **54**, 181, 1914.

Artif. formation; Baur, Zs. Anorg. Chem., **72**, 119, 1911. Study of thermal dehydration; Merwin, J. Wash. Ac. Sc., **4**, 494, 1914.

Stilpnomelane, Min., p. 658; App. I, p. 65; II, p. 99. — Anal. from Maddalena archipelago, Sardinia; Lovisato, Mem. Acc. Linc., **9**, 404, 1913.

Stolpenite, Min., p. 690; App. II, p. 100. — See under *Montmorillonite*.

Strengite, Min., p. 822. — Refractive indices on material from Eleonore mine on the Dünsberg, near Giessen, Germany, were determined as, α = 1·71, γ = 1·735; Schaller, J. Wash. Ac. Sc., **3**, 249, 1913.

Occ. as blue powder at Stewart mine, Pala, Cal.; Schaller, (priv. contr.; to be described in U. S. G. S., Prof. Paper, **92**).

Crystallographic and optical relation to *variscite* see under *Variscite*.

Strüverite, App. II, p. 100. — Large twin crystals, with anal. from Ampangabé, Madagascar; Lacroix, Bull. Soc. Min., **35**, 180, 228, 1912.

Occ. at Etta mine, near Keystone, Black Hills, S. D., with following anal.: H_2O, 0·4; SiO_2, 2·0; TiO_2, 47·8; SnO_2, 1·3; FeO, 7·3; Ta_2O_5, 34·8; Nb_2O_5, 6·2; Total, 99·8. Formula approximates to $FeO.(Ta,Nb)_2O_5.6TiO_2$. Crystal forms agree with those of *rutile group*. Hess and Wells, Am. J. Sc., **31**, 432, 1911. Anal. and description of material found on Sebantun River, near Salak North village, Kuala Kangsar district, Perak; Crook and Johnstone, Min. Mag., **16**, 224, 1912; Scrivenor, *ibid.*, 302.

Discussion of composition and relation to members of *rutile group*. The Italian mineral should be called *ilmenorutile* and the material from South Dakota should be known as *tantalum ilmenorutile*. Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

Sulphohalite, Min., p. 917; App. I, p. 65; II, p. 101. — Occurrence from Searles Lake, Cal., in octahedral crystals. Refractive index = 1·455 in Na-light. A new anal. confirms the original one. Gale and Hicks, Am. J. Sc., **38**, 273, 1914.

Sulphur, Min., pp. 8, 1048; App. I, p. 66; II, p. 101. — Crystals from Kostajnik, Servia; Šimek, ["Rozpravy" Böhm. Ak., **18**, No. 28, 1909], Zs. Kr., **50**, 639, 1912; of the γ-modification observed upon the Island Vulcano; Panichi, [Flugblatt Reggio Calabria, 1911], Zs. Kr., **54**, 393, 1914; from Nebida, Sardinia; Tacconi, Rend. Ist. Lombardo, **44**, 986, 1911; from Sarrabus, Sardinia; Carrara, Italy; and Etna, Sicily; Ungemach, Ann. Soc. Geol. Belgique, Mem., **39**, 421, 1912; from Island of Nisi, Ægean Sea; Grill, Mem. Acc. Linc., **10**, 14, 1914.

Change in crystal angles with lowering of temperature; Goldschmidt, Zs. Kr., **51**, 1, 1912.

Refractive indices on crystal from Girgenti, Sicily; Baumhauer, Zs. Kr., **47**, 1, 1909. Cause of unusual color; van der Ween, Zs. Kr., **52**, 511, 1913.

Sulvanite, App. II, p. 101. — Anal.; Schultze, [Inaug. Diss., München, 35, 1907], Zs. Kr., **49**, 640, 1911.

Svanbergite, Min., p. 868; App. II, p. 101. — Relations to similar minerals; Schaller, Am. J. Sc., **32**, 363, 1911. See also under *Alunite*.

Sylvialite. See under *Scapolite.*

SYLVITE, Min., pp. 156, 1036, 1049; App. I, p. 66; II, p. 102. — Study of crystals from Kalusz, Galicia, with discussion of crystal structure, etc.; Kreutz, Zs. Kr., **51**, 209, 1912. Crystals of sylvite from Vesuvius which contained small percentages of NaCl are proven by means of heavy solution to hold the halite as a mechanical mixture; Miele, Rend. Acc. Napoli, **16**, 235, 1910.

Refractive indices for ultra-red light; Paschen, Ann. Phys., **26**, 120, 1908.

Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

Deformation under pressure with resultant optical anomalies; Ritsel Zs. Kr., **52**, 238, 1913; **53**, 97, 1913.

SYNCHISITE, App. II, p. 102. — See under *Parisite.*

SYNGENITE, Min., p. 945; App. I, p. 66; II, p. 102. — Crystallographic study gives new axial ratio; $a : b : c = 1 \cdot 352 : 1 : 0 \cdot 871$. $\beta = 76° 3'$. G. = 2·579. With increase of temperature axial angle becomes smaller, the mineral becoming uniaxial in yellow light at 158° C.; at higher temperatures the axial angle again increases, the axial plane being now parallel to (010). The indices of refraction for yellow light at 22° C. are, $\alpha = 1 \cdot 5010$, $\beta = 1 \cdot 5166$, $\gamma = 1 \cdot 5176$. Schreiber, Jb. Min., Beil.-Bd., **37**, 247, 1914.

SZAJBELYITE, Min., p. 878. — Occ. at Vaskö, Comitat Krassöszórény, Hungary; Löw, Földt. Közl., **41**, 811, 1911.

Szomolnokite. *J. A. Krenner*, [Ak. Ert., **2**, 96, 1891], [Földt. Közl., **37**, 204, 295, 1907], Min. Mag., **15**, 431, 1910; Fortschr. Min., **2**, 142, 1912; Scharizer, Zs. Kr., **54**, 127, 1914.

Monoclinic. G. = 3·083. In pyramids. Color yellow or brown.

Comp. — Hydrous ferrous sulphate, $FeSO_4.H_2O$. Isomorphous with *kieserite* and apparently identical with *ferropallidite* (App. II, p. 42).

Anal. — A microchemical anal. by J. Donau, quoted by Scharizer, *loc. cit.* FeO, 34·46; Fe_2O_3, 7·43; SO_3, 45·66; H_2O, 12·45; Total, 100·00.

The ratio between Fe and SO_3 = 1 : 1. The ferric iron is thought by Scharizer to be secondary in nature.

Obs. — Found with other iron sulphates at Szomolnok, Hungary.

TALC, Min., p. 678; App. I, p. 66; II, p. 103. — Anal. of exceptionally pure material from Hozsuret, Hungary; Michel, Min. Mitt., **31**, 331, 1912.

Cause of color; Redlich, Centralbl. Min., 65, 1914. Determination by grinding methods of the hardness of talc in relation to that of other minerals; Holmquist, G. För. Förh., **33**, 281, 1911.

Artif. formation; Doelter and Dittler, Ber. Ak. Wien, **121**, (1), 897, 1912.

TAPIOLITE, Min., p. 738; App. I, p. 67. — Discussion of composition and relation to other members of the *rutile group*; Schaller, J. Wash. Ac. Sc., **1**, 177, 1911; U. S. G. S., Bull., **509**, 9, 1912.

TARBUTTITE, App. II, p. 103. — Correction of errors in original description of crystals; Cesàro, Bull. Ac. Belg., No. 5, 567, 1909. Crystals from Broken Hill, Rhodesia, with new forms. A Table of Angles after Goldschmidt given; Rosický, Bull. Ac. Sc. Bohême, **18**, 1913.

Tartarkaite. *A. Meister*, [Geol. Untersuch. in goldführenden Gebieten Sibiriens, Yenisei-Distr., IX, **34**, 668, 1910; résumé in French]; Zs. Kr., **53**, 596, 1914.

In elongated tabular crystals. G. = 2·744. Color dark gray to black. Uniaxial, +. Birefringence about that of quartz.

Comp. — $R_2O.11RO.13R_2O_3.30SiO_2.19H_2O$.

Anal. — SiO_2, 42·17; TiO_2, 0·50; Al_2O_3, 31·65; Fe_2O_3, 1·09; FeO, 3·46; MgO, 8·61; CaO, 0·17; Na_2O, 0·90; K_2O, 0·86; H_2O, 8·14; Total, 97·55.

Obs. — Occ. in a limestone on the Tatarka River in the southern part of the Yenisei District.

Tantalum. *P. Walther*, Nature, **81**, 335, 1909; *W. von John, ibid.*, **83**, 398, 1910.

Cubic crystals. In fine grains. Color grayish yellow.

Comp. — Metallic tantalum with small amount of niobium. Found in gold washings of the Ural and Altai mountains.

Tawmawite. *A. W. G. Bleeck*, Rec. Geol. Sur. India, **36**, 254, 1908.

A chromium-bearing epidote from Tawmaw, Kachin Hills, Upper Burma. Has a deep green color and strong pleochroism, $\mathfrak{a}$, $\mathfrak{c}$ = emerald-green, $\mathfrak{b}$ = bright yellow.

Anal. — SiO_2, 37·92; Fe_2O_3, 9·93; Al_2O_3, 12·83; Cr_2O_3, 11·16; CaO, 25·35; H_2O, 2·38; Total, 99·57.

Temiskamite. *T. L. Walker*, Am. J. Sc., **37**, 170, 1914.
Occurs in radiating fibrous masses. Traces of cleavage. H. = 5·5. G. = 7·901. Color silver-white with red tone, tarnishing first to madder-gray and later to colors resembling bornite. Metallic luster. Brownish black streak.
Comp. — Ni_4As_3, with Co and S in small amounts.
Anal. — Ni, 49·07; Co, 1·73; Fe, *trace*; As, 46·34; S, 1·03; Bi, 0·55; Total, 98·72.
Obs. — Occ. at Moose Horn mine, Elk Lake, Ontario, Canada. Associated with *niccolite, bismuth, silver* and *calcite*.
Name. — Derived from the mining district of Temiskaming in northern Ontario.
See also under *Maucherite*.

TENNANTITE, Min., pp. 137, 1049; App. I, p. 67; II, p. 104. — Crystals of *binnite*; Zs. Kr., **52**, 580, 1913.
Anal. of *tennantite* with 7·76% Zn, from Lengenbach, Binnental; Prior, Min. Mag., **15**, 385, 1910.

TERLINGUAITE, App. II, p. 104. — Detailed description; Hillebrand and Schaller, Zs. Kr., **47**, 433, 1909; U. S. G. S., Bull., **405**, 1909; see App. II.

TETRADYMITE, Min., p. 39; App. I, p. 67; II, p. 105. — Anal. from various Russian localities; Nenadkewitsch, [Trav. Mus. Geol. Ac. Sc. St. Pet., **1**, 81, 1907], Zs. Kr., **47**, 288, 1909.

TETRAHEDRITE, Min., p. 137; App. I, p. 67; II, p. 105. — **Cryst.** — From Nagolnij Krjasch, Province of Don Cossacks, Russia, with anal.; Samojlov, [Mat. Min. Russ., **23**, 1, 1906], Zs. Kr., **46**, 287, 1909; with new forms from Saint-Sylvestre mine, Urbeis, Alsace; Ungemach, Bull. Soc. Min., **32**, 368, 1909; from this locality and from Markirch, Alsace, with new forms; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, 115, 293, 1909], Zs. Kr., **49**, 512, 1911; **53**, 569, 1914; from Canelas, Durango, Mexico; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Servoz, Haute-Savoie, and from Baigorry, Pyrénées Mts.; Ungemach, Bull. Soc. Min., **35**, 526, 1912.
Anal. — Of tetrahedrite containing selenium from Besimjanni, Altai Mts., Russia; Pilipenko, Bull. Ac. St. Pet., **3**, 1113, 1909; Zs. Kr., **51**, 105, 1912; from Markirch, Alsace; Dürr, [Inaug. Diss., Strassburg, 1907; Mitt. Geol. Landesanst. Elsass-Lothringen, **6**, 183], Zs. Kr., **47**, 303, 1909; by Steiger from Anchor mine, Park City district, Utah; Clark, U. S. G. S., Bull., **419**, 1910. Critical study of 162 previous analyses does not lead to a definite formula. 15 new analyses of material from different localities gave the following general formula: $(M'_x,M''_y)_3M'''S_{3+\frac{y}{2}}$, in which $M' = Cu,Ag$; $M'' = Zn,Fe,Pb,Hg,Mn,Ni$; $M''' = Sb,As,Bi$; $x + y = 3·00$. The mineral is thought to consist of an isomorphous mixture of the two compounds, Cu_3SbS_3 and $Zn_6Sb_2S_9$, or written in another way, $xCu_9Sb_3S_9 + Zn_6Sb_2S_9$, in which x varies from 2 to 10, but usually is 3 to 4; Kretschner, Zs. Kr., **48**, 484, 1910.

THAUMASITE, Min., p. 698; App. I, p. 68; II, p. 105. — Occ. in Beaver Co., Utah, with anal.; Butler and Schaller, Am. J. Sc., **31**, 131, 1911; Zs. Kr., **49**, 236, 1911; U. S. G. S. Bull., **509**, 110, 1912.
Study of thermal dehydration; Merwin, J. Wash. Ac. Sc., **4**, 494, 1914.

THENARDITE, Min., p. 895; App. I, p. 68; II, p. 105. — Crystals from Bilma Oasis, eastern Sahara; Lacroix, Bull. Min. Soc., **33**, 68, 1910; crystals formed from boiler water; Hlawatsch, Min. Mitt., **31**, 89, 1912.
Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.

THOMSENOLITE, Min., p. 180. — Birefringence on material from Greenland; Cesàro, Bull. Ac. Belg., No. 7, 619, 1908. Greenland mineral gave, G. = 2·982; refractive indices: $\alpha = 1·4072$, $\beta = 1·4136$, $\gamma = 1·4150$; $2V = 49° 56'$. Intergrowths with *pachnolite* described. Occ. at cryolite locality, Ural Mts.; Böggild, Zs. Kr., **51**, 591, 1912; in agate-like form with *fluorite*, from Ivigtut, Greenland; *idem, ibid.*, **51**, 614, 1912.

THOMSONITE, Min., pp. 607, 1050; App. I, p. 68; II, p. 105. — Crystals from various localities with determination of their birefringence; Cesàro, Bull. Ac. Belg., No. 7, 619, 1908.
Regular intergrowth with *natrolite* from Jakuben, Bohemia, with optical study of the *thomsonite*; Scheit, Min. Mitt., **31**, 495, 1912.
Anal. of mineral and alteration product from Zchra-Zkaro; Glinka, [Trav. Soc. Nat. St. Pet., **24**, No. 5, 1, 1906], Zs. Kr., **46**, 283, 1909; from Bergen Hill, N. J.; Canfield, School of Mines Quart., **32**, 215, 1911; from Neubauerberg at Böhmisch-Leipa, Bohemia; Görgey, [Mitt. Naturwiss. Ver. Uni. Wien, **9**, 17, 1911], Zs. Kr., **54**, 409, 1914.
Microchem. tests on var. *faröelite* and *lintonite*; Thugutt, C. R. Soc. Sc. Varsovie, **5**, 93, 100, 1912.

THORIANITE, App. II, p. 106. — Anal. from Ceylon; Jakób and Tolloczko, [Bull. Ac. Sc. Cracovie, 558, 1911], Zs. Kr., **54**, 196, 1914. Description of occurrence of crystals with anal. from Province of Betroka, Madagascar; Lacroix, Bull. Soc. Min., **37**, 176, 1914.

Thortveitite. *J. Schetelig*, Centralbl. Min., 721, 1911; 64, 1912.

Orthorhombic. $a : b : c = 0{\cdot}7456 : 1 : 1{\cdot}4912$. In radiating groups of large tapering crystals. Faces usually dull. Forms: $m(110)$, $s(221)$, $o(111)$, uncertain, $u(112)$. Twinning on $m(110)$. Cleavage parallel to $m(110)$. Fracture conchoidal to uneven. H. = 6–7. G. = 3·5712. Color of fresh mineral grayish green, of altered material white to reddish gray. Adamantine luster. From transparent to opaque. Usually translucent. Ax. pl. parallel to (010). $a = \mathfrak{c}$, $b = \mathfrak{b}$, $c = \mathfrak{a}$. Optically −. Strong birefringence.

Comp. — A silicate of the yttrium metals, $(Sc,Y)_2Si_2O_7$.

Anal. — ½ SiO_2, 42·86; R_2O_3, 57·67; Ign., 0·44; Total, 100·97.

Contains about 37% Sc_2O_3. No metals of the cerium group present.

Pyr. — Difficultly fusible. Partly decomposed by hydrochloric acid.

Obs. — Found with *euxenite* and *monazite* in pegmatite in Iveland parish, Sätersdalen, southern Norway.

TILASITE, App. I, p. 68. — Found at Kajlidongri, Jhabua State, India, with the following characters. In large and imperfect crystals which apparently are monoclinic, clinohedral. Axes, $a : b : c = 0{\cdot}7503 : 1 : 0{\cdot}8391$; $\beta = 59° 30''$. $110 \wedge 1\bar{1}0 = 65° 30'$. $110 \wedge 10\bar{1} = 61° 4'$, $110 \wedge 111 = 27° 5'$, $110 \wedge 1\bar{1}1 = 60° 11'$. Observed forms: $b(010)$, $a(\bar{1}00)$, $m(110)$, $m_1(\bar{1}10)$, $e(\bar{1}01)$, $g(021)$, $p(111)$, $p_1(\bar{1}1\bar{1})$, $x(11\bar{1})$, $r(\bar{3}3\bar{1})$, $r_1(331)$, $o(\bar{1}31)$, $y(11\bar{2})$, $z(15\bar{2})$, $\delta(1\bar{6}\bar{5})$. A section parallel to cleavage, $e(\bar{1}01)$, shows biaxial interference figure with large axial angle. Bx_{ac} perpendicular to this cleavage face. Optically −. Refractive indices approx.: $\alpha = 1{\cdot}640$, $\beta = 1{\cdot}660$, $\gamma = 1{\cdot}675$. 2V = 83° 24', calc. Anal. by Prior gave: ½, As_2O_5, 50·35; P_2O_5, 0·43; FeO, 0·55; CaO, 25·68; SrO, 0·06; MgO, 18·34; F, 7·18; H_2O, 0·73; Insol., 0·05; less O = F, 3·02; Total, 100·35. G. = 3·77. The anal. and optical properties agree with previous description of the mineral. Smith and Prior, Min. Mag., **16**, 84, 1911.

TITANITE, Min., p. 712; App. I, p. 68; II, p. 106. — Crystals from the Rauris, Salzburg, with new forms and with critical discussion of various forms; Seisser, Zs. Kr., **47**, 321, 1909; crystals from Hohenstein in Kremstal, Lower Austria; Reinhold, Min. Mitt., **28**, 376, 1909; with new forms from Val Giuf, Isvizzera; Ranfaldi, Mem. Acc. Linc., **9**, 438, 1913; description of a large crystal with anal. from province of Betroka, Madagascar; Lacroix, Bull. Soc. Min., **37**, 179, 1914. Study of crystals from Nordmarken, Sweden, with determination of specific gravity and optical constants. It is shown that the latter properties vary in different parts of the same crystal, indicating a variation in composition through isomorphous replacement. Hadding, G. För. Förh., **36**, 319, 1914. Discussion of crystal orientation; von Federov, [Vh. Min. Ges., **44**, 299, 1906], Zs. Kr., **46**, 213, 1909.

Chem. constitution; Bruckmoser, Ber. Ak. Wien, **116**, (1), 1653, 1907.

Occ. as an alteration from *ilmenite* in a quartz inclusion in basalt of the Finkenberg near Bonn; Schürmann, N. Jb. Min., **2**, 107, 1911. The manganese var., *greenovite*, from Jothvád in Nárukot, India; Fermor, Geol. Sur. India, **37**, 1909.

Artif. formation; Smolensky, [Ann. Inst. Polytech. St. Pet., **15**, 245, 1911], Zs. Kr., **53**, 615, 1914; Zs. Anorg. Chem., **73**, 293, 1912.

Tolypite. See under *Chlorite*.

TOPAZ, Min., p. 492; App. I, p. 69; II, p. 106. — **Cryst.** — From Carpet Snake Creek, Torrington, N. S. W. Axial ratio derived. Anderson, Rec. Austral. Mus., **7**, 274, 1909; from the Waldstein granite in the Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; **47**, 242, 1909; twin crystals from Brazil with tw. pl. (101); new forms; Goldschmidt, Zs. Kr., **47**, 639, 1909; Goldschmidt and Sauer, *ibid.*, 645, 1909; from La Paz, Guanajuato, San Luis Potosi, and Pianos, Zacatecas, with new form; Ungemach, Bull. Soc. Min., **33**, 375, 1910; from Epprechtstein, Fichtelgebirge, Bavaria; Henglein, Centralbl. Min., 36, 1910; Laubmann and Steinmetz, Zs. Kr., **54**, 168, 1914; from Elba with new form; Panichi, Rend. Acc. Linc., **20**, (2), 279, 1911; from Tanokami Yama, Omi, Japan; Jahn, Zs. Kr., **50**, 136, 1911; from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 467, 1911; from Lundy Island, England; McLintock and Hall, Min. Mag., **16**, 294, 1912; from various localities in Mexico; Wittich and Pastor y Giraud; Boll. Soc. Geol. Mex., **8**, 47, 1913; from New Brunswick, Canada; Ellsworth, Min. Mag., **17**, 39, 1913; study of crystals from Minas Novas in the state of Minas Geraes, Brazil, showed the presence of 63 forms that are considered as certain with 29 forms described as uncertain. Of the certain forms 25 are new. The axial ratio derived was $a : b : c = 0{\cdot}53854 : 1 : 0{\cdot}95323$. Fenner, N. Jb. Min., Beil.-Bd., **36**, 704, 1913; crystals from various localities in N. S. W. and Queensland; Anderson, Rec. Aus. Mus., **8**, 120, 1911; from Minas Geraes, Brazil, with new forms; Goldschmidt and Rosický, Beitr. Krys. Min., **1**, 71, 1914.

Natural etch figures; Fedorov, [Ann. Inst. Mines, St. Pet., **1**, 186, 1908], Zs. Kr., **51**, 298, 1912.

Anal. of fresh and altered material from cryolite deposit at Ivigtut, Greenland; Steenstrup, [Medd. om Grönland, **34**, 117, 1909], Zs. Kr., **50**, 283, 1911.

Determination by grinding methods of hardness in relation to that of other minerals and to different crystal faces upon topaz; Holmquist, G. För. Förh., **33**, 281, 1911.

TORBERNITE, Min., p. 856; App. I, p. 69; II, p. 107. — Occ. at Reichenbach near Lahr, Baden; Dürrfeld, Zs. Kr., **51**, 279, 1912.

TOURMALINE, Min., pp. 551, 1050; App. I, p. 69; II, p. 107. — **Cryst.** — From Ceylon with several new forms having complex indices and determination of refractive indices; Ondřej, ["Rozpravy" Böhm. Ak., **18**, No. 40, 1909], Zs. Kr., **50**, 647, 1912; from S. Piero in Campo, Elba; Viola and Ferrari, Mem. Acc. Linc., **8**, 429, 1911; from Lipowaïa, Ural Mts.; Duparc and Sabot, Bull. Soc. Min., **34**, 139, 1911; black crystals with new form from near Betroka, Madagascar; Lacroix, *ibid.*, **35**, 123, 1912; from Madagascar; Ungemach, *ibid.*, **35**, 526, 1912.

Anal. — Of black crystal from Asinara Island, Sardinia; Serra, Rend. Acc. Linc., **16**, (2), 702, 1907; from near Collingwood, New Zealand; Finlayson, Quart. J. Geol. Soc., **65**, 351, 1909. Analytical and optical study of numerous tourmalines from near Antsirabé, Madagascar; Duparc, Wunder, Sabot; Mem. Soc. phys. et hist. nat. de Genève, **36**, III, 283, 1910; anal. from Newlin, Chester Co., and from Avondale, Delaware Co., Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914; from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912; from serpentine from south of Ekaterinburg, southern Ural Mts.; Duparc and Sigg, Bull. Soc. Min., **37**, 14, 1914.

Chem. Comp. — New anal. from the following localities: Elba, Mesa Grande, Pala, and Lost Valley, Cal. Critical study of the composition of the mineral with confirmation of the general formula given by Penfield and Foote (App. I). Relations between specific gravity, crystal angles and refractive indices and chemical comp. discussed. Schaller, Zs. Kr., **51**, 321, 1912; **53**, 181, 1913; discussion of chem. comp.; Vernadsky, *ibid.*, **53**, 273, 1913; discussion of recent anal.; Wülfing and Becht, Ber. Ak. Wiss., Heidelberg, 1913. New anal. with general discussion of chem. comp. Also study of the crystallographic and optical variations with change in comp. Reiner, Inaug. Diss., Heidelberg, 1913. Study of magnesia-rich tourmalines to show variation in crystallographic, optical and general physical characters with variation in chem. comp.; Becht, Inaug. Diss., Heidelberg, 1913.

Occ. in the Waldstein granite in the Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909; **47**, 242, 1909. Occ. of *rubellite* in Lower California, with anal.; Wittich, Centralbl. Min., 449, 1914.

TRIDYMITE, Min., p. 192; App. II, p. 108. — Occ. in inclusions of the lavas of Mt. Etna; Stella-Starrabba, Centralbl. Min., 627, 1911.

Formation in quartz brick; Holmquist, G. För. Förh., **33**, 245, 1911. Formation and thermal relations; Smits and Endell, Zs. Anorg. Chem., **80**, 176, 1913; see also Schlaepfer and Niggli, *ibid.*, **87**, 54, 1914. Study of artificial tridymite shows that its physical properties are in close agreement with those of the natural mineral; Fenner, Am. J. Sc., **36**, 341, 1913.

Trihydrocalcite. *P. N. Tschirwinsky*, [Ann. Geol. Min. Russ., **8**, 238 and 245, 1906], Zs. Kr., **46**, 302, 1909. Name proposed for a hydrous calcite, $CaCO_3.3H_2O$ described by Iwanov, [Ann. Geol. Min. Russ., **8**, 1906], from near Nowo-Alexandria, Russia.

TRIPLITE, Min., p. 777; App. II, p. 108. — Occurs with *wolframite*, *scheelite*, *pyrite*, *chalcopyrite*, *cosalite* (?) and *quartz* in a vein in the Reagan mining district, White Pine Co., Nev. Anal. as follows: MnO, 57·63; FeO, 1·68; CaO, 2·86; MgO, 1·21; P_2O_5, 31·84; F, 7·77; 102·99; O = F, 3·27; Total, 99·72. Color salmon-pink with vitreous luster. Indices of refraction, α = 1·650, β = 1·660, γ = 1·672. Hess and Hunt, J. Wash. Ac. Sc., **3**, 286, 1913; Am. J. Sc., **36**, 51, 1913.

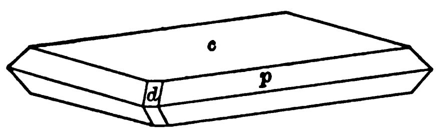
Occ. at Singar, District Gáya, Bengal, India; Fermor, Mem. Geol. Sur. India, **37**, 1909; from Königswart, near Marienbad, Bohemia; Lazarević, Centralbl. Min., 385, 1910.

TROILITE, Min., pp. 72, 1051; App. I, p. 70. — Artif. crystals containing zinc; Federov, [Ann. Inst. Mines St. Pet., **1**, 160, 1909], Zs. Kr., **51**, 296, 1912.

Shown to be the end member of the *pyrrhotite* series; Allen Crenshaw, Johnston, and Larsen, Am. J. Sc., **33**, 169, 1912.

TSCHEFFKINITE, Min., p. 718; App. I, p. 70. — Anal. of a black mineral from near Betroka, Madagascar, which may represent an unaltered *tscheffkinite*; Lacroix, C. R., **155**, 672, 1912.

Tsumebite. *K. Busz,* [Festschr. Med.-Naturwiss. Ges. zur 84 Versammlung, Munster, 1912], Zs. Kr., **51**, 526, 1912. Preslite, *Rosický,* Zs. Kr., **51**, 521, 1912.



Tsumebite (*Rosický*).

Orthorhombic? Described as monoclinic by Busz. Orthorhombic axes given as $a : b : c = 0{\cdot}977 : 1 : 0{\cdot}879$. Observed forms (Rosický): *c*(001), *d*(101), *p*(111), *e*(201), *n*(121). Crystals very small and faces curved. Habit tabular. Twins frequent. H. = 3·5. G. = 6·09, (6·13, Busz). Mean refractive index >1·78. Color emerald-green. Luster vitreous. Pleochroism from blue-green to yellowish green.

Comp. — A basic lead and copper phosphate.

Anal. — 1, Frejka (Rosický); 2, Rüsberg-Dubigk (Busz).

	PbO	CuO	P_2O_5	H_2O	Total
1.	65·09	11·97	10·26	undet.	
2.	63·77	11·79	12·01	12·33	99·90

Pyr. — In C. T. fuses easily and yields water. B. B. fuses to smooth and faceted globule. On charcoal gives lead reactions. Copper flame color. Easily soluble in hydrochloric acid and deposits lead chloride. Reacts for phosphoric acid.

Obs. — Found assoc. with *azurite* from Tsumeb, Otavi, German S. W. Africa.

Name. — *Tsumebite* from locality of occurrence; *Preslite* in honor of J. Sv. Presl, the mineralogist.

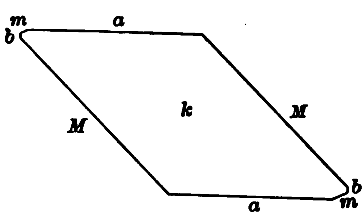
TUESITE, Min., p. 685. — Considered to be a variety of *halloysite*; Gregory, Proc. Edinb. Roy. Soc., **30**, 361, 1909.

Turanite. *K. Nenadkewitsch,* Bull. Ac. St. Pet., **3**, 185, 1909; Zs. Kr., **51**, 91, 1912.

Radiating fibrous, in spherical concretions and reniform crusts.

Comp. — $5CuO.V_2O_5.2H_2O$.

Occurs associated with *malachite* in limestone at Tyuya-Muyun, south of Andidjan in the foothills of the Alai Mts., Turkestan.



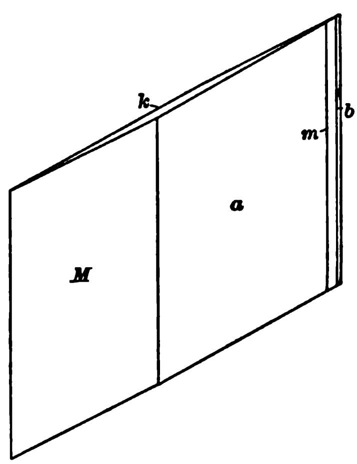
TURGITE, Min., p. 245; App. II, p. 108. — Anal. from Easton, Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 100, 1914; from Rosseto, Elba; Manasse, Mem. Soc. Tosc., **27**, 76, 1911.

TURQUOIS, Min., p. 844; App. I, p. 70; II, p. 108.— Crystallized turquois has been found near Lynch Station, Campbell Co., Va. Occurs in minute crystals in spherical groups forming a botryoidal surface associated with small quartz crystals. It is bright blue in color and vitreous in luster. Cleavage present, possibly in two directions. Brittle. H. about 5. G. = 2·84 (corrected for quartz present). Crystals clear and transparent. Pleochroism distinct, from colorless to pale blue. Inclined extinction on all sections. Crystals are triclinic and near those of *chalcosiderite* in angles. Axial ratio of latter mineral adopted for calculation. Forms present: *b*(010), *a*(100), *m*(110), *M*(1$\bar{1}$0), *k*(0$\bar{1}$1). Forms *a* and *M* are prominent and striated vertically.

Anal. — After deducting 12·57% insol. material (quartz).

P_2O_5	Al_2O_3	Fe_2O_3	CuO	H_2O	Total
34·13	36·50	0·21	9·00	20·12	99·96

From this anal. and other earlier ones (especially that by Penfield) the following formula is proposed: $CuO.3Al_2O_3.2P_2O_5.9H_2O$ or $CuOH.6[Al(OH)_2].H_5.(PO_4)_4$. This formula is analogous to that taken for *chalcosiderite* except that the latter has but $8H_2O$. From the chemical and crystallographic analogy between the two minerals they are thought to be isomorphous and that the true formula of chalcosiderite should show $9H_2O$. Schaller, J. Wash. Ac. Sc., **1**, 58, 1911; Zs. Kr., **50**, 120, 1911; Am. J. Sc., **33**, 35, 1912; U. S. G. S., Bull., **509**, 42, 1912.



Turquois.

TYSONITE, Min., p. 166; App. I, p. 70. — Prismatic cleavage observed on specimen from Pike's Peak, Col., and a lamellar structure parallel to a pyramid face; Koechlin, Min. Mitt., **31**, 525, 1912.

Tyuyamunite, *tuyamunite*, *tjuiamunite*. *K. A. Nenadkewitsch*, Bull. Ac. St. Pet., **6**, 945, 1912; Min. Mag., **16**, 374, 1913.
A hydrous urano-vanadate of calcium, $V_2O_5.2UO_3.CaO.4H_2O$. Found with *ferganite* and *turanite* at Tyuya-Muyun, Fergana, Russian Central Asia. Hillebrand, Am. J. Sc., **35**, 440, 1913, suggests that it is a *calcium carnotite*.

Uhligite. *O. Hauser*, Zs. Anorg. Chem., **63**, 340, 1909.
Isometric. Habit octahedral with subordinate cubic faces. Triangular striations on octahedral faces. Twinning with octahedron as tw. pl. Cleavage cubic, imperfect. Color black. Brown and transparent on thin edges.
Comp. — $Ca(Ti,Zr)O_5.Al(Ti,Al)O_5$. A member of the *zirkelite-keilhauite* group.
Anal. — TiO_2, 48·25; ZrO_2, 21·95; Al_2O_3, 10·50; CaO, 19·00; Nb_2O_5, and Fe_2O_3, *tr.*; Total, 99·70.
Obs. — Found in a nepheline rock on the shore of Magad Lake, East Africa.

ULLMANITE, Min., pp. 91, 1051. — Occ. at New Brancepeth Colliery, near Durham, England, with anal.; Spencer, Min. Mag., **15**, 302, 1910.

URANINITE, Min., p. 889; App. I, p. 70; II, p. 109. — Large crystal from German East Africa; Brauns, Centralbl. Min., 689, 1911.
Anal. of material probably from the New England District, N. S. W.; Laby, J. Roy. Soc. N. S. W., **43**, 28, 1909; of *bröggerite* from southern Borneo and Moss, Norway; Tschernik, Bull. Ac. St. Pet., **3**, 1203, 1909; Zs. Kr., **51**, 110, 1912.

Ussingite. *O. B. Böggild*, Zs. Kr., **54**, 120, 1914.
Triclinic. Crystals not observed. Three cleavages: $c(001)$ perfect, $m(110)$ fair, $M(1\bar{1}0)$ poor. Cleavage angles: $c : m = 70° 21'$, $c : M = 71° 30'$, $m : M = 90° 28'$. Twinning lamellæ with tw. pl. $b(010)$.
G. = 2·495. H. = 6–7. Color various shades of reddish violet. Luster vitreous, somewhat pearly on basal cleavage. Refractive indices: $\alpha = 1·5037$, $\beta = 1·5082$, $\gamma = 1·5454$; $2V = 39° 4'$. Optically +. Extinction angle on base with trace of (010) = 5°–6°; on plane at right angles to both (001) and (010) = 4°. Angle between c and normal to (001) as observed on section parallel to (010) = + 33°.
Comp. — $HNa_2Al(SiO_3)_3$; SiO_2, 59·6; Al_2O_3, 16·9; Na_2O, 20·5; H_2O, 3·0.
Anal. — By Christensen:

SiO_2	Al_2O_3	Na_2O	H_2O	Total
58·74	17·73	19·91	4·19	100·57

Pyr. — B. B. easily fusible. Soluble in hydrochloric acid with formation of silica jelly.
Obs. — Found in rolled masses from pegmatite, assoc. with *sodalite*, *feldspar*, etc., from Kangerdluarsuk, Greenland.
Name. — Named after the late Prof. N. V. Ussing of Copenhagen.

UTAHITE, Min., p. 966; App. II, p. 109. — Comp. see under *Carphosiderite*.

Uvanite. *F. L. Hess* and *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 576, 1914 and priv. contr.
Orthorhombic. Fine granular. Two pinacoidal cleavages. Color brownish yellow. Refractive indices for Na-light; $\alpha = 1·817, \pm ·005$, $\beta = 1·879, \pm ·008$, $\gamma = 2·057, \pm ·005$. Pleochroic; $\mathfrak{a}$ = light brown to yellow; $\mathfrak{b}$ = dark brown, $\mathfrak{c}$ = greenish yellow.
Comp. — Hydrous uranium vanadate, $2UO_3.3V_2O_5.15H_2O$.
Anal. — Insol., 1·24; UO_3, 39·60; CaO, 1·73; K_2O, 0·30; MgO, 0·04; V_2O_5, 37·70; P_2O_5, 0·06; As_2O_5, 0·05; H_2O, 18·28; Total, 99·00.
Pyr. — Insoluble in water, but dissolves readily in a solution of ammonium carbonate.
Obs. — Found disseminated in rocks in the vicinity of Temple Rock on the San Rafael Swell, Emery County, about 45 miles southwest of Greenriver, Utah.
Name. — From the first syllables of the two words *uranium* and *vanadium*.

VALENTINITE, Min., p. 199; App. II, p. 109. — Crystals from Sensa, Algeria, with general discussion of orientation of crystals and known forms. Ungemach, Bull. Soc. Min., **35**, 539, 1912.

VANADINITE, Min., p. 773; App. II, p. 109. — Crystals from Old Yuma mine, near Tucson, Arizona; Guild, Zs. Kr., **49**, 321, 1911; from Cutter, and Kelly, New Mexico, with new forms; Paul, Zs. Kr., **50**, 600, 1912.

VANTHOFFITE, App. II, p. 109. — Anal. with determination of refractive indices of material from Hall in Tyrol; Görgey, Min. Mitt., **28**, 334, 1909.
Occ., assoc., genesis, etc., as illustrated in the Berlepsch mine at Stassfurt; Riedel, Zs. Kr., **50**, 139, 1911.
Artif. formation; Nacken, Nachr. Ges. Wiss. Göttingen, 602, 1907.

VARISCITE, Min., p. 824; App. I, p. 71. — Study of crystallized variscite from near Lucin, Utah, by Schaller, J. Wash. Ac. Sc., **1**, 150, 1911; **2**, 143, 1912; Zs. Kr., **50**, 321, 1911; Proc. U. S. Nat. Mus., **41**, 413, 1912; U. S. G. S., Bull., **509**, 48, 1912; Bull., **610**; gave the following facts. Orthorhombic. $a : b : c = 0{\cdot}8944 : 1 : 1{\cdot}0919$; $010 \wedge 110 = 48° 12'$; $010 \wedge 012 = 61° 22$. Forms present: *a*(100), *b*(010), *l*(130), *J*(250), *d*(120), *h*(340), *m*(110), *q*(210), *f*(520), *e*(012), *g*(032), *t*(102), *p*(111). Habit tabular parallel to *b* with prism and dome faces beveling the edges; *a* only present as very small truncation. Comparison of crystal orientation with that of *scorodite*, *strengite*, *phosphosiderite* and *vilateite* given. Twins with tw. pl. (102).

Optically −. Ax. pl. parallel to *b*(010), Bx_{ac} perpendicular to *c*(001). Axial angle large, 2E = about 113°. Pleochroism weak, $\mathfrak{a}$ = colorless, $\mathfrak{b}$, $\mathfrak{c}$ = pale green. Refractive indices: $\alpha = 1{\cdot}577$, $\beta = 1{\cdot}556$, $\gamma = 1{\cdot}547$. On heating to 160° the mineral loses water and its color changes to lavender-blue with marked change in optical character. Optical orientation is different, but character could not be determined. Strongly pleochroic, ‖ to *a* axis = lavender-blue, ‖ to *b* axis = reddish lavender-blue, ‖ to *c* axis = violet. Refractive indices approx.: $\alpha = 1{\cdot}447$, $\beta = 1{\cdot}448$, $\gamma = 1{\cdot}450$. Comparison of optical characters with those of related minerals given.

Anal. gave the usually accepted formula, $Al_2O_3.P_2O_5.4H_2O$.

H_2O	P_2O_5	V_2O_3	Cr_2O_3	Fe_2O_3	Al_2O_3	Total
22·68	44·73	0·32	0·18	0·06	32·40	100·37

Description and anal. of an aluminium phosphate from Vashegy, Comitat Gömör, Hungary, which closely resembles variscite, but differs in containing one more molecule of water; Zimányi, Ber. aus Ungarn, **25**, 241, 1907, [Math. Természettud. Értesitö, **26**, 72, 1908], Zs. Kr., **48**, 525, 1910.

Anal. from Sarrabus, Sardinia; Pelloux, Ann. Mus. Genova, **5**, 470, 1912.

Vashegyite. *K. Zimányi*, Mathemat. Természettud. Értesitö, **27**, 64, 1909], Zs. Kr., **47**, 53, 1909.

Massive, compact. H. = 2–3. G. = 1·964. Color white or yellow to rust-brown when colored by iron oxide. Dull luster, opaque. Sticks to the tongue.

Comp. — $4Al_2O_3.3P_2O_5 + 30H_2O$ = Alumina, 29·73; phosphorus pentoxide, 30·99; water, 39·28.

Anal. — By Loczka:

Al_2O_3	Fe_2O_3	K_2O	Na_2O	P_2O_5	CO_2	H_2O	Insol.	Total
28·33	1·19	0·16	0·05	31·32	0·12	38·97	0·24	100·38

Pyr. — Infusible in Bunsen burner flame. Easily soluble in acids.

Obs. — Found in an iron mine at Vashegy (whence name) in Comitat Gömör, Hungary, associated with *limonite*, *variscite*, and another new but undetermined aluminium phosphate.

Vaterite. See under *Calcite*.

Velardeñite. *W. T. Schaller*, J. Wash. Ac. Sc., **4**, 354, 1914; (priv. contr.; to be published in detail in U. S. G. S., Bull., **610**). Name suggested for a member of the *melilite group* having the composition $2CaO.Al_2O_3.SiO_2$. Artificial material shows following characters: Tetragonal. Cleavage, *c*(001), distinct. G. = 3·038. Optically −. Refractive indices: $\omega = 1{\cdot}667$; $\epsilon = 1{\cdot}658$. This molecule occurs in large amount in the material described by Wright as *gehlenite* from the Velardeña mining district, Mexico (App. II, p. 44). For relations of this compound to *melilite group* see under *Melilite*.

Vernadskite. *F. Zambonini*, Mem. Acc. Sc. Napoli, **14**, 337, 1910.

In aggregates of minute doubly refracting crystals. H. = 3·5. G. = greater than 3·3.

Comp. — $3CuSO_4.Cu(OH)_2.4H_2O$.

Anal. — SO_3, 37·04; CuO, 49·07; H_2O, 13·89; Total, 100·00.

Obs. — Occ. as alteration of *dolerophanite* at Vesuvius. Named after Prof. V. I. Vernadsky.

VESUVIANITE, Min., p. 477; App. I, p. 71; II, p. 109. — Crystals from Vesuvius with new forms; Rosati, Mem. Acc. Linc., **8**, 558, 1911; from Tiriolo, Catanzaro, Italy; Panichi, Rend. Acc. Linc., **20**, (2), 421, 518, 1911; with optical study from contact zones near Kristiania, Norway; Videnskapsselskapets Skrifter, No. 1, 425, 1911; from Kordon Karmankúl, southern Ural Mts.; Kaschinsky, [Ann. Inst. Mines., St. Pet., **2**, 77, 1910], Zs. Kr., **52**, 624, 1913; from S. Vincent e Chatillon, Valle d'Aosta, Italy; Pelloux, Ann. Mus. Genova, **6**, 25, 1913.

Anal. of material from Silver Peak Quadrangle, Nev.; Turner, Bull. Geol. Soc. Am., **20**, 223, 1909; of *cyprine* by Steiger from Franklin Furnace, N. J.; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909; from near Alunge, Sweden; Quensel, Bull. Geol. Inst. Upsala, **12**, 173, 1914.

Vilateite. *A. Lacroix*, Min. de la France, **4**, 477, 1910.

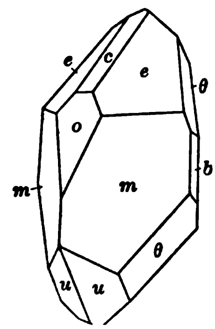
The violet crystals from La Vilate, near Chanteloube, Haute-Vienne, described by Des Cloizeaux as Type I of *hureaulite* are shown to be a distinct species.

Monoclinic. $a : b : c = 1 \cdot 69581 : 1 : 0 \cdot 88864$. $\beta = 89° 27'$. Forms: $c(001)$, $b(010)$, $m(110)$, $o(301)$, $e(011)$, $u(\bar{3}11)$, $\theta(\bar{3}41)$. H. = 3–4. G. = 2·745. Color violet. Powder white. Transparent to translucent. Optically –. Refractive index = 1·74. Birefringence strong. Dispersion strong, $\rho > v$.

Comp. — Hydrous iron phosphate with a little manganese.

Obs. — Found in a pegmatite on *heterosite* and *psilomelane* at La Vilate near Chanteloube, Haute Vienne.

Crystallographic and optical relation to variscite, see under *Variscite.*



Vilatéite.

Viridine. See under *Andalusite.*

VIVIANITE, Min., p. 814; App. I, p. 71; II, p. 110. — Crystals from Valdic, Bohemia, with new form. Refractive indices, Na-light: α = 1·5809, β = 1·6038; γ = 1·6361. $2V_{ob}$ = 106° 52½′ (meas.). Optical determinations on specimen from Cornwall also made. Rosický, Bull. Ac. Sc. Bohême, **13**, 1908; crystals from Leadville, Col.; Ungemach, Ann. Soc. Geol. Belgique, Mem., **39**, 421, 1912; with optical study from Stanley-Pool, Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, 83, 1912; optical orientation; *idem, ibid.*, **40**, M. 3, 1913.

Anal. of phosphate from Egueï, Africa, which apparently is an altered vivianite; Garde, C. R., **149**, 1616, 1909. From diluvial clays at Noranco near Lugano, Tessin, Switzerland; Schmidt, [Eclogae geol. Helvet., **9**, No. 1, 75], Zs. Kr., **46**, 307, 1909.

Anal. of material from Janysch-Takil, peninsulas of Kertch and Taman, Crimea, containing high percentages of MnO, MgO, and CaO, called *paravivianite*. Anal. of various alteration products of vivianite given from same general locality, with following formulas for the series: 1. *Vivianite* (*Paravivianite*), $3RO.P_2O_5.8H_2O$. 2. *α-Kertschenite*, $5RO.2Fe_2O_3.3P_2O_5.23H_2O$. 3. *β-Kertschenite*, $RO.Fe_2O_3.P_2O_5.7H_2O$. 4. *Oxykertschenite*, $RO.4Fe_2O_3.3P_2O_5.21H_2O$. Popov, Trav. Mus. Geol. Ac. Sc. St. Pet., **4**, 99, 1910; Zs. Kr., **52**, **606**, **1913**.

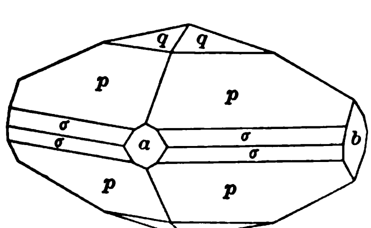
Vœlckerite. See under *Apatite.*

VOLTAITE, Min., p. 972. — Study of voltaite from Schmölnitz, Hungary, gave the following: G. = 2·695. Anal. — SO_3, 46·78; Fe_2O_3, 13·47; Al_2O_3, 1·58; FeO, 14·07; ZnO, 1·69; CuO, 0·55; MgO, 0·48; NiO, 0·08; K_2O, 4·73; Na_2O, 0·50; H_2O, 15·70; Total, 99·73. Formula, $R''_3R'''_2(SO_4)_6.9H_2O$. Discussion of the character of the water content. Artif. crystals; Scharizer, Zs. Kr., **54**, 127, 1914.

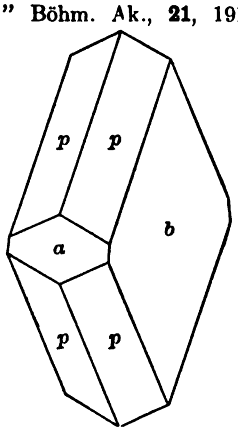
Vorobyevite. See under *Beryl.*

Vrbaite. *B. Ježek*, ["Rozpravy" Böhm. Ak., **21**, 1912], Zs. Kr., **51**, 365, 1912. *F. Křehlík, ibid.*, 379.

Orthorhombic. Axes, $a : b : c = 0 \cdot 5659 : 1 : 0 \cdot 4836$. Observed forms: $c(001)$, $b(010)$, $a(100)$, $f(035)$, $e(021)$, $d(041)$, $q(112)$, $p(111)$, $o(331)$, $r(131)$. Crystals small, either tabular (parallel to $b(010)$) or pyramidal in habit. In groups. Cleavage: b good. Fracture uneven to conchoidal. H. = 3·5. G. = 5·3. Luster sub-metallic to metallic. Color gray-black in larger crystals to dark red in thin splinters. Opaque to transparent. Streak light red with yellow tone.



Vrbaite.



Vrbaite.

Comp.— $TlAs_2SbS_5$ = Thallium, 32·15; antimony, 18·94; arsenic, 23·64; sulphur, 25·27.

Anal. — By Křehlík. — Tl, 29·52; Sb, 18·34; As, 24·06; S, 25·20; Fe, 1·85; Total, 98·97.

Obs. — Found assoc. with *realgar* and *orpiment* at Allchar, Macedonia.

Name. — In honor of Dr. Karl Vrba.

Vredenburgite. *L. L. Fermor*, Rec. Geol. Sur. India, **37**, 199, 1909; Mem. Geol. Sur. India, **37**, 1909.

Isometric or tetragonal. Crystals not found. Cleavage parallel to octahedron or tetragonal pyramid. H. = 6·5. G. = 4·74–4·85. Luster metallic. Color bronze to dark steel-gray. Streak deep brown-black to chocolate-brown. Strongly magnetic.

Comp. — $3Mn_3O_4.2Fe_2O_3$.

Anal. — By Pattinson; 1 from Beldóngri, 2 from Gravidi.

	MnO_2	MnO	Fe_2O_3	Al_2O_3	BaO	CaO	MgO	K_2O
1. G. = 4·74	23·67	38·24	28·85	1·32	1·30	1·53	0·99	....
2. G. = 4·84	24·94	38·53	31·29	2·10	0·03	0·90	1·20	0·06

Na_2O	SiO_2	S	P_2O_5	As_2O_5	CoO	CuO	TiO_2	H_2O	CO_2	Total
.....	1·77	.....	1·07	0·01	....	....	....	1·50	0·09	100·34
0·14	0·20	0·03	0·03	....	0·05	0·03	0·14	0·50	.....	100·17

Pyr. — Completely soluble in acids.

Obs. — Found at Beldóngri, District Nágpur and at Gravidi, District Vizagapatam, India.

Name. — After E. W. Vredenburg of the Geological Survey of India.

WAD, Min., p. 257. — Anal. from Mte. Arco, Elba; Manasse, Mem. Soc. Tosc., **28**, 118, 1912.

WARRENITE, Min., p. 120; App. II, p. 111. — Shown probably to consist of a mixture of about two parts *jamesonite* to three parts *zinkenite*; Schaller, Zs. Kr., **48**, 562, 1910; U. S. G. S., Bull., **490**, 25, 1911.

WARWICKITE, Min., p. 881. — Anal. of material from Amity, N. Y., gave the following results: B_2O_3, 21·29; TiO_2, 24·86; SiO_2, 1·39; MgO, 35·71; FeO, 9·15; Fe_2O_3, 4·76; Al_2O_3, 2·91; Total, 100·07. After deducting for small amounts of *spinel* and *magnetite*, the analysis recalculated to 100% gave: B_2O_3, 23·87; TiO_2, 27·87; SiO_2, 1·56; MgO, 38·63; FeO, 8·07. Formula derived: $(Mg,Fe)_3TiB_2O_8$. Bradley, Am. J. Sc., **27**, 179, 1909.

WAVELLITE, Min., p. 842; App. I, p. 71; II, p. 111. — Crystals from York Co., Pa., and from Montebras, Creuse, France; Ungemach, Bull. Soc. Min., **35**, 536, 1912.

Weibullite. *G. Flink*, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

The mineral from Falun, Sweden, originally described by Weibull as a *galenobismutite* (see anal. 6 and 7, Sys., p. 114) containing selenium, is thought to be a distinct species.

H. = 3. G. = 6·97. Color, steel-gray. One distinct cleavage and another less perfect.

Comp. — $2PbS.Bi_4S_3Se_3$.

WELLSITE, App. I, p. 72. — Occ. at Kurzy, near Simferopol, Crimea; with description of paragenesis, crystals and anal.; Fersmann, Trav. Mus. Geol. Ac. St. Pet., **3**, 129, 1909; Zs. Kr., **51**, 291, 1912.

WERNERITE, Min., p. 468; App. I, p. 72. — Anal. from various localities in Pa.; Eyerman, [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 97, 1914.

WHEWELLITE, Min., p. 993; App. I, p. 72; II, p. 111. — Crystals with new forms from Saint-Sylvestre mine, Urbeis, Alsace; Ungemach, Bull. Soc. Min., **32**, 20, 1909; Dürrfeld, [Mitt. Geol. Landesanst. Elsass-Lothringen, **7**, 115, 1909], Zs. Kr., **49**, 512, 1911; Centralbl. Min., 553, 1909; from near Schlan, Bohemia, with new forms; Slavík, Bull. Ac. Sc. Bohême, **13**, 1908; **14**, 1909; ["Rozpravy" Böhm. Ak., **17**, 1908; **18**, 1909], Zs. Kr., **46**, 614, 1909; **50**, 641, 1912; with new forms from Burgk and Zickau, Saxony, and Kopitz, Bohemia. Table of angles of all forms given. Refractive indices on material from Burgk; α = 1·4902, β = 1·5551, γ = 1·6494, 2V = 83° 42′ 18″, calc. Anal. of material from Kopitz; Ježek, Bull. Ac. Sc. Bohême, **13**, 1908; **14**, 1909, ["Rozpravy" Böhm. Ak., **17**, No. 24, 1908; **18**, No. 4, 1909], Zs. Kr., **50**, 644, 645, 1912; from Bruch near Dux, Bohemia; *idem*, Bull. Ac. Sc. Bohême, **16**, 1911; ["Rozpravy" Böhm. Ak., **20**, No. 2, 1911], Zs. Kr., **54**, 191, 1914.

Wiikite. *W. Ramsay.* Mentioned, but without name, by W. Ramsay and A. Zilliacus, [Öfv. Finsk. Vetenskaps-Soc. Förh., **39**, 58, 1897]. The name appears in a dealer's advertisement, Am. J. Sc., **8**, Dec., 1899. Spencer in Min. Mag., **13**, 379, 1903. W. Crookes, Proc. Roy. Soc. **80A**, 516, 1908; Börgström, G. För. Förh., **32**, 1525, 1911.

A euxenite-like mineral with wide variations in composition. Börgström considers that *loranskite* and *wiikite* belong to the same group and proposes the name *wiikite* as the general name. Usually in irregular masses. Crystals have been observed which are orthorhombic. The axial elements for *loranskite* are given by Börgström, $a : b : c$ = 0·5317 : 1 : 0·5046. Forms: a(100), b(010), m(110), x(201). Usually isotropic, but at times showing birefringent spots. H. = 6. G. varies from 3·8 to 4·8, becoming higher with the lighter-colored material and with a corresponding decrease in water content. Color black to brown and yellow. Luster metallic to resinous.

Comp. — A niobate, titanate, and silicate of iron and the rare earths.

Anal. — 1 by Crookes; 2 by Holmquist (quoted by Börgström).

SiO_2	TiO_2	ThO_2	Nb_2O_5	Ta_2O_5	Ce-metals	Y-metals	Sc-metals	
1–16·98	23·36	5·51	.....	15·95	2·55	7·64	1·17	
2– 8·75	29·58	....	23·67	.....	....	4·06	....	
FeO	UO_3	UO_2	Al_2O_3	Mn_3O_4	CaO	Pp. with H_2S	H_2O	Total
15·52	3·56	....	.....	.....	1·97	....	5·83	100·00
7·51*	7·37	1·86	0·74	1·28	4·86	1·06	11·06	101·80

* Fe_2O_3.

Pyr. — Infusible.
Obs. — Found in pegmatite veins at Impilaks, Finland.
Name. — After Prof. F. J. Wiik, of Helsingfors.

Wilkeite. *A. S. Eakle* and *A. F. Rogers*, Am. J. Sc., **37**, 262, 1914.
Hexagonal. Probably belonging to *Apatite Group*. $c = 0·730$, approx. Forms: (10$\bar{1}$0), (11$\bar{2}$0), (10$\bar{1}$1). Imperfect basal cleavage. H. = 5. G. = 3·234. Color pale rose-red, yellow. Optically −. $n = 1·640$.
Comp. — $3Ca_3(PO_4)_2.CaCO_3.3Ca_3[(SiO_4)(SO_4)].CaO$.
Anal. —

CaO	MnO	P_2O_5	SO_3	SiO_2	CO_2	H_2O	Total
54·44	0·77	20·85	12·28	9·62	2·10	*tr.*	100·06

Pyr. — Fusible at 5·5. Soluble in dilute hydrochloric and nitric acids with separation of flocculent silica. Usual tests for SO_4, P_2O_5, CaO. Alters to *okenite*.
Obs. — In contact zone of crystalline limestone, associated with blue *calcite*, *diopside* and *vesuvianite* at Crestmore, eight miles west of Riverside, Riverside Co., Cal.
Name. — After Mr. R. M. Wilke.

Willemite, Min., p. 460; App. I, p. 72; II, p. 111. — Crystals from Franklin Furnace, N. J. Refractive indices: $\omega = 1·69390_{Na}$, $= 1·68897_{Li}$; $\epsilon = 1·72304_{Na}$, $1·71812_{Li}$. Palache, Am. J. Sc., **29**, 177, 1910, Zs. Kr., **47**, 576, 1909. Crystals from same locality with new forms: a new axial ratio was derived, $c = 0·6679$; a new Goldschmidt table of angles for the known forms based on this new axial ratio is given: Palache and Graham, Am. J. Sc., **36**, 639, 1913; Zs. Kr., **53**, 332, 1914.
Anal. and optical determinations of material from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 389, 1911. Fluorescence in ultra-violet light; Liebisch, Ber. Ak. Wiss., 229, 1912. Birefringence on material from Moresnet, Belgium; Cesàro, Bull. Ac. Belg., No. 7, 619, 1908.

Wiltshireite. Same as *Rathite*, which see.

Winchite. See under *Amphibole*.

Witherite, Min., p. 284; App. I, p. 73. — Crystals from New Brancepeth Colliery near Durham, England; Spencer, Min. Mag., **15**, 302, 1910.

Wöhlerite, Min., p. 376; App. II, p. 111. — Anal. of material from a Norwegian locality, probably Langesundfjord; Tschernik, Bull. Ac. St. Pet., **3**, 903, 1909; Zs. Kr., **51**, 97, 1912.

Wolchonskoite, Min., p. 696; App. II, p. 111. — New anal. of material from the lime sandstone of Gouv. Perm, Russia, show that, disregarding the water given off under 160°, the composition corresponds to $(H_2,Mg,Fe,Ca)_3(Cr,Fe,Al)_2Si_3O_{12}$, or similar to the chrome garnet, *uvarovite*. Its optical properties show that it belongs to the class of mineral gels. H. = 1. G. = 2·337. Not attacked by acids. Angel, Zs. Kr., **52**, 568, 1913.

Wolframite, Min., p. 982; App. I, p. 73; II, p. 111. — Crystals with new form from Tonopah, Nev.; Eakle, Bull. Uni. Cal. Geol. Dept., **7**, 1, 1912.
Anal. of material from Spain; Granell, [Boll. Soc. Esp. Hist. Nat., **9**, 81, 1909], Zs. Kr., **50**, 472, 1911; from Carrock Fell, Cumberland, England; Finlayson, Geol. Mag., **7**, 19, 1910; from Zinnwald and Sadisdorf, Saxony; Meyer and Winter, Zs. Anorg. Chem., **67**, 398, 1910; from New Brunswick; Walker, Econ. Geol., **6**, 396, 1911; from Cornwall and from Cave Creek, north of Phoenix, Ariz.; Wherry, Proc. U. S. Nat. Mus., **47**, 501, 1914.
See under *Ferberite*.

Wolftonite. See under *Hetærolite*.

Wollastonite, Min., pp. 371, 1052; App. I, p. 73; II, p. 111. — Crystals from a furnace slag; Rüsberg, Centralbl. Min., 689, 1913.
Anal. and its alteration from near Concepcion del Oro, Mexico; Bergeat, Centralbl. Min., 161, 1909; occ. with anal. from contact zones near Kristiania, Norway; Goldschmidt, Videnskapsselskapets Skrifter, No. 1, 324, 1911.

Optical properties of artif. *wollastonite* and *pseudo-wollastonite*; Allen, White, Wright, and Larsen, Am. J. Sc., **27**, 1, 1909. Upon artificial hexagonal modification; Szathmáry, [Földt. Közl., **39**, 280, 314, 1909]; Mauritz, [*ibid.*, 396, 505]; Szathmàry, [*ibid.*, 399, 508], Zs. Kr., **50**, 632, 1912. Preparation of artificial material and its relation to calcium-magnesium metasilicate series; Allen and White, Am. J. Sc., **27**, 1, 1909. Artificial formation; Zinke, N. Jb. Min., **2**, 117, 1911. Experiments with melts containing various mixtures of *wollastonite* and *anorthite*; Lebedew, Ann. Inst. Polytech. St. Pet., **15**, 691, 1911.

Worobewite, Worobieffite. Same as *Vorobyevite*. See under *Beryl*.

WULFENITE, Min., p. 989; App. I, p. 73; II, p. 112. — Crystals from Rudnik, Carinthia; Hunek, Zs. Kr., **49**, 11, 1910; from old Yuma mine, near Tucson, Ariz.; Guild, Zs. Kr., **49**, 321, 1911; from granite pegmatite, Quincy, Mass.; Palache and Warren, Am. J. Sc., **31**, 533, 1911; Zs. Kr., **49**, 332, 1911; from Broken Hill, N. S. W.; Anderson, [Rec. Austral. Mus., **8**, 120, 1911], Zs. Kr., **53**, 578, 1914; from Reichenbach near Lahr, Baden; Dürrfeld, Zs. Kr., **50**, 586, 1912.

Refractive indices on crystals from Red Cloud mine, Arizona, and from Bleiberg, Carinthia; Baumhauer, Zs. Kr., **47**, 1, 1909.

Artif. formation; Dittler, Zs. Kr., **53**, 158, 1913; **54**, 332, 1914.

WURTZITE, Min., pp. 70, 1051; App. I, p. 74; II, p. 112. — Crystals from Joplin, Mo., district; Rogers, [Uni, Geol. Sur. Kansas, **8**, 445, 1904], Zs. Kr., **49**, 370, 1911; from Nordmark, Sweden, with new form; Flink, Ark. Kemi, Min., Geol., **3**, No. 11, 1, 1908; from Horn Silver mine, near Frisco, Beaver Co., Utah; Butler and Schaller, Am. J. Sc., **32**, 418, 1911; Zs. Kr., **50**, 114, 1911; U. S. G. S., Bull., **509**, 79, 1912.

Occ. in ores at Goldfield, Nev.; Ransome, J. Wash. Ac. Sc., **4**, 482, 1914.

Artif. formation and thermal relations; Allen, Crenshaw, and Merwin, Am. J. Sc., **34**, 341, 1912; **38**, 393, 1914; Zs. Anorg. Chem., **79**, 125, 1912; **90**, 81, 1914.

XANTHOCONITE, Min., p. 149; App. I, p. 74. — Crystals from St. Kreuz, Lebertal, Alsace; Bücking, Mitt. Geol. Landesanst. Elsass-Lothringen, **8**, 201, 1913.

XENOTIME, Min., p. 748; App. I, p. 74; II, p. 112. — Anal. of material similar to *hussakite*, found with graphite from an American locality given as "South Mountains, Blue Ridge"; Tschernik, [Vh. Min. Ges., **45**, 425, 1907], Zs. Kr., **47**, 291, 1909. Anal. from San Miguel de Piracicaba, Minas Geraes, Brazil; Hussak, Centralbl. Min., 268, 1909.

YTTROCERITE, Min., p. 182; App. II, p. 112. — From Finbo, Sweden, shows three types, (1) with dirty yellow color, greasy luster, octahedral cleavage; (2), dark violet color, duller luster, less distinct cleavage; (3), white or brick colored, earthy. Flink, Ark. Kemi, Min., Geol., **3**, No. 35, 1, 1910.

Relations to *fluorite*, etc., see under *Fluorite*.

Yttrofluorite. *T. Vogt*, Centralbl. Min., 373, 1911.

Isometric. In granular masses. Cleavage, octahedral imperfect. Fracture, uneven. Brittle. H. = 4·5. G. = 3·535–3·557. Luster vitreous on cleavage faces, greasy on fracture surface. Color, yellow to yellow-brown, also brownish and light yellow-green; on exposure colors fade. Transparent to translucent. Refractive index, Na-light = 1·4572.

Comp. — A fluoride of calcium and yttrium, near *yttrocerite*; $x\mathrm{CaF_2}.y\mathrm{YF_3}$ or $(\mathrm{Ca_3,Y_2})\mathrm{F_6}$. The relative amounts of the fluorides vary in different specimens.

Anal. —

CaO	Y_2O_3, etc.	Ce_2O_3, etc.	Alk.	F	Ign.	$O = F_2$	Total
54·89	17·35	1·68	0·15	45·54*	0·89	19·17	101·33

* Calc.

Obs. — Found in a pegmatite vein, in northern Norway.

Relations to *fluorite*, etc., see under *Fluorite*.

YTTROTANTALITE, Min., p. 738; App. II, p. 112. — Anal. of material from Ytterby, Sweden; Tschernik, [Vh. Min., Ges., **45**, 265, 1907], Zs. Kr., **47**, 293, 1909.

Yukonite. *J. B. Tyrrell* and *R. P. D. Graham*, Trans. Roy. Soc. Canada, **7**, Sect. IV, 3, 1913.

Amorphous. In irregular concretions. Fracture conchoidal. Brittle. H. = 2–3. G. = 2·8, approx. Color nearly black with brownish tinge. Opaque in mass but transparent with deep brown to yellow-brown color in thin section. Luster vitreous to pitchy. Isotropic.

Comp. — A hydrous arsenate of iron and calcium, perhaps $(\mathrm{Ca_3,Fe_2'''})\mathrm{As_2O_8.Fe_2'''(OH)_6.5H_2O}$.

Anal. — ½ CaO, 10·07; Fe_2O_3, 36·36; As_2O_5, 33·94; H_2O, 20·28*; Total, 100·55.

* About half of the water is given off at 100° C., the remainder coming off only at high temperatures.

Pyr. — Decrepitates violently at low heat, yielding considerable amount of carbon dioxide gas, probably held in an occluded state. Decrepitates when immersed in water. Fuses readily with intumescence, yielding arsenious oxide fumes and a magnetic residue.

Obs. — Found at a mining prospect on the west side of Windy Arm of Tagish Lake, Yukon Territory.

Zamboninite. See under *Müllerite.*

ZEOLITES. — Paragenesis of the zeolites associated with the Watchung basalt in northern New Jersey; Fenner, Ann. N. Y. Ac. Sc., **20**, (2), 93, 1910. Discussion of the chemical constitution of the zeolites; Clarke, U. S. G. S., Bull., **588**, 1914.

ZEOPHYLLITE, App. II, p. 113. — Determination of index, ω = 1·565, as average of values given by specimens from several different localities. Himmelbauer, Min. Mitt., **32**, 133, 1913.

Occ. at Krebshöhe, near Schönpriesen, Bohemia; Cornu, Centralbl. Min., 154, 1909.

ZEUNERITE, Min., p. 857. — Crystals from Island of Monte Cristo; Millosevich, Rend. Acc. Linc., **21**, (1), 594, 1912.

ZINCITE, Min., p. 208; App. I, p. 74; II, p. 114. — Crystals from Franklin Furnace, N. J., with determination of *c* axis = 1·5870; Palache, Am. J. Sc., **29**, 177, 1910; Zs. Kr., **47**, 576, 1909; from same locality; Phillips, Am. J. Sc., **31**, 464, 1911.

Artif. crystals; Stanley, [Proc. Uni. Durham, Phil. Soc., **3**, 157, 1908], Zs. Kr., **53**, 576, 1914.

Zincorodocrosite. See under *Rhodochrosite.*

ZINNWALDITE, Min., p. 626. — Anal. of material from Grossen Waldstein, Fichtelgebirge, Bavaria; Dürrfeld, Zs. Kr., **46**, 563, 1909.

ZIRCON, Min., p. 482; App. I, p. 74; II, p. 114. — Crystals from Laacher See, Prussia; Brauns, Centralbl. Min., 721, 1909; from Congo Free State; Buttgenbach, Ann. Soc. Geol. Belgique, 31, 1913.

Refractive indices on crystal from Ceylon; Baumhauer, Zs. Kr., **47**, 1, 1909.

Anal. with refractive index from Madagascar; Duparc, Sabot, and Wunder, Bull. Soc. Min., **37**, 19, 1914; anal. from Nellore District, Madras; Tipper, Rec. Geol. Sur. India, **41**, 210, 1911; of *malacon* from granite boulder, near Mukden, Manchuria; Tschernik, [Vh. Min. Ges., **44**, 507, 1906], Zs. Kr., **50**, 57, 1911.

Radioactivity; Doelter, Min. Mitt., **29**, 258, 1910.

Artif. formation; Doelter and Dittler, Ber. Ak. Wien, **121**, (1), 897, 1912.

Occ. in sandstone near Ashland, Va.; Watson and Hess, Bull. Phil. Soc., Uni. of Va., **1**, 267, 1912.

ZIRKELITE, App. I, p. 75. — Anal. of material from Walaweduwa in the Bambarabotuwa district of the Sabaragamuwa province, Ceylon, and from gem gravels obtained from southern Sabaragamuwa. Examination of crystals show that they are probably hexagonal and frequently twinned. Axis *c* = 1·1647. It is thought that the crystals of the original occurrence which were described as isometric might be hexagonal instead. In both occurrences the crystals are of poor quality. Blake and Smith, Min. Mag., **16**, 309, 1913.

ZOISITE, Min., pp. 513, 1035; App. I, p. 75; II, p. 114. — Anal. from Bath Spring, West Chester, and Leiperville, Pa.; Eyerman. [Minerals of Pennsylvania, Sep. Pub., 1911], Zs. Kr., **54**, 98, 1914.