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APPENDIXES

TO THE

FIFTH EDITION

OF

DANA'S MINERALOGY.

APPENDIX I., 1868-1872,

BY GEORGE J. BRUSH.

APPENDIX II., 1872-1875,

AND

APPENDIX III., 1875-1882,

BY EDWARD S. DANA.

NEW YORK:
JOHN WILEY & SONS.
1882.

FIRST APPENDIX

TO THE

FIFTH EDITION

OF

DANA'S MINERALOGY,

BY

GEORGE J. BRUSH,

PROFESSOR OF MINERALOGY IN THE SHEFFIELD SCIENTIFIC SCHOOL OF YALE COLLEGE.

COMPLETING THE WORK TO 1872.

NEW YORK:
JOHN WILEY & SONS,
15 ASTOR PLACE.
1882.

PREFATORY NOTE.

THIS Appendix, prepared with the co-operation of Professor DANA, is intended as one of a series to be published from time to time. It includes descriptions of 87 minerals announced as new, and also some important facts regarding a few old species, published since the appearance of the Mineralogy in 1868.

An alphabetical arrangement is adopted for convenience of reference. The species included, arranged according to the general subdivisions in the classification of minerals, are as follows:—

1. *Native Elements.*

1. Diamond.
2. Maldonite.

2. *Sulphids*, *Arsenids*, *etc.*

3. Arsenical Cobalt, Einfach-Arsenik-Cobalt.
4. Beyrichite.
5. Diaphorite.
6. Dyscrasite: Stibiotriargentite, Stibiohexargentite.
7. Epiboulangerite.
8. Epigenite.
9. Glaucopyrite.
10. Julianite.
11. Klaprotholite.
12. Metacinnabarite.
13. Orileyite.
14. Osbornite.
15. Polyargyrite.
16. Rionite.
17. Tellurwismuthsilber.
18. Wolfachite.
19. Sylvanite.

3. *Chlorids*, *Fluorids.*

20. Nadorite, Sb, Pb, Cl, O.
21. Nantokite, $Cu^2 Cl$.
22. Ralstonite, Al, Fl, H.
23. Sellaite, Mg Fl.

4. *Oxyds.*

24. Chrompicotite (Spinel group).
25. Ilsemannite, $\dot{Mo}+4\dddot{Mo}$.
26. Jacobsite (Spinel group).
27. Lithiophorite (near Asbolan).
28. Namaqualite (near Hydrotalcite).
29. Rabdionite.
30. Brookite.
31. Tridymite.

5. *Anhydrous Silicates.*

32. Amblystegite (Hypersthenite).
33. Aspidolite (Mica Group).
34. Asteroite (Pyroxene).
35. Barettite.
36. Bismutoferrite.
37. Hortonolite (Chrysolite Group).
38. Monzonite.
39. Roepperite (Chrysolite Group).

6. *Hydrous Silicates.*

40. Antillite (near Serpentine).
41. Aquacreptite (near Hydrophite).
42. Cyanochalcite (near Chrysocolla).
43. Diabantachronnyn (Chlorite Group).
44. Ephesite.
45. Epiphanite (near Eukamptite).
46. Euralite (near Delessite).
47. Gümbelite (near Pinite).
48. Hallite.
49. Hypochlorite.
50. Ivigtite.
51. Milarite (a Zeolite ?).
52. Næsumite.
53. Nigrescite.
54. Plumballophane.
55. Restormelite.
56. Reissite (near Monophane).
57. Talcosite.
58. Uranotil.
59. Westanite (near Wörthite).
60. Lesleyite.
61. Pattersonite.
62. Selwynite.

7. *Tantalates, Columbates.*

63. Ferroilmenite (Columbite).
64. Kochelite (near Fergusonite).

8. *Phosphates, Arsenates, etc.*

65. Andrewsite.
66. Cœruleolactite.
67. Durangite.
68. Guano Phosphates.
69. Isoclasite.
70. Kollophan.
71. Lime-Wavellite.
72. Lünebergite.
73. Montebrasite (Amblygonite).
74. Redondite.
75. Sarcopside (Triplite).
76. Trögerite.
77. Walpurgite.
78. Zepharovichite.

9. *Borates.*

79. Sussexite.
80. Winkworthite.

10. *Tungstates, Molybdates, Vanadates.*

81. Wolframite.
82. Eosite.
83. Pucherite.
84. Vanadiolite.

11. *Sulphates, Chromates.*

85. Guano Sulphates.
86. Caledonite.
87. Simonyite.
88. Laxmannite.
89. Phosphochromite.

12. *Carbonates, Oxalates.*

90. Bastnaesite (Hamartite)
91. Guano-oxalates.

13. *Carbo-hydrogen Compounds.*

92. Ambrosine.
93. Rosthornite.
94. Trinkerite.
95. Wollongongite.

APPENDIX I.*

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1. *Minerals described as new species.*

411. *Antillite.*--A name given by C. U. Shepard to a substance he considers to be a hydrated bronzite. It occurs both massive and crystalline, presenting minute coppery laminæ, with a fibrous cleavage. H. =3·5–4. G. =2·52. Color dark greenish-brown. An analysis gave $\ddot{\mathrm{Si}}$ 39·30, $\dot{\mathrm{Mg}}$ 36·12, $\dot{\mathrm{Fe}}$ 6·70, $\dot{\mathrm{H}}$ 16·79, with traces of $\dot{\mathrm{Cr}}$, $\dot{\mathrm{Ca}}$, $\dot{\mathrm{K}}$=98·91. This composition approaches that of serpentine or deweylite. (Appendix to Catalogue of Meteorites, Amherst, Mass., January 1, 1872).

235. AMBLYSTEGITE.—*G. vom Rath*, Pogg. Ann., cxxxviii. 531.
Orthorhombic: $i\text{-}\bar{i} \wedge I=135^\circ\ 50'$, $i\text{-}\bar{i} \wedge 1\text{-}\bar{2}=119^\circ\ 26'$, $\frac{1}{4}\text{-}\breve{i} \wedge \frac{1}{4}\text{-}\breve{i}=163^\circ\ 47'$, $i\ \breve{i} \wedge \frac{1}{4}\ \breve{i}=98^\circ\ 6\frac{1}{2}'$. Cleavage not observed. Hardness nearly equal to quartz. G.=3·454. Lustre adamantine-vitreous. Color brown to reddish-brown. Streak greenish-gray. Translucent. Fracture conchoidal. Analysis, G. vom Rath (l. c.):

$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{Al}}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$
49·8	5·05	25·6	17·7	0·15=98·30

Only half a gram was available for analysis, and the state of oxydation of the iron was not determined. B. B. difficultly fusible without intumescence to a black glass. Not decomposed by muriatic acid. Found at Lake Laach. Amblystegite is closely related to hypersthenite in form and chemical composition. V. v. Lang has recently discovered crystals of hypersthenite in the meteorite of Breitenbach which give the same planes as amblystegite, and vom Rath now announces (Jahrb. Min., 1871, 642) the identity of his supposed new species with hypersthenite.

799 B. AMBROSINE. *C. U. Shepard*, Rural Carolinian, i. p. 311.
In rounded masses. Color yellowish to clove-brown. Fracture conchoidal. Lustre, resinous. Becomes electric on friction. Melts at about 460°F. to a clear yellowish liquid; softens at a lower temperature. Gives off "succinic acid" before melting; on fusion gives an agreeable balsam odor, unlike that from the resins of ordinary pines, and a dark brown non-volatile fluid remains as long as the melting heat is kept up. Combustible, leaves no ash. Soluble for the most part in oil of turpentine, alcohol, ether, and chloroform, as also in potash. Found in the phosphatic beds near Charleston, S. C., having originated in the eocene formation.

ANDREWSITE. *N. S. Maskelyne*, Chem. News, xxiv. 99.
In globular disks with radiated structure resembling wavellite. G. =3·475. Color bluish-green. Composition, a hydrous phosphate of iron and copper. An average of four determinations gave 10·82 per cent. of copper; and according to Maskelyne the analyses (not given in the article quoted) "justify the formula 3 ($\dddot{\bar{\mathrm{Fe}}}$ $\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}$, $\dddot{\bar{\mathrm{Fe}}}$ $\dot{\mathrm{H}}^3$) + $\dot{\mathrm{Cu}}^3$ $\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}$, in which, however, a portion of the ferric phosphate is replaced by ferrous phosphate, as in vivianite is frequently the case with the two phosphates."
Occurs in Cornwall on a quartzose veinstone associated with limonite and göthite, and interpenetrated with a mineral resembling, if not identical with, dufrenite. Requires further description.

71 A. *Arsenical cobalt.* Under the title *Einfach-arsenik-cobalt*, Kenngott calls attention to a mineral which appears to be hexagonally crystallized arsenid of cobalt, occurring with barite and quartz at Bieber (Jahrb. Min., 1869, 754).

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* This appendix contains descriptions of minerals announced as new since the publication of this work in 1868. A few notes are added at the end, on previously described species. It has been prepared by Prof. G. J. Brush. The black-faced figures indicate the number of the species, as arranged in the classification adopted in the Mineralogy.—NEW HAVEN, March 1, 1872

288 A. **ASPIDOLITE.**—Aspidolith, *F. v. Kobell*, Ber. Ak. München, March 6, 1869.

Orthorhombic: in prisms giving approximatively 120° and 60°. The smaller sides show reëntering angles from twinning, or an aggregation of several crystals, giving the base an oval shield-like appearance. Optically biaxial, with the divergence angle 11° 55′ for the red rays. Bisectrix normal to cleavage plane. H.=1—2. G.=2·72. Lustre pearly, submetallic. Color olive-green, in thin leaves brownish-yellow. Foliated, leaves flexible, but not elastic. An analysis afforded von Kobell:

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
46·44	10·50	26·30	9·00	4·77	2·52	1·33=100·86

The oxygen ratio of $\dot{\mathrm{R}}$, $\dddot{\mathrm{R}}$, and $\ddot{\mathrm{Si}}$ is 14·16 : 4·91 : 24·66, or 3 : 1 : 5. The composition approaches that of a soda phlogopite.

B. B. exfoliates like vermiculite, giving water in the closed tube. In the forceps difficultly fusible to a dirty gray-white glass. Entirely decomposed by muriatic acid, leaving the silica in pearly scales.

Found in Zillerthal, in Tyrol, associated with chlorite.

238. *Asteroite*—A name given to a variety of stellate radiated pyroxene, from Nordmark, in Sweden, by L. J. Igelström (B. and H. Ztg. xxix. 8, 1870). It is ash-gray to white in color, has a silky lustre, is opaque, becomes bronze color on exposure. Analysis gave $\ddot{\mathrm{Si}}$ 48·48, $\dot{\mathrm{Fe}}$ 22·24, $\dot{\mathrm{Mn}}$ 4·12, $\dot{\mathrm{Ca}}$ 17·00, $\dot{\mathrm{Mg}}$ 4·18, ignition 2·83=98·85. The oxygen ratio of $\dot{\mathrm{R}}$ to $\ddot{\mathrm{Si}}$ is 1:2. It is a pyroxene near hedenbergite, but containing a portion of the iron replaced by manganese.

415 B. **AQUACREPTITE.**—*C. U. Shepard*, Am. J. Sci. II. xlvii. 256.

Massive, occurring in irregular polyhedral fragments, with flat or concave surfaces. H.=2·5. G.=2·05—2·08. Lustre dull. Color yellowish-brown. Streak orange-yellow. Brittle. Adheres to the tongue. Falls to pieces in water, with a crackling noise.

Analyses—1. C. U. Shepard; 2. J. H. Eaton (l. c.):

	$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{H}}$
1.	41·00	4·00	17·60	13·30	23·00=98·90
2.	43·03	5·56	19·58	12·30	17·40=97·87

Decomposed by muriatic acid. Found in a vein in serpentine, at Westchester, Pa. It is near hydrophite. Needs further investigation.

732 A. **BASTNÄSITE.** *Huot*, *Min.* i. 296 (1841). Basiskfluorcerium, *Hisinger*, Œf. Ak. Stockh., 1838, 189. Hamartite, *A. E. Nordenskiöld*, Œf. Ak. Stockh., 1868, 399.

The so-called basic fluorid of cerium, from Bastnäs, examined by Hisinger, has been reëxamined by A. E. Nordenskiöld, and shown to be a fluo-carbonate. As the name basic fluorid, or hydrofluocerite, conveys an incorrect idea of the composition of the mineral, Nordenskiöld gives it the new name *hamartite*, overlooking the fact that Huot had already named the mineral *bastnäsite*, after the locality.

Orthorhombic ?—Found in small masses imbedded between allanite crystals. Shows distinct cleavage. H.=4. G.=4·93. Lustre greasy. Color wax-yellow.

Composition Ce F+2 ($\dot{\mathrm{Ce}}$, $\dot{\mathrm{La}}$) $\ddot{\mathrm{C}}$=$\dot{\mathrm{La}}$ 46·15, $\dot{\mathrm{Ce}}$ 3·87, Ce 21·12, $\ddot{\mathrm{C}}$ 20·20, F 8·72=100. Analysis by Nordenskiöld (l. c.)—

$\ddot{\mathrm{C}}$	La	$\dot{\mathrm{Ce}}$	$\dot{\mathrm{H}}$	F—O
19·50	45·77	28·49	1·01	(5·23)=100

Nordenskiöld, having shown by direct determination that but 1·01 per cent. water exists in the mineral, and that the balance of loss on ignition is carbonic acid, finds, on recalculating Hisinger's early results with this correction, a close correspondence with the above, viz., $\dot{\mathrm{La}}$, $\dot{\mathrm{Ce}}$, 73·59, $\ddot{\mathrm{C}}$, $\dot{\mathrm{H}}$ 19·11, F—O, 5·76, $\ddot{\mathrm{Si}}$ 1·25=99·71. The direct determination of fluorine by Hisinger gave 9·95 per ct.

In the closed tube gives but little water, blackens, then becomes whitish-yellow and opaque; also gives a weak reaction for fluorine. Infusible. With acids effervesces slightly. With sulphuric acid gives off fluohydric acid, even after ignition. Found only at the Bastnäs Mine, Riddarhyttan, Sweden. The percentage composition brings this mineral near kischtimite (p. 703). It also resembles kischtimite in some of its physical characters, and further investigation may prove these minerals to be identical.

Barettite. A name given by Bombicci to a mineral from Traversella in the province of Ivrea, having the following characters:—Occurs in nodular, radiated, and fibrous masses. H.=2·5. G.=2·5. Color apple-green. Streak white. Feel soapy. Analysis gave $\ddot{\text{Si}}$ 30·00, $\dot{\text{Ca}}$ 33·70, $\dot{\text{Mg}}$ 10·00, $\dot{\text{Fe}}$ 7·20, $\dddot{\overline{\text{Al}}}$ 1·60, $\ddot{\text{C}}$ 9·1, $\dot{\text{H}}$ 1·2, with a small amount of sulphuric acid, and probably also containing phosphoric acid and alkalies. (Atti della Soc. Ital. di Sc. Nat. xi., in Jahrb. Min., 1868, 750.

66 A. BEYRICHITE. *K. Th. Liebe*, Jahrb. Min., 1871, 840.

Hexagonal? Occurring in screw-shaped groups, radiated in structure, the constituent prisms of which are about 70 mm. long and 8 mm. wide. One terminal plane makes an angle of 81° with the vertical axis; a second, rarer, inclines to the first at an angle of 144°, the angle of the rhombohedron of millerite. Cleavage rather perfect parallel to the first of these planes, and no other cleavage direction observed, so that the rhombohedral character of the crystals is not certain.

H=3—3·5. G.=4·7. Lustre metallic. Color lead-gray. Composition $3\ \text{Ni S}+2\ \text{Ni S}^2=\text{S}$ 43·21, Ni 56·79=100. An analysis by Liebe gave:

S	Fe	Ni
42·86	2·79	54·23=99·88

B. B. in the closed tube decrepitates and gives a sublimate of sulphur, on charcoal fuses to a brass-yellow magnetic globule. Soluble in nitro-muriatic acid, yielding an emerald green solution.

From Lammrichs Kaul Mine in Westerwald, where it is associated with millerite.

Bismutoferrite. A. Frenzel, J. pr. Chem., II., iv. 355. This name has been given to a so-called hypochlorite from Schneeberg, having H.=1–2. G.=4·47, and containing $\ddot{\text{Si}}$ 23·08 $\dddot{\overline{\text{Fe}}}$ 33·33, $\dddot{\overline{\text{Bi}}}$ 43·26=99·67. Frenzel further distinguishes two varieties of hypochlorite, *antimony-hypochlorite* from Bräunsdorf, and *bismuth-hypochlorite* from Schneeberg; both of these are stated to be mixtures, and not homogeneous minerals.

189. *Chrompicotite. T. Petersen*, J. pr. Ch., cvi. 137.

A variety of chromite occurring in rounded octahedrons. H=8. G.=4·115. Lustre vitreous to greasy. Color black. Analysis by T. Petersen and K. Senfter (l. c.) afforded:

$\dddot{\overline{\text{Cr}}}$	$\dddot{\overline{\text{Al}}}$	$\dot{\text{Fe}}$	$\dot{\text{Mn}}$	$\dot{\text{Co}}$, $\dot{\text{Ni}}$	$\dot{\text{Mg}}$
56·54	12·13	18·01	0·46	tr.	14·08=101·22

This composition does not differ much from that of the magnesian alumina chromite from Baltimore, analyzed by Abich (Anal. 3. 4, p. 153), and that from Lake Memphramagog, examined by Hunt. If this variety is to have a new name it should have reference to chromite rather than picotite, a magnesia iron alumina spinel with only 7 per cent. of chromic oxyd. Its hardness is the chief character which favors its being classed with picotite.

From Dun Mountain, New Zealand.

554 C. COERULEOLACTITE. Cœruleolactin, *T. Petersen*, Jahrb. Min., 1871, 353.

Crypto-crystalline to micro-crystalline. Fracture uneven to conchoidal. H.=5. G.=2·552—2·593. Color milk-white passing into light copper-blue. Streak white. Composition: $\dddot{\overline{\text{Al}}}{}^3, \overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\text{P}}}{}^2+10\ \dot{\text{H}}=\overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\text{P}}}$ 36·74, $\dddot{\overline{\text{Al}}}$ 39·37, $\dot{\text{H}}$ 23·29. Analysis by Petersen (l. c.):

$\overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\text{P}}}$	$\dddot{\overline{\text{Al}}}$	$\dddot{\overline{\text{Fe}}}$	$\dot{\text{Cu}}$	$\dot{\text{Zn}}$	$\dot{\text{Ca}}$	$\dot{\text{Mg}}$	$\ddot{\text{Si}}$	F	$\dot{\text{H}}$
36·33	35·11	0·93	1·40	tr.	2·41	0·20	1·82	tr.	21·23=99·43

Excluding the iron (supposed to exist as limonite), the silica, and copper, lime and magnesia with sufficient phosphoric acid (=3·27 $\overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\text{P}}}$) to make an ortho-phosphate, and calculating the remaining constituents (89·26 p. c.) up to 100 we have for the true composition of the mineral, according to Petersen, $\overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\text{P}}}$ 37·04, $\dddot{\overline{\text{Al}}}$ 39·34, $\dot{\text{H}}$ 23·62, corresponding very closely with the above formula. B. B. decrepitates, infusible, on charcoal turns reddish-gray. With cobalt solution gives a deep blue. Moistened with sulphuric acid colors the flame green. With the fluxes gives a faint reaction for copper. Soluble in mineral acids, also in fixed caustic alkalies.

From the Rindsberg Mine near Katzenellnbogen, Nassau.

346. CYANOCHALCITE. *R. Hermann*, J. pr. Chem., cvi. 65.

Massive. H.=4·5. G.=2·79. Lustre glistening to dull. Color azure-blue. Fracture even and compact. Brittle. Analysis by R. Hermann:

$\ddot{\mathrm{Si}}$	$\bar{\mathrm{P}}$	$\dot{\mathrm{Cu}}$	$\dot{\mathrm{H}}$
26·90	6·95	49·63	16·52.

According to Hermann, this shows the composition to be equivalent to 1 atom of libethenite, and 9 atoms of chrysocolla. It is evidently a substance of like character with the demidoffite of Nordenskiöld. In the tube gives off water and becomes black. With the fluxes reacts for copper. Decomposed by acids without gelatinization.

Occurs at Nischne-Tagilsk.

452. *Diabantachronnyn.* A name given by Liebe (Jahrb. Min., 1870, 1) to a chlorite-like mineral occurring in the diabase of Voigtland and Frankenwald, and which contributes to the green color of the rock. It is found in seams and clefts, sometimes in amygdules and lining cavities in the rock. In some occurrences of diabase it forms the chief binding or cementing material, and is apparently a product of the alteration of the augitic constituent of the diabase. Compact, breaks with a conchoidal fracture, sometimes fibrous. Lustre dull. Color greenish-black, in thin splinters chrome-green. H.=2. G.±2·81–2·93. Composition, analyses by Liebe:

	$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dddot{\mathrm{Fe}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{H}}$
1. Reinsdorf	30·27	11·16	——	26·94	21·22	10·20=99·79
2. Landesfreude	29·37	12·00	——	25·63	21·01	11·27=99·28
3. Höllethal	29·85	9·07	——	26·60	17·92	15·81=99·25
4. Trilloch	31·25	10·03	3·47	23·52	19·73	11·37=99·37
5. Gräfenwart (fibrous)	31·56	12·08	——	21·61	22·44	11·78=99·47

Oxygen ratio for $\dot{\mathrm{R}}$, $\dddot{\mathrm{R}}$, $\ddot{\mathrm{Si}}$, $\dot{\mathrm{H}}$ in the last analysis is 13·8 : 5·8 : 16·4 : 10·5. In the closed tube yields water. B. B. turns brown and fuses readily to a grayish-black glass, gives with salt of phosphorus reactions for iron and silica. Soluble in cold muriatic acid with deposition of pure white silica, with nitric acid gives off red nitrous fumes leaving a reddish-brown residue of silica.

113 A. DIAPHORITE. *V. v. Zepharovich*, Sitzb. Ak. Wien, lxiii. 130.

In endeavoring to ascertain the cause of the difference of the views of crystallographers in regard to the crystallization of freieslebenite, Zepharovich has discovered that the specimens referred to this species belong to two distinct crystalline systems, although chemically they are identical. He retains the name of freieslebenite for the monoclinic form, and names the new orthorhombic mineral *diaphorite*. The following planes were observed: i-$\breve{i}$, i-$\bar{i}$, i-$\bar{3}$, I, $i\breve{2}$-, i-$\frac{1}{3}^{2}$, i-$\breve{3}$, i-$\breve{5}$, i-$\breve{11}$, $\frac{1}{2}$-$\bar{i}$, 1-$\bar{i}$, $\frac{1}{2}$-$\breve{i}$, 1-$\breve{i}$, $\frac{3}{2}$-$\breve{i}$, $\frac{5}{3}$-$\breve{i}$, 2-$\breve{i}$, $\frac{3}{4}$-$\breve{3}$, $\frac{5}{4}$-$\frac{5}{3}$, $\frac{1}{4}$, $\frac{1}{2}$, 1-$\breve{2}$ $\frac{3}{4}$-$\breve{3}$, 1-4. Cleavage not observed. Fracture uneven to sub-conchoidal. H.=2·5–3. G.=5·902, (Freieslebenite G.=6·35). Lustre metallic. Color steel-gray. Brittle. An analysis of the mineral from Przibram gave Helmhacker (B. and H. Jahrb. xiii. 379):

S	Sb	Pb	Ag	Fe	Cu
20·18	26·43	28·67	23·44	0·67	0·73=100·12

corresponding closely with the earlier analysis by Payr (this Min. Anal. 4. p. 93). These analyses Zepharovich refers to diaphorite, as no freieslebenite occurs at Przibram. The pyrognostic characters of both species are the same. Diaphorite occurs at Przibram and Bräunsdorf exclusively, while at Freiberg it is found with freieslebenite. The name diaphorite was formerly used for an altered rhodonite related to allagite.

503 A. DURANGITE. *G. J. Brush*, Am. J. Sci., II. xlviii. 179, Sept., 1869.

Monoclinic. Form of crystal like that of keilhauite (p. 387), omitting O and $-2i$, and adding $4i$. Cleavage parallel to I, distinct, giving 110° 10′, J. M. Blake. H.=5. G.=3·95–4.03. Lustre vitreous. Color bright orange-red. Streak cream-yellow. Analysis, G. J. Brush (l. c.):

$\ddot{\mathrm{As}}$	$\dddot{\mathrm{Al}}$	$\dddot{\mathrm{Fe}}$	$\dot{\mathrm{Mn}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{Li}}$	F—O
55·10	20·68	4·78	1·30	11·66	0·81	(5·67)=100
53·22[a]	20·09	5·06	1·28	1[illegible]·86	0·70	———

[a] Too low.

The oxygen ratio of $\dot{R}$, $\dddot{\bar{R}}$ and $\overset{\cdot\cdot\cdot\cdot\cdot}{As}$ is 3·74 : 11·07 : 19·16, or nearly 1 : 3 : 5, giving the formula ($\frac{1}{4}\dot{R}^3 + \frac{3}{4}\dddot{\bar{R}}$) $\overset{\cdot\cdot\cdot\cdot\cdot}{As}$, in which a portion of the oxygen is replaced by fluorine.

In the closed tube blackens at a moderate temperature, but regains its color on cooling at a higher heat fuses easily to a yellow glass and gives a faint white volatile sublimate, etching the tube slightly. The same in the open tube, with evolution of acid fumes, reddening litmus paper. On charcoal, B. B. fuses readily and gives a white sublimate with a strong arsenical odor in R. F. With soda and charcoal powder in a matrass yields a sublimate of metallic arsenic. With the fluxes reacts for iron and manganese. In the forceps fuses at 2, giving an intense soda flame. Decomposed by sulphuric acid with evolution of fluohydric acid.

Found near Durango in Mexico. The chemical composition of this mineral places it near amblygonite, an analogous fluo-phosphate, although the form of durangite is monoclinic while amblygonite is triclinic.

35. *Dyscrasite.* *T. Petersen* (Pogg. Ann., cxxxvii. 377), in a review of the analyses of dyscrasite, endeavors to show that there are two native compounds of antimony and silver, to one of which he gives the name *stibiotriargentite* ($Ag^3 Sb^2$), and the other, *stibiohexargentite* $Ag^6 Sb^2$. The former has a density of 9·611–9·77, and the latter 10·027. All recorded analyses that do not give one of these formulas he considers either to be erroneous or to have been made on a mixture of the above minerals.

617 A. EOSITE. *A. Schrauf*, Min. Beobachtungen, ii. 20, in Sitzb. Ak. Wien, February, 1871.

Tetragonal, in minute octahedrons ($\frac{1}{3}$ mm. diam.) a : b : c=1·3758 : 1 : 1. (Basal angle of octahedron 125° 40′). Inclination of basal plane to octahedral 117° 10′. H.=3–4. Color deep aurora-red, between that of crocoite and realgar, and much darker than red wulfenite. Streak brownish orange-yellow. Heated in the closed tube darkens, but regains its color on cooling. Fused with bi-sulphate of potash gives a mass which is light yellow while hot, becomes, on cooling, first reddish-brown and finally brownish orange-yellow. This dissolved in water and boiled with tin-foil colors the solution faint greenish-blue. Not so rapidly acted upon by muriatic acid as crocoite or wulfenite. When a splinter of eosite is placed on a glass plate, and treated with muriatic acid, with subsequent addition of alcohol, and then gently evaporated, it affords a blue to bluish-green coating, with a green precipitate on the edges. From these reactions, and a series of comparative tests made with crocoite, wulfenite, and vanadinite, Schrauf concludes that eosite is vanadio-molybdate of lead. Found implanted in very minute crystals on pyromorphite and cerussite at Leadhills, Scotland.

122 A. EPIBOULANGERITE. *M. Websky*, ZS. G. Ges., 1869, p. 747.

Orthorhombic ? occurring in striated prismatic needles G.=6·309. Lustre metallic. Color dark bluish gray, almost black. Structure granular, acicular. Analyses, 1.2, Websky (l. c.):

	S	Sb	Pb	Ni	Fe	Zn
1. Granular.	21·89	20·77	56·11	0·20	0·60	0·29=99·86
2. Needles.	21·31	20·23	54·88	0·30	0·84	1·32=98·88

Websky considers the mineral as probably a product of the decomposition of Boulangerite, from which it differs in containing more sulphur and correspondingly less antimony. Found with galena, pyrite, blende, and mispickel, at Altenberg in Silesia.

132 A. EPIGENITE. *T. Petersen*, Pogg. Ann., cxxxvi. 502, Arsenikkupferwismutherz, Epigenit, *Sandberger.*

Orthorhombic, observed planes, *I*, $1\text{-}\breve{i}$, $1\text{-}\bar{i}$. $I \wedge 1\text{-}\bar{i}$=110° 50′. H.=3·5. Lustre feebly metallic. Color steel-gray. Streak black. Fracture granular.

Composition 6R S+$As^2 S^5$. Analysis, Petersen (l. c.):

	S	As	Fe	Cu	Bi	Ag Zn
1.	31·57	12·09	13·43	40·32	2·12	tr.=99·53
2.	32·34	12·78	14·20	40·68=100·00		

No. 2 is No. 1 after deducting the 2·12 Bi which was present as intermingled wittichenite, and as such was combined with 1·84 Cu and 0·98 S. In the closed tube gives first sulphur then sulphid of arsenic. B.B. on charcoal gives an arsenic reaction and a magnetic slag with copper globules. Soluble in nitric acid with separation of sulphur.

Occurs sparingly at Neuglück Mine in Wittichen.

289. *Epiphanite.* *Igelström*, Œfv. Ak. Stockh., 1868, p. 29. This name has been given to a chlorite like mineral from Tväran in Wermland, Sweden. The composition Igelström found to be $\ddot{\mathrm{Si}}$ 37·10, $\bar{\ddot{\mathrm{Al}}}$ 21·13, $\dot{\mathrm{Fe}}$ 20·00, $\dot{\mathrm{Mn}}$ tr, $\dot{\mathrm{Mg}}$ 14·03, $\dot{\mathrm{H}}$ 7·83=100·09. It approaches Kenngott's eukamptite (p. 307) and gives the same formula plus one atom of water $\mathrm{R}^2\,\ddot{\mathrm{Si}}+\bar{\ddot{\mathrm{Al}}}\;\ddot{\mathrm{Si}}+2\;\dot{\mathrm{H}}$.

449. *Euralite.* A name given by F. J. Wiik to a chloritic mineral occurring in seams in clefts of hyperite rock in the parish of Eura, Finland. It is apparently amorphous, but breaks under the hammer into prismatic fragments. H.=2·5. G.=2·62. Color dark-green to black. B. B. fuses easily to a magnetic globule. Soluble in muriatic acid. An analysi gave $\ddot{\mathrm{Si}}$ 33·68, $\bar{\ddot{\mathrm{Al}}}$ 12·15, $\bar{\ddot{\mathrm{Fe}}}$ 6·80, $\dot{\mathrm{Fe}}$ 15·66, $\dot{\mathrm{Mg}}$ 17·92, $\dot{\mathrm{Ca}}$ 1·34, $\dot{\mathrm{H}}$ 11·49=99·04. Wiik suggests that this composition is near delessite, which it also resembles in its mode of occurrence. (Jahrb. Min. p. 357.)

474. *Ferro-ilmenite*, a name given to a variety of columbite from Haddam, Connecticut (Hermann, J. pr. Chem., II. ii. 118).

93 A. GLAUCOPYRITE. *F. Sandberger*, J. pr. Chem., II. i. 230. Orthorhombic. Planes *i-ī*, *I*, *m-ī*. H.=4·5. G.=7·181. Lustre metallic. Color light lead-gray to tin-white. Streak grayish-black. Composition $\mathrm{Fe\,S^2+12\,(Fe, Co, Cu)\,(As, Sb)^2}$=S 2·47, As 69·45, Fe 28·08. Analysis R. Senfter (l. c.):

S	As	Sb	Fe	Co	Cu
2·36	66·90	3·59	21·38	4·67	1·14=100·04

In the closed tube gives a sublimate of arsenic with only a small amount of sulphid. B. B. on charcoal gives arsenic fumes with an antimony coating. After roasting yields with soda a magnetic slag with spangles of metallic copper. With the fluxes reacts for iron and cobalt. Decomposed by nitric acid leaving a residue of antimonic acid. Found in the mines of Guadalcanal in Andalusia, Spain. Belongs near Lölingite, p. 77.

Guano Minerals. C. U. Shepard, Rural Carolinian, i. 470. The substances described occur in the guano of Guanape Island, 400 miles north-east of the Chincha Islands.

Guanapite occurs in irregular balls and veins looking like red rock-salt but having a rhombic cleavage. H.=1–2. G.=2·3. Soluble in 4–5 pts. of water at 60°. Taste bitter and saline. Analysis gave sulphate of potash 67·75, sulphate of ammonia 27·88, oxalate of ammonia 3·75=99·38. It loses ammonia on exposure to the air. Heated to redness leaves a residue of about 70 pr. ct. of sulphate of potash. It is near Taylorite (p. 614) in composition. *Guanoxalate* is stated to be a pseudomorph of birds' eggs; the specimens are exteriorly white, "and seem to retain portions of the original shell, but these when tested seemed to be a mixture of phosphate and oxalate of lime." Within the substance is foliated and has a rhombic cleavage. Color cream white; lustre pearly; translucent. H.=1–2. G.=1·58. When heated swells up, turns black, partially fuses, gives off ammonia fumes, and leaves a white residue of sulphate of potash. Composition stated to be sulphate of potash 40·20, oxalate of ammonia 29·57, water 30·46=100·23—a very doubtful compound. *Oxammite*, *phosphammite*, and *biphosphammite* are other names given by Shepard for supposed new species consisting of oxalate of ammonia, phosphate of ammonia, and biphosphate of ammonia.

422 A. GÜMBELITE. *F. von Kobell*, Ber. Ak. München, March 5th, 1870.

In thin, short fibrous layers in clay slate. Color light greenish-white. Translucent. Lustre pearly. Soft and flexible. Analysis, v. Kobell (l. c.):

$\ddot{\mathrm{Si}}$	$\bar{\ddot{\mathrm{Al}}}$	$\bar{\ddot{\mathrm{Fe}}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$	$\grave{\mathrm{X}}$[a]
50·52	31·04	3·00	1·88	3·18	7·00	1·46=98·08.

(a) Undecomposed mineral.

The oxygen ratio of $\dot{\mathrm{R}}$, $\bar{\mathrm{R}}$, $\ddot{\mathrm{Si}}$ and $\dot{\mathrm{H}}$ is as 1 : 12 : 21 : 5, which scarcely leads to a satisfactory formula. In the closed tube yields water. B. B. exfoliates somewhat like pyrophyllite. Fuses at 4. Not acted upon by acid.

Found at Nordhalben near Steben, in Oberfranken. The composition approaches that of pinite or neurolite (p. 482).

Hallite. A name given by A. R. Leeds to a flexible micaceous mineral of a brown color occurring in Chester Co., Pa., and supposed to possess distinguishing optical properties (Jour. Frank. Inst., III. lxii. 70.)

Hartartite. See Bastnaesite.

259 A. HORTONOLITE. *G. J. Brush*, Am. J. Sci. II., xlviii. 17., July, 1869.

Orthorhombic. Observed planes *O*, *i*-ĭ, *i*-2̆, 1-ī, 1-ĭ, 1-2̆ and 1-4 (J. M. Blake, l. c.), *i*-ĭ ∧ *i*-2̆ =65° (normals) 1-4 ∧ *i*-ĭ=77°–80°, *i*-ĭ ∧ 1-2̆=69°–70°. *i*-ĭ ∧ 1-ĭ 40° 45′. Acute bisectrix perpendicular to *i*-ĭ, optic axes in a plane parallel to *O*, angle between axes 83°–86, measured in olive oil (J. M. Blake). H.=6·5. G.=3·91. Lustre vitreous, subresinous. Color yellow to yellowish-green, in large masses almost black. Composition $\dot{R}^2\ddot{Si}$. Analysis, W. G. Mixter (l. c.):

$\ddot{Si}$	$\dot{Fe}$	$\dot{Mn}$	$\dot{Mg}$	$\dot{Ca}$	$\dot{K}$	Ign.
$\frac{3}{2}$ 33·59	44·37	4·35	16·68	tr.	0·39	0·26=99·64

B. B. in the open tube and on charcoal becomes dull and magnetic. F=4. With the fluxes reacts for iron and manganese. Gelatinizes with muriatic acid.

Found in abundance at the O'Niel Mine, Orange Co., N. Y., associated with magnetite and calcite. The mineral is a member of the chrysolite group, and is intermediate between hyalosiderite and fayalite.

Hypochlorite. See Bismutoferrite.

224 A. ILSEMANNITE. *H. Höfer*, Jahrb. Min., 1871, p. 566.

Crypto-crystalline. Color blue-black to black, on exposure becoming blue. Found imbedded in barite. It is soluble in water, giving a deep-blue solution, and leaving a colorless residue of barite. The solution contained on analysis chiefly a molybdate of molybdic oxyd, and yielded on evaporation deep-blue crystals, which were considered to be the salt $\dot{Mo}$ + 4 $\ddot{Mo}$, which is also supposed to be the composition of the mineral. Ilsemannite is a product of the decomposition of metallic molybdates, and occurs associated with wulfenite at Bleiberg in Carinthia.

431 A. IVIGTITE. *T. D. Rand*, Proc. Acad. Sci. Philad., 1868, 142.

In films and seams in massive cryolite. Granular, approaching micaceous. H.=2–2·5. G.=2·05. Color pale yellowish-green to yellow (Rand). Also in gold yellow to pale green radiated elastic plates imbedded in cryolite (Hagemann). Analyses: 1. T. D. Rand (l. c.); 2. 3. G. Hagemann, Am. J. Sci., II. xlvii. 133:

	$\ddot{Si}$	$\ddot{\overline{Al}}$	$\ddot{\overline{Fe}}$	$\dot{Na}$	$\dot{K}$	F	$\dot{H}$
1.	36·49	24·09	7·54	16·03	—	0·75	3·42
2. Yellow	40·00	38·47		10·27	1·05	tr.	3·06
3. Green	42·82	27·03	13·06	*undet.*	*undet.*	tr.	3·93

The loss in No. 1, exclusive of fluorine, is 11·68 per cent., while the average of Nos. 2 and 3 gives a loss of almost 5 per cent. In the closed tube yields acid water, and B. B. according to Rand fuses easily, while Hagemann states that when free from cryolite it does not fuse. With the fluxes gives iron and silica reactions.

Found with pachnolite and cryolite in the Greenland cryolite. Hagemann's analysis of the green mineral, which he considers the purest variety, gives with the alkalies of No. 2 the oxygen ratio of $\dot{R}$, $\ddot{\overline{R}}$, $\ddot{Si}$ and $\dot{H}$ of 1 : 6 : 8 : 1. Needs further investigation.

520 A. ISOCLASITE. Isoklas, *F. Sandberger*, J. pr. Chem., II. ii. 125.

Monoclinic. Occurring planes *I*, *i*-ĭ, *O*. Planes dull; crystals minute (10 mm. diam.), Associated with pseudomorphic crystals 3·7 c. m. long. Habit. columnar. Clinodiagonal cleavage perfect. H.=1·5. G.=2·92. Lustre vitreous to pearly. Colorless to snow-white. Composition: Var. 1. fresh crystals; 2. altered mineral, by Köttnitz, l. c.:

	$\ddot{\overline{P}}$	$\dot{Ca}$	$\dot{Mg}$	$\dot{Na}$	$\ddot{\overline{Fe}}\ \ddot{\overline{Al}}$	$\dot{H}$(a)	$\dot{H}$(b)	Ins.
1.	29·90	49·51		—	——	2·06	18·53	——=100·0
2.	34·00	1·00	17.30	9·80	0·36	24·26	9·22	0·18=96·12

(a) at 100° C., (b) on ignition.

The fresh crystals give the formula $\dot{Ca}^3\ddot{\overline{P}} + \dot{Ca}\dot{H} + 4\dot{H}$. Analogous in composition to tagilite, but containing more water.

In the closed tube both varieties give off neutral water. B. B. the fresh mineral glows and fuses. Soluble in muriatic acid.

Found with hornstone and brown-spar on specimens from Joachimsthal, obtained eighty years ago, and now in the Würzburg Museum.

188 A. JACOBSITE. *A. Damour*, C. R., lxix. 168.

Isometric, in distorted octahedrons, H.=6? (scratches glass). G.=4·75. Lustre brilliant metallic. Color deep black. Streak blackish-brown. Magnetic.

Composition: $\dot{\mathrm{R}}$, $\overset{\dots}{\overline{\mathrm{R}}}$, or ($\dot{\mathrm{Mn}}$ $\dot{\mathrm{Mg}}$) ($\overset{\dots}{\overline{\mathrm{Fe}}}$ $\overset{\dots}{\overline{\mathrm{Mn}}}$)

	$\overset{\dots}{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Mn}}$	$\dot{\mathrm{Mg}}$
$\frac{4}{4}$	68·25	24·35	6·41=99·01

As the mineral evolves chlorine feebly when acted upon by muriatic acid; Damour considers a portion of the manganese to exist as $\overset{\dots}{\overline{\mathrm{Mn}}}$, giving for the true composition of the mineral, in correspondence to the spinel formula, $\overset{\dots}{\overline{\mathrm{Fe}}}$ 68·25, $\overset{\dots}{\overline{\mathrm{Mn}}}$ 4·21, $\dot{\mathrm{Mn}}$ 20·57, $\dot{\mathrm{Mg}}$ 6·41=99·44.

B. B. infusible. It does not lose weight when ignited. With the fluxes reacts for iron and manganese. Soluble in muriatic acid, with a slight evolution of chlorine.

From Jacobsberg, in Nordmark, Sweden, where it occurs associated with white mica and native copper in a crystalline limestone

127 A. JULIANITE. *M. Websky*, ZS. G. Ges., 1871, p. 486.

Isometric. Cubic with octahedral and dodecahedral planes. Also dodecahedral. Planes much rounded.

G.=5·12. Very soft. Lustre metallic-adamantine. Color dark, somewhat reddish lead-gray, iron black on exposure. Brittle. Fracture splintery to subconchoidal.

Analysis by Websky (l. c.):

S	As	Sb	Fe	Ag	Cu
26·50	16·78	1·42	0·79	0·54	52·30=98·33

Giving a composition approaching tennantite or enargite. It agrees with the former in crystalline form, but differs in density from both these species.

B. B. Same as tennantite. Found in the Frederick-Julian Mine at Rudelstadt, in Silesia.

121 A. KLAPROTHOLITE. Klaprothit, *Petersen* and *Sandberger*, Jahrb. Min., 1868, 415. Klaprotholite, *G. J. Brush*.

This name is given to the Kupferwismutherz analyzed by Schneider, and recorded in this Mineralogy under Wittichenite, p. 99, anal. 7. Sandberger gives the following characters:—Orthorhombic, habit in long furrowed prisms. Planes I, i-$\bar{i}$, m-$\bar{i}$; $I \wedge I$=107°. Cleavage i-$\bar{i}$ very distinct. In twins, composition-face I. Fracture granular. H.=2·5. G.=4·6 approx. (Petersen). Lustre metallic. Color steel-gray inclining to yellow, tarnishing brass-yellow. Streak black. Composition, $3\,\overline{\mathrm{Cu}}\,\mathrm{S}+\overline{\mathrm{Bi}}^{2}\,\mathrm{S}^{3}$=S 19·22, Bi 55·54, Cu 25·24=100. The mean of three analyses by Petersen gave, on mineral from the Daniel Mine, S 18·66, Bi 53·87, Cu 23·96, Fe 1·70=98·19. Occurs at many localities in the Black Forest, and distinguished from wittichenite by its distinct cleavage, and in its larger content of bismuth. Klaprotholite is generally associated with a cobalt-tetrahedrite, while wittichenite is usually found with smaltite. The name klaprothite was given to lazulite by Beudant in 1824, we therefore change Petersen's name to klaprotholite.

483 A. KOCHELITE. *M. Websky*, ZS. G. Ges., xx. 250, 1868.

Tetragonal? In columnar incrustations passing into rounded, apparently square octahedrons, occasionally showing prismatic planes. Color brownish isabella-yellow to honey-yellow. Translucent. Lustre dull greasy. H.=3–3·5. G.=3·74, taken on 0·1373 grm.

Composition. An imperfect analysis gave $\ddot{\mathrm{Si}}$ 4·49, $\overset{\dots}{\overline{\mathrm{Al}}}$ 1·41, $\ddot{\mathrm{Cb}}$ 29·49, $\ddot{\mathrm{Zr}}$ 12·81, $\ddot{\mathrm{Th}}$ 1·23, $\dot{\mathrm{Y}}$ 17·22, $\dot{\mathrm{Ca}}$ 2·10, $\overset{\dots}{\overline{\mathrm{U}}}$ 0·43, $\overset{\dots}{\overline{\mathrm{Fe}}}$ 12·48, $\dot{\mathrm{H}}$ 6·52, $\dot{\mathrm{Pb}}$? $\dot{\mathrm{Na}}$? Loss 11·82=100.

In the closed tube yields water, and the mineral turns reddish. B. B. in the forceps fuses only on the edges to a black glass, coloring the flame yellow. With salt of phosphorus reacts for iron, but in R. F. fuses to a clear bead, showing only a faint reaction for uranium. With soda on charcoal yields a yellowish-white enamel, but no metallic globules, although giving a lead coating on the coal. Occurs as an incrustation upon a mixture of titanic iron and crystals of fergusonite in a coarse granite in the Kochelwiesen, near Schreiberhau in Silesia.

The composition is near that of fergusonite, but further investigation is needed. The density is remarkably low for a mineral containing so large a percentage of metallic acids.

518 A. *Kollophan.* This name has been given by Sandberger to a gymnite-like looking substance found with Sombrero guano. It is a tri-basic phosphate of lime with one atom of water, mixed with about 8 per cent. of carbonate of lime. G. =2·70. H.=5. J. pr. Chem., II. ii. 129.

644 A. LAXMANNITE. *A. E. Nordenskiöld*, Pogg. Ann., cxxxvii. 299, 1869.

Monoclinic. C.=69° 46′. $a:b:c=1{\cdot}3854:0{\cdot}7400:1$. Occurs in wedge-shaped forms with sharp edges. H.=3. G.=5·77. Color dark olive-green to pistachio-green and greenish-gray. Streak pistachio-green. Fracture, crystalline to compact and earthy. Composition $(\frac{2}{3}\,\dot{\mathrm{C}}\mathrm{u}+\frac{1}{3}\,\dot{\mathrm{H}})^3\ \overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}+3\ (\dot{\mathrm{P}}\mathrm{b},\ \dot{\mathrm{C}}\mathrm{u})^2\ \dddot{\mathrm{C}}\mathrm{r}$=$\dot{\mathrm{P}}\mathrm{b}$ 61·48, $\dot{\mathrm{C}}\mathrm{u}$ 13·13, $\dddot{\mathrm{C}}\mathrm{r}$ 16·57, $\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$ 7·83, $\dot{\mathrm{H}}$ 0·99=100 Analyses 1. 2. Nordenskiöld (l. c.):

	$\dddot{\mathrm{C}}\mathrm{r}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$	$\dot{\mathrm{P}}\mathrm{b}$	$\dot{\mathrm{C}}\mathrm{u}$	$\overset{\cdot\cdot\cdot}{\bar{\mathrm{F}}}\mathrm{e}$	$\dot{\mathrm{H}}$
1.	15·26	8·05	61·26	12·43	1·09	1·31=99·40
2.	16·76	8·57	61·06	10·85	1·28	0·90=99·42

Hermann has reviewed these results (J. pr. Chem., II. i. 447), and called attention to the close correspondence of this species in physical characters with vauquelinite, and also to the fact that the analyses were made on material from the very specimens from which Berzelius obtained the vauquelinite. By assuming that what Berzelius weighed as chromic acid was really phosphate of chromium, the results of the analysis are made to approximate very closely to those of Nordenskiöld; and Hermann believes that laxmannite is probably identical with vauquelinite. But Nordenskiöld shows in his investigation that there is associated with laxmannite a chromate free from phosphoric acid corresponding to the vauquelinite of Berzelius.

Hermann has also analyzed a phospho-chromate from Beresof, to which he gives the name *phosphochromite*, a mineral resembling *laxmannite* in physical characters, but containing

	$\dddot{\mathrm{C}}\mathrm{r}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$	$\dot{\mathrm{P}}\mathrm{b}$	$\dot{\mathrm{C}}\mathrm{u}$	$\dot{\mathrm{F}}\mathrm{e}$	$\dot{\mathrm{H}}$
G.=5·80	10·13	9·94	68·33	7·36	2·80	1·16=99.72

This mineral occurs in rounded masses of half a pound weight, made up of globular particles, which exteriorly are covered with small tabular crystals with rounded terminations. It would seem possible that this aggregate might be a mixture rather than a distinct species; and this may perhaps also be true in regard to laxmannite. A chromo-phosphate of lead and copper from the same locality was described by John (this Min., p. 631) as early as 1845, but was thought to be an impure vauquelinite.

554. *Lime-Wavellite.* Kalkwavellit, *Kosmann*, Z. G. Ges., xxi. 795 (1869).

This name has been given to a mineral occurrring in concentric radiated spherical and hemispherical aggregations, sometimes in acicular crystals, as binding material in phosphorite-breccia; also found botryoidal and reniform. G.=2·45. Lustre feeble. Color white. Analysis, Kosmann (l. c.):

$\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$	$\overset{\cdot\cdot\cdot}{\bar{\mathrm{A}}}\mathrm{l}$	$\overset{\cdot\cdot\cdot}{\bar{\mathrm{F}}}\mathrm{e}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\mathrm{N}}\mathrm{a}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$	$\ddot{\mathrm{S}}\mathrm{i}$	$\ddot{\mathrm{C}}$	Ca Fl
24·10	30·26	0·29	16·16	0·12	3·58	0·89	17·90	3·59	2·78	0·37=100·04

Considering the carbonic acid to exist as carbonate of lime, and assuming the silica combined with the alkalies, Kosmann takes the remainder of the constituents $\dot{\mathrm{C}}\mathrm{a}$ 12·62, $\overset{\cdot\cdot\cdot}{\bar{\mathrm{A}}}\mathrm{l}$ 30·26, $\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$ 24·11, and $\dot{\mathrm{H}}$ 17·90=84·88, and averages them up to 100 pts. as follows, $\dot{\mathrm{C}}\mathrm{a}$ 14·86, $\overset{\cdot\cdot\cdot}{\bar{\mathrm{A}}}\mathrm{l}$ 35·65, $\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$ 28·39, $\dot{\mathrm{H}}$ 21·09=99·99, from which composition he concludes that the mineral is a *lime-wavellite.* In the closed tube yields water. B. B. fuses on the edges. Decomposed by muriatic acid with separation of gelatinous silica.

Found with phosphorite at Dehrn and Ahlbach. Needs further examination to determine its exact chemical composition.

218 D. LITHIOPHORITE (*Breithaupt*). *A. Frenzel*, J. pr. Chem., II. ii. 203 and iv. 353.

This is the substance already noticed by v. Kobell (Ber. Ak. München, Jan. 8, 1870, p. 49) as a lithia manganese ore in an examination of a so-called Asbolan from Saalfeld. Occurs in fine scales, also compact, botryoidal, H.=3. G.=3·65 (v. Kobell) 3·14—3.36 (Frenzel). Lustre dull to metallic. Color bluish-black. Streak blackish-gray. Composition: 1. 3. C. Winckler, J. pr. Chem., II. iv. 353.

	$\bar{\dddot{\mathrm{Fe}}}$	$\bar{\dddot{\mathrm{Al}}}$	$\ddot{\mathrm{Mn}}$	$\dot{\mathrm{Cu}}$	$\dot{\mathrm{Co}}$, $\dot{\mathrm{Ni}}$	$\dot{\mathrm{Ba}}$	$\dot{\mathrm{Li}}$	$\dot{\mathrm{K}}$	O	$\dot{\mathrm{H}}$	Ins.	
1.	1·48	10·54	55·12	1·74	2·42	2·78	1·23	0·73	10·28	12·64	—	=98·96
2.	2·43	15·53	49·87	0·96	0·64 0·30	1·26	1·42	1·50	7·77	15·42	3·08	=100·18

with traces of lime and bismuth. G. of No. 1=3·36, both specimens were from Schneeberg, Saxony. In a partial analysis v. Kobell obtained (l. c.) $\ddot{\mathrm{Mn}}$ 54·00, $\dot{\mathrm{Co}}$ 4·00, $\dot{\mathrm{Cu}}$ 0·61, $\bar{\dddot{\mathrm{Al}}}$ 23·00, $\dot{\mathrm{H}}$ 13.4.

Gives water in the tube. Infusible, colors the flame carmine-red. With the fluxes reacts for manganese; with salt of phosphorus in R. F. gives reactions for copper and cobalt. Soluble in muriatic acid with evolution of chlorine.

Found associated with quartz in many localities in the Schneeberg mining district, also occurs at Sayn, and near Siegen. Supposed to be a product of the decomposition of psilomelane. The large percentage of alumina and its content of lithia distinguish it readily from asbolite and lampadite.

598 A. *Lüneburgite.* C. Nöllner, Ber. Ak. München, 1870, 291.

This name has been applied by Nöllner to a salt from Lüneburg having the following composition: $\bar{\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}}$ 29·8, $\dddot{\mathrm{B}}$ 12·7, $\dot{\mathrm{Mg}}$ 25·3, $\dot{\mathrm{H}}$ 32·2=100. It also contains 0·7 Fl. Nöllner gives as formula for this substance (2 $\dot{\mathrm{Mg}}$, $\dot{\mathrm{H}}$) $\bar{\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}}$ + $\dot{\mathrm{Mg}}$ $\dddot{\mathrm{B}}$ + 7 $\dot{\mathrm{H}}$. No physical characters are stated.

1 A. MALDONITE. *G. H. F. Ulrich*, Contrib. to Mineralogy of Victoria, 1870, (pamphlet 32 pp. 8vo.).

In small particles in quartz, cleavage apparently cubical. H.=1·5–2. G.=8·2–9·7 ? (made on less than one grain of impure mineral). Color pinkish-white, but tarnishing on exposure to copper-color and then black. Malleable. An assay by C. Newbery showed the composition to be Au 64·5, Bi 35·5, or nearly Au^2 Bi. B. B. fuses easily; on charcoal coats the coal yellow and yields a globule of gold.

From Nuggety Reef, Maldon.

64 A. METACINNABARITE. *G. E. Moore*, J. pr. Chem. II. ii. 319 (1870). Am. J. Sci. III. iii. 36.

Amorphous, also found in small apparently isometric crystals, perhaps pseudomorphic. H.=3. G.=7·70–7·748. Lustre metallic. Color grayish-black. Streak black. Fracture sub-conchoidal, uneven. Very brittle. Composition: Hg S. Analyses 1. 2., G. E. Moore (l. c.):

	S	Hg	Fe	quartz
1.	13·79	85·69	0·33	0·26=100·07
2.	13·84	85·89	0·45	0·24=100·42

Blowpipe characters like cinnabar. Occurs at the Redington Mine, Lake Co., California, with cinnabar, quartz and marcasite. It differs from cinnabar in its amorphous character, in color, streak, specific gravity and lustre, while in these respects it is identical with the black artificial mercuric sulphide of the laboratory.

MILARITE. *A. Kenngott*, Jahrb. Min., 1870, 81.

Hexagonal. Occurring form a hexagonal prism with a plane of a hexagonal pyramid on each angle, and a narrow termination of the lateral edges; observed angle over a terminal edge of the pyramid 144° 46½′ (mean of results), and over a basal edge 74° 40′; the latter gives for the former, by calculation, 144° 42′.

H.=5·5–6. Lustre vitreous. Colorless to greenish, resembling the datholite crystals from Bergen Hill. Brittle. B. B. in the closed tube becomes white and gives off water. In the forceps fuses with intumescence to a white blebby glass. In salt of phosphorus slowly but completely soluble to a colorless glass. A partial qualitative analysis gave evidence of the presence of an alkali and besides probably lime. Kenngott considers it a zeolitic hydrous silicate of alumina, lime, and soda, but on uncertain evidence.

Found in Val Milar near Ruäras, Switzerland.

503. *Montebrasite. Des Cloizeaux*, C. R. lxxiii. 306, 1247. *L. Moissenet*, Ann. d. Mines, VI xx. 1 (1871). *F. Pisani*, C. R. lxxiii, 1479. *F. von Kobell*, Ber. Ak., München, Feb. 3, 1872.

This supposed fluo-phosphate from Montebras in France has recently been shown by Pisani and von Kobell to be identical with amblygonite. Des Cloizeaux found it to be triclinic, with two cleavages giving 105° 44′, and in the optical examination the bisectrix of the acute angle was positive, while in the Hebron amblygonite it is negative. Analyses by Moissenet (1), Pisani (2), and v. Kobell (3) afforded:

	F	$\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$	$\ddot{\bar{\mathrm{Al}}}$	$\ddot{\bar{\mathrm{Mn}}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{Li}}$	$\ddot{\mathrm{Si}}$	Ign.	
1.	26·50	21·80	38·20	—	2·00	6·70	6·50	2·25	0·60=104·55.	M.
2.	8·20	46·15	36·32	0·40	—	2·58	8·10	—	1·10=102·85.	P.
3.	9·00	45·91	35·50	—	0·50	5·30	6·70	0·60	0·70—104·21.	K.

Pisani's and v. Kobell's results give essentially the composition of amblygonite as analyzed by Rammelsberg, and as the physical and pyrognostic characters are also those of amblygonite, there can be no question as to the identity of the Montebras mineral with this species.

MONZONITE. *F. v. Kobell*, Ber. Ak. München, 6 May, 1871.

Compact. H.=6. G.=3. Color light grayish-green. Translucent on thin edges. Fracture splintery to sub-conchoidal. Resembles green hornstone. Analysis by v. Kobell (l. c.):

$\ddot{\mathrm{Si}}$	$\ddot{\bar{\mathrm{Al}}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
52·60	17·10	9·00	2·10	9·65	6·60	1·90	1·50=100·45

Giving the oxygen of $\dot{\mathrm{R}}$, $\ddot{\bar{\mathrm{R}}}$, and $\ddot{\mathrm{Si}}$ as 1 : 1 : 3·5.

B. B. fuses at 3 to a lustrous grayish-green glass. Not decomposed by acids after fusion. Not attacked by muriatic or sulphuric acids. Soluble in concentrated phosphoric acid.

Found on the Monzoni Mt. in the valley of Fassa, Tyrol. A microscopic examination of a thin plate of the mineral showed it to be homogeneous.

Næsumite. *C. W. Blomstrand*, Œf. Ak. Stockh., 1868, p. 197.

A chalk-white mineral, from Näsum, Sweden. It occurs mixed with the phosphate attacolite. After calculating out the phosphoric acid as $\ddot{\bar{\mathrm{Al}}}$ $\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\mathrm{P}}}$, the analysis gave $\ddot{\mathrm{Si}}$ 50·91, $\ddot{\bar{\mathrm{Al}}}$ 27·86, $\ddot{\bar{\mathrm{Fe}}}$ 1·36, $\dot{\mathrm{Mn}}$ 0·36, $\dot{\mathrm{Ca}}$ 13·82, $\dot{\mathrm{H}}$ 4·39=98·70. The oxygen ratio of $\dot{\mathrm{R}}$. $\ddot{\bar{\mathrm{R}}}$, $\ddot{\mathrm{Si}}$, $\dot{\mathrm{H}}$ is as 1 : 3 : 7 : 1. It may perhaps be classed near fahlunite.

510. NADORITE. *Flajolot*, C. R., lxxi. 237, 406. *F. Pisani*, C. R., lxxi. 319; *Des Cloizeaux*, Ann. d. M., VI. xx. 32, 1871.

In flattened tabular orthorhombic crystals, $I \wedge I$=132° 51′. Cleavage macrodiagonal, very easy. H.=3. G.=7·02. Lustre resinous to adamantine. Color smoky-brown to brownish-yellow. Streak yellow. Translucent. Analyses: 1. Pisani (l. c.); 2. Flajolot (l. c.):

	Sb	Pb	O	Cl
1.	31·24	51·89	8 14	9·00=100·27
2.	32·25	51·60	8·00	8·85=100·70

Pisani considers the mineral to correspond to the formula $\overset{\cdots}{\bar{\mathrm{Sb}}}$ $\dot{\mathrm{Pb}}$ + Pb Cl, while Flajolot looks upon it as a compound of oxychlorid of antimony with oxyd of lead. Pisani suggests its analogy with mendipite 2 $\dot{\mathrm{Pb}}$ + Pb Cl.

In the closed tube decrepitates and gives a white sublimate. B. B. on charcoal yields an antimony coating and a globule of metallic lead. Added to a bead of salt of phosphorus saturated with copper gives the blue coloration of the flame due to chlorid of copper. Soluble in muriatic acid; also in nitric acid diluted with tartaric acid.

From Djebel-Nador, in the province of Constantine, Algiers.

214 A. NAMAQUALITE. *A. H. Church*, Jour. Chem. Soc., II., viii. 1 (1870).

In silky fibres and thin layers. H.=2·5. G.=2·49. Lustre silky. Color pale-blue. Transparent to translucent. Analysis by Church (l. c.):

$\ddot{\bar{\mathrm{Al}}}$	$\dot{\mathrm{Cu}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$	$\ddot{\mathrm{Si}}$	$\dot{\mathrm{H}}$
15·29	44·74	3·42	2·01	2·25	32·38=100·09

Giving the oxygen ratio of $\dot{\mathrm{R}}$, $\ddot{\bar{\mathrm{R}}}$ and $\dot{\mathrm{H}}$ as 4 : 3 : 11, or 4 $\dot{\mathrm{R}}$ $\dot{\mathrm{H}}$ + $\ddot{\bar{\mathrm{Al}}}$ $\dot{\mathrm{H}}^3$ + 4 $\dot{\mathrm{H}}$.

In the closed tube gives off water and turns black. B. B. reacts for copper.

From Namaqualand, S. Africa. It is analogous in composition to hydrotalcite (p. 178).

146 A. NANTOKITE. An anhydrous sub-chlorid of copper from Nantoko in Chile. Occurs in a copper vein with atacamite and oxydized ores at the surface, while lower down in the vein this anhydrous chlorid is found with chalcopyrite and chalcocite. The mineral is white, resembles cerussite in physical characters. It oxydizes on exposure to the atmosphere, and is converted into atacamite. W. Hermann considers all atacamite the product of the alteration of nantokite (*Breithaupt* in B. and H. Ztg. xxvii. 3).

247 D. NIGRESCITE. *F. Hornstein*, ZS. G. Ges., 1867, 342.

Amorphous. Fracture uneven and splintery. H.=2. G.=2·845. Color, when fresh, apple-green; on exposure becomes gray to black; opaque and earthy, and, on drying, as light as wad. Loses 16·5 per cent. hygroscopic water.

Analysis:

$\ddot{Si}$	$\dddot{\bar{Al}}$	$\dot{Fe}$	$\dot{Mn}$	$\dot{Mg}$	$\dot{Ca}$	$\dot{H}$
52·29	5·14	15·71	0·23	18·11	2·59	6·29=100·36

Perhaps the product of the alteration of a magnesia-iron augite or amphibole.

Found in rounded masses in basalt, at Dietesheim, in the valley of the Maine.

Orileyite. *D. Waldie*, Proc. Asiatic Society, Bengal, p. 279. September, 1870.

Massive. H.=5·5. G.=7·34—7·42. Color steel-gray, on fresh fracture with purplish tint. Lustre metallic. Streak dark-gray. Analysis, D. Waldie (l. c.):

As	Sb	Cu	Fe	X	Insol.
38·45	0·54	12·13	42·12	6·19	0·12=99·55

X, oxydized matters soluble in dilute muriatic acid = $\dot{Cu}'$1·21, $\dot{Fe}$ 1·97, $\dot{Pb}$ 1·89, $\dddot{\bar{As}}$ 1·12= 6·19. B. B. in the closed tube yields no arsenic. Soluble in nitric acid.

From Burmah, but exact locality not known. Needs further investigation.

Osbornite.—This name has been given by Maskelyne to small gold-yellow octahedrons occurring in augite in a meteorite from Busti, India. It is supposed to be an oxysulphid of titanium and calcium.

Phosphorchromite. See Laxmannite.

374. *Plumballophane.* A name given by Bombicci to a plumbiferous allophane from Monte Vecchio in Sardinia. Occurs in small stalactitic cylinders, rough and opaque on the surface, but interiorly glassy. Color grayish-yellow with a white streak. H.=2·5. G.=1·9. Analysis gave $\ddot{Si}$ 23·8, $\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{P}}$ 2·6, $\dddot{\bar{Al}}$ 32·9, $\dddot{\bar{Fe}}$ 0·5, $\dot{Ca}$ 2·4, $\dot{H}$ 35·2, $\dot{Pb}$, $\dot{Mg}$ and alkalies 2·5=99·9 (Atti della Sc. Ital. di Sc. Nat. xi., in Jahrb. Min. 1868, p. 750.

40 C. POLYARGYRITE. *F. Sandberger*, Jahrb. Min., 1869, 311. *T. Petersen*, Pogg. Ann., cxxxvii. 386. 1869.

Isometric. Observed planes 1 *O* *i*, *m-m*. Cleavage cubic. H.=2·5. G.=6·974. Lustre metallic. Color iron-black to dark blackish-gray. Streak black to blackish-gray. Malleable, flattening more under the hammer than argentite.

Composition: $12\,Ag\,S + Sb_2S_3$=Ag. 78·16, Sb 7·37, S 14·47=100·00.

Analysis, Petersen (l. c.):

S	Sb	Ag	Pb	Fe	Zn
14·78	6·98	76·70	tr.	0·36	0·27*=99·09

* Corrected.

B. B. on charcoal fuses easily to a black globule, giving off antimony fumes, and yielding a brittle globule of silver. Soluble with difficulty in nitric acid with separation of sulphur. Fuming acid dissolves it readily with separation of antimonate of silver.

Occurs at Wolfach in Baden.

The mineral is between argentite and pyrargrite in composition. If homogenous it would be classified chemically near polybasite; but its isometric form, and the fact that in another analysis Petersen found 78·85 Ag, suggests that it may possibly be a mixture.

624. PUCHERITE. *A. Frenzel*, J. pr. Chem., II. iv. 227, 361.

Orthorhombic. Observed planes *I*, *O*, 1-$\breve{n}$, *m-u*. Cleavage basal. H.=4. G.=5·91. Lustre vitreous adamantine. Color reddish-brown. Streak yellow. Translucent to opaque. Composition: $\dddot{\bar{Bi}}\,\overset{\cdot\cdot\cdot\cdot\cdot}{V}$=$\dddot{\bar{Bi}}$ 71·67 $\overset{\cdot\cdot\cdot\cdot\cdot}{V}$ 28·33=100. Analyses, 1. 2. Frenzel (l. c.):

	$\overset{\cdot\cdot\cdot\cdot\cdot}{V}$	$\dddot{\bar{Bi}}$
1.	27·31	73·39=100·70
2.	27·07	72·93=100 —

In the closed tube decrepitates. B. B. on charcoal fuses and gives a coating of bismuth-oxyd, with soda yields a globule of metallic bismuth. With salt of phosphorus a chrome-green bead in R. F. becoming light yellow in O. F. (vanadium). Soluble in muriatic acid with evolution of chlorine to a deep-red solution, which on dilution becomes green and deposits a yellow basic chlorid.

Named pucherite from the locality, the Pucher Mine, Schneeberg, Saxony. Found associated with bismite and asbolite.

218 E. RABDIONITE. *F. von Kobell*, Ber. Ak. München, January 8, 1870.

Stalactitic, in columnar or rod-like forms. Very soft, soiling the fingers. G.=2·80. Lustre dull, after rubbing is greasy to submetallic. Color black. Streak dark-brown. Composition ·

$\ddot{\overline{\text{F}}}\text{e}$	$\ddot{\overline{\text{M}}}\text{n}$	$\ddot{\overline{\text{A}}}\text{l}$	$\dot{\text{C}}\text{u}$	$\dot{\text{M}}\text{n}$	$\dot{\text{C}}\text{o}$	$\dot{\text{H}}$
45·00	13·00	1·40	14·00	7·61	5·10	13·50=99·61

The oxygen ratio of $\dot{\text{R}}$: $\ddot{\overline{\text{R}}}$: $\dot{\text{H}}$ is 1 : 3 : 2, and v. Kobell writes the formula ($\dot{\text{C}}\text{u}$, $\dot{\text{M}}\text{n}$, $\dot{\text{C}}\text{o}$) ($\ddot{\overline{\text{F}}}\text{e}$. $\ddot{\overline{\text{M}}}\text{n}$) + 2 $\dot{\text{H}}$.

In the closed tube gives neutral water. B. B. fuses at 3 to a steel-gray, magnetic-globule, and colors the flame green. With borax gives a cobalt blue bead. Soluble in muriatic acid with evolution of chlorine, giving an emerald-green colored solution.

From Nischne Tagilsk in Ural. The mineral is near asbolite (p. 181), but differs from it in chemical composition, in containing a large percentage of iron, and in being easily fusible.

163 A. RALSTONITE. *G. J. Brush*, Am. J. Sci., III. ii. 30. July, 1871.

Isometric. Habit octahedral. Observed planes 1, *O* (this Min. fig. 7, p. 21). H.=4·5. G.=2·4 (on 25 milligrams). Composition, a hydrous fluorid of aluminum, with possibly small quantities of calcium and sodium.

In the closed tube whitens, yields water at first, then a copious white sublimate which etches the tube. The water reacts acid. B. B. on charcoal a faint white sublimate. In the forceps whitens, colors the flame yellow, but does not fuse. With cobalt solution gives a deep blue. In salt of phosphorus dissolves completely to a colorless bead in both flames. Soluble with effervescence in a carbonate of soda bead. Decomposed by sulphuric acid with evolution of fluohydric acid.

Occurs with cryolite and thomsenolite at Arksut Fiord, Greenland.

Redondite. A name given by C. U. Shepard to a hydrous phosphate of alumina and iron from Redonda, W. I. Found in nodular aggregations. Translucent to opaque. Color grayish to yellowish white. H.=3·5. G.=1·90–2·07. Specimen analyzed contained 8·8 per cent. $\ddot{\text{S}}\text{i}$, 40·192 $\dddot{\overline{\text{P}}}$ and 24·73 $\dot{\text{H}}$ (Am. J. Sci. II. l. 96). An earlier analysis gave $\dddot{\overline{\text{P}}}$ 43·20, $\ddot{\overline{\text{F}}}\text{e}$ 14·40. $\ddot{\overline{\text{A}}}\text{l}$ 16·60, $\dot{\text{H}}$ 24·00, $\ddot{\text{S}}\text{i}$ 1·60, $\dot{\text{C}}\text{a}$ 0.57=100·37, contained also traces of $\dddot{\text{S}}$, Na, Cl, and $\dot{\text{M}}\text{g}$. B. B. infusible. Heated with solution of cobalt gives a deep blue color (Am. J. Sci., II. xlvii. 428.

422. *Restormelite.* A name given by A. H. Church (Jour. Chem. Soc. II. viii. 166) to a massive grayish-green agalmatolite-like mineral from Restormel Mine in Cornwall. H.=2. G.=2·58. Mean results of analysis gave $\ddot{\text{S}}\text{i}$ 45·66, $\ddot{\overline{\text{A}}}\text{l}$ 35·10, $\dot{\text{F}}\text{e}$ 1·11, $\dot{\text{M}}\text{g}$ 0·85, $\dot{\text{K}}$ 2·30, $\dot{\text{N}}\text{a}$ 4·39, $\dot{\text{H}}$ 11·68=101·09. This composition is near that given by Lehunt and Blythe for killinite (anal. 29 and 30, under pinite, p. 481). Church does not consider the mineral worthy to rank as a distinct species, but speaks of it as an "*immature* kaolinite."

261 A. ROEPPERITE. Iron, manganese, zinc, chrysolite. *W. T. Roepper*, Am. J. Sci., II. l. 35. Roepperite, *G. J. Brush*.

Orthorhombic, observed planes i-$\bar{2}$, i-$\breve{\imath}$, 1-$\bar{\imath}$, i-$\bar{\imath}$, 1-$\breve{\imath}$, 1-$\bar{4}$, *O*, 2-2. i-$\bar{2}$ $\wedge$ i-$\bar{2}$ (over i-$\bar{\imath}$) 130°, i-$\breve{\imath}$ $\wedge$ i-$\bar{2}$=115° 1-$\bar{\imath}$ $\wedge$ 1-$\bar{\imath}$=77°. Cleavage in three directions rectangular, *O* and i-$\breve{\imath}$ eminent, i-$\bar{\imath}$ splintery. H.=5·5–6. G.=3·95–4·08. Lustre on cleavage planes vitreous to subadamantine. Color dark-green to black, mottled. In thin splinters translucent and pale-yellow color. Streak yellow to reddish-gray. Slightly magnetic. Composition: $\dot{\text{R}}^2\ddot{\text{S}}\text{i}$. $\dot{\text{R}}$ =$\dot{\text{F}}\text{e}$, $\dot{\text{M}}\text{n}$, $\dot{\text{Z}}\text{n}$ and $\dot{\text{M}}\text{g}$. Analyses 1. 2. 3., W. T. Roepper (l. c.):

	$\ddot{\text{S}}\text{i}$	$\dot{\text{F}}\text{e}$	$\dot{\text{M}}\text{n}$	$\dot{\text{Z}}\text{n}$	$\dot{\text{M}}\text{g}$	Insol.*
1. Cryst.	30·76	33·78	16·25	10·96	7·60	——=99·35
2. Cryst. $\frac{3}{2}$	30·23	35·52	16·91	10·68	5·63	1·04=100.01
3. Mass. $\frac{2}{2}$	30·54	34·78	17·74	9·48	6·09	2·02=100·65

* Spinel.

B. B. fuses with difficulty on the thin edges to a black slag. With the fluxes reacts for iron, manganese, and silica; on charcoal with soda gives a zinc coating. Gelatinizes with acids readily and completely, leaving sometimes a bright-green residue of spinel.

Occurs at Stirling Hill, Sussex Co., N. J., with willemite, franklinite, jeffersonite, and spinel; also found at Franklin Furnace with gahnite.

393 A. *Reissite.* A name given by K. v. Fritzsch to a zeolitic mineral from Santorin According to Hessenberg (his Min. Notizen, No. 9, p. 22) it is orthorhombic with the axia relation for the brachydiagonal, macrodiagonal, and vertical axis. 0·4231 : 1 : 0·2866. Observed planes *I*, *i*-ĭ, 1-ī, 2-ĭ. Cleavage brachydiagonal. Lustre vitreous. Colorless to white. Fusible with intumescence to a blebby enamel. Gelatinizes with acids more readily after fusion than before. The solution contains lime and alkalies. Hessenberg considers it probable that reissite is identical with Breithaupt's species monophane, and distinct from epistilbite.

125. *Rionite.* A name given by Brauns to a bismuth-tetrahedrite from Cremenz, Einfischthal in Wallis Canton, Switzerland. It has a conchoidal fracture, an iron-black color, black streak, and greasy-metallic lustre. An analysis gave S 29·10, As 11·44, Sb 2·19, Bi 13·07, Cu 37·52, Ag 0·04, Fe 6·51, Co 1·20=101·07. Found associatad with chalcopyrite. It is worked as an ore of bismuth. The composition places it near annivite, p. 103. (T. Petersen in Jahrb. Min., 1870, 590).

The name *Rionite* was used formerly for a supposed selenid of zinc, described by Del Rio, and *Riolite* for a supposed selenid of silver as well as the preceding, but both names have been dropped from the science, the material on which they were founded being only a mixture.

807 A. ROSTHORNITE. *H. Höfer*, Jahrb. Min., 1871, p. 561.

In lenticular masses in coal. G.=1·076. Lustre greasy. Color brown, with garnet-red reflections: in thin splinters wine-yellow. Composition: Ꞓ$_{24}$ H$_{40}$ Ɵ. Analysis by Mitteregger (l. c.):

	C	H	O
$\frac{2}{2}$	84·42	11·01	4·57=100·00

At 96°C. commences to melt to a viscous brownish-red mass, which at 160° gives off bubbles and at 205° white fumes, heated to 225° the evolution of gas ceases, leaving a thin dark purplish-red fluid. Insoluble in dilute nitric acid as also in potash or alcohol. Slightly soluble in warm ether and entirely so in warm oil of turpentine. Completely soluble in benzole at ordinary temperatures. From Sonnberge, Carinthia. Resembles jaulingite in physical characters, while it is near euosmite in chemical composition.

499. SARCOPSIDE. Sarkopsid, *M. Websky*, ZS. G. Ges., xx. 245, 1868.

Monoclinic? occurring in irregular ellipsoids, sometimes in distorted six-sided plates.

H.=4. G.=3·692–3·730. Lustre glistening to silky and greasy. Color, on fresh surface, flesh-red to lavender-blue. Translucent in thin splinters. Streak straw-yellow, some grains give a green color. Composition: $4\dot{R}^3\,\overset{\cdot\cdot}{\bar{P}} + (R\,Fl + \overset{\cdot\cdot}{\bar{R}}\,\dot{H})$ Websky:

	$\overset{\cdot\cdot}{\bar{P}}$	$\overset{\cdot\cdot}{\bar{Fe}}$	$\dot{Fe}$	$\dot{Mn}$	$\dot{Ca}$	$\dot{H}$	Fl
$\frac{2}{2}$	34·73	8·83	30·53	20·57	3·40	(1·64)	undet.

In the closed tube gives water which reacts for fluorine, turns dark-brown and assumes a sub-metallic lustre. Fuses very easily, may be melted to a bead on platinum wire, and this imparts a blue-green color to the outer flame. With the fluxes reacts for iron and manganese, and fused with bi-sulphate of potash in a closed tube reacts for fluorine, coloring brazil-wood paper and etching the tube. Soluble in dilute muriatic and sulphuric acids.

Occurs with vivianite and hureaulite in a granite vein on a ridge between Michelsdorf and the valley of the Mühlbach in Silesia. This mineral corresponds so closely to triplite (p. 543) in chemical composition and pyrognostic characters, as also in density and hardness, as to make it exceedingly probable that it may be a variety of that species.

163 B. SELLAITE. *Strüver*, Atti della R. Accad. di Torino, iv. 1868, 35.

Tetragonal, *I* on 1=123° 30′, *i*-*i* on *i*-3 161° 34′. Cleavage parallel to *I* and *i*-*i* perfect. H.=5. G.=2·972. Lustre vitreous. Fracture conchoidal. Colorless. Transparent. Composition: MgFl? In small fragments melts in the flame of a candle with intumescence. Insoluble in water, also in acids, except concentrated sulphuric acid, with this it evolves fluohydric acid. The sulphuric solution gave 39·64 pr. ct. of magnesia, which with the other chemical and physical properties of the mineral leads Strüver to consider the mineral a fluorid of magnesium analogous to fluorite in composition.

Found with anhydrite at Geibroula in Piedmont.

659 A. SIMONYITE. *G. Tschermak*, Ber. Ak. Wien, November Heft, 1869.

Monoclinic. Ratio of orthodiagonal, clinodiagonal, and vertical axis 1 : 0·7453 · 0·5041 ; in clination of axis=C=101° 29′. Observed planes *I*, *O*, *i*-2, 1, 1-*i*. *I*∧*I*=105° 15′, *O*∧1-*i*=146° 28′, *O*∧1=142° 5′, *I*∧ *i*-2=160° 34′. Crystals minute. Also massive. H.=2·5. G.=2·244. Color of the massive mineral bluish-green to reddish-yellow. The crystals sometimes colorless and transparent. Taste faint, saline, and bitter. Unaltered on exposure to the air.

Analysis: G. Tschermak (l. c.):

$\dddot{\text{S}}$	$\dot{\text{Mg}}$	$\dot{\text{Na}}$	$\dot{\text{H}}$
47·17	12·65	18·86	21·82=100·50

This yields the oxygen ratio for $\dot{\text{R}}$: $\dddot{\text{S}}$: $\dot{\text{H}}$, 1 : 3 : 2 or $\dot{\text{R}}\,\dddot{\text{S}} + 2\dot{\text{H}}$, the same as the formula given for Blœdite (p. 643), which mineral it also resembles in crystalline form. Tschermak remarks that simonyite differs from blœdite in not efflorescing on exposure to air, and losing only a portion of its water (4·90 pr. ct.) on being heated for two hours in a water-bath. Occurs at Hallstadt.

A mineral of the same composition and form, likewise unalterable in air, found at Stassfurth, has been referred by Groth and Hintze to blœdite, these authors assuming that the efflorescence of blœdite, noticed by earlier observers, was due to mixture with some efflorescent salt. ZS. G. Ges. 1871, 870.

Stibiotriargentite, *Stibiohexargentite*, see Dyscrasite.

595 A. SUSSEXITE. *G. J. Brush*, Am. J. Sci., II. xlvi. 140, 240, 1868.

In fibrous seams or veins. H.=3. G.=3·42. Lustre silky to pearly. Color white with a tinge of pink or yellow. Translucent.

Composition: $(\dot{\text{Mn}}, \dot{\text{Mg}})^2\,\dddot{\text{B}} + \text{H}$ or $(\frac{2}{3}(\dot{\text{Mn}}, \dot{\text{Mg}}) + \frac{1}{3}\dot{\text{H}})^3\,\dddot{\text{B}}$. Analysis: G. J. Brush (l. c.):

$\dddot{\text{B}}$	$\dot{\text{Mn}}$	$\dot{\text{Mg}}$	$\dot{\text{H}}$
31·89	40·10	17·03	9·59=98·61

In the closed tube darkens in color and yields neutral water. If turmeric paper is moistened with this water, and then with dilute muriatic acid, it assumes a red color (boric acid). In the forceps fuses in the flame of a candle (F=2), and B. B. in O. F. yields a black crystalline mass, coloring the flame intensely yellowish-green. With the fluxes reacts for manganese. Soluble in chlorhydric acid.

Found on Mine Hill, Franklin Furnace, Sussex Co., N. J., associated with franklinite, zincite, willemite, and other manganese and zinc minerals. This species approaches in composition the mineral szaibelyite.

TALCOSITE. *G. H. F. Ulrich*, Contributions to the Mineralogy of Victoria, Melbourne, 1870 (pamphlet of 32 pp. 8vo.).

In thin seams and threads with scaly structure, the scales apparently rhombic plates. H.=1–2. G.=2·46–2·5. Lustre pearly. Color silver-white, faint greenish, or yellowish. Scales flexible but not elastic. Resembles talc. Analyses 1. 2 by C. Newbery (l. c.):

	$\ddot{\text{Si}}$	$\ddot{\bar{\text{A}}}\text{l}$	$\ddot{\bar{\text{C}}}\text{r}$	$\dot{\bar{\text{F}}}\text{e}$	$\dot{\text{Mg}}$	$\dot{\text{Na}}$	$\dot{\text{H}}$
1.	49·01	45·10	tr.	tr.	tr.	tr.	4·98=99·09
2.	49·07	46·96	tr.	tr.	tr.	tr.	3·73=99·76

The oxygen ratio of anal. 1 for $\dot{\text{H}}$, $\ddot{\bar{\text{A}}}\text{l}$, $\ddot{\text{Si}}$ is 1 : 5 : 6. This mineral is perhaps related to selwynite, with which it occurs, and also to westanite (described in this appendix).

Obs. From Mount Ida near Heathcote, Victoria.

Tellurwismuthsilber. *C. Rammelsberg*, ZS. G. Ges., xxi. 81.

Granular. G.=7·803. Lustre metallic. Color gray, tarnished. Cuts with a knife, but sufficiently brittle to be readily pulverized. Composition: analysis by Rammelsberg, l. c.:

S	Te	Bi	Ag	Cu
3·32	24·10	48·50	23·35	tr.=99·27

Rammelsberg gives the relation of S : Ag : Bi : Te as 1 : 2·08 : 2·24 : 1·8, but thinks it may be more correctly expressed by 1 : 2 : 2 : 2, as the bismuth obtained was not free from tellurium, and the formula of this new tellurium mineral may then be written $\text{Ag}^2\,\text{S} + \text{Bi}^2\,\text{Te}^2$ or $\text{Ag}^2\,\text{S} + 2\,\text{Bi Te}$?. He also questions whether the mineral may not be a mixture of argentite and tellurid of bismuth, or of native silver and sulphotellurid of bismuth, but finds nothing in the physical properties of the mineral to indicate a mixture.

Obs. From Sierra de Tapalpa, Mexico.

817 A. TRINKERITE. *G. Tschermak*, J. pr. Chem., II. ii. 258, and Jahrb. G. Reichs. 1870, xx. 279.

Compact and amorphous. H.=1·5–2. G.=1·025. Lustre greasy. Color hyacinth-red to chestnut-brown. Transparent to translucent. Analysis, 1. Hlasiwetz (l. c.); 2. Niedzwiedzki, Jahrb. Min., 1871, 641:

	C	H	S	O	Ash
1. Carpano	81·1	11·2	4·7	3·0	None=100
2. Gams	81·9	10·9	4·1	3·1	——=99·0

Fuses at 168°—180°C., at a higher temperature gives off choking fumes. Insoluble in water, and only slightly in alcohol and ether. Soluble in hot benzole.

Occurs in large compact masses in brown coal at Carpano near Albona in Istria; also found at Gams near Hieflau in Styria. Resembles in composition the tasmanite of Church (p. 746).

573 B. TRÖGERITE. *A. Weisbach*, Jahrb. Min., 1871, 870.

Monoclinic, in thin tabular crystals. Cleavage perfect, parallel to the broad tabular plane. G.=3·3. Lustre on the cleavage-plane pearly. Color lemon-yellow. Composition, $\dddot{\mathrm{U}}^5 \overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{As}}{}^3 + 20\dot{\mathrm{H}}$ (Winckler). No analysis is given. Occurs with walpurgite and other uranium minerals at the Weisser Hirsch Mine in Neustädtel near Schneeberg, Saxony.

URANOTIL. *E. Boricky*, Jahrb. Min., 1870, 780.

Orthorhombic, in acicular crystals. Occurring form *I*, *i-ĭ*, *m-ĭ*; angle of prism *I* about 164° (Zepharovich). In radiated or stellated groups. Cleavage probably basic. G.=3·9595. Color lemon-yellow. Streak lighter. The mean of three analyses gave Boricky:

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{U}}$	$\underbrace{\dddot{\mathrm{Al}}\ \dddot{\mathrm{Fe}}}$	$\dot{\mathrm{Ca}}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}$	$\dot{\mathrm{H}}$
13·78	66·75	0·51	5·27	0·45	12·67=99·43

Giving a composition near that of uranophane (p. 805). It also resembles it in crystalline form, the angle of prism *I* of uranophane 146°, giving 162° for the prism *i*-2.

B. B. turns black. Soluble in warm muriatic acid with separation of flocky silica.

Found with fluorite, uranite, and quartz at Wölsendorf, Bavaria.

622 B. VANADIOLITE. *Hermann*, J. pr. Chem., II. i. 445.

Form not determined. Occurs in small crystals, partly in druses. Color dark-green, almost black, in small fragments dark emerald-green. Streak grayish-green. Lustre vitreous, brilliant. G.=3·96. Analysis gave

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$	$\dddot{\mathrm{V}}$
15·61	1·10	1·40	34·43	2·61	44·85=100.00

which Hermann considers as representing a compound of three atoms of augite, and one of subvanadate of lime. He gives for this the formula $3\dot{\mathrm{R}}\,\ddot{\mathrm{Si}} + \dot{\mathrm{Ca}}{}^6\,(\mathrm{VO}^4 + 2\mathrm{VO}^5)$. B. B. fuses to a black slag with cauliflower-like intumescences. With salt of phosphorus gives a dark-green bead, and a silica skeleton. Decomposed on fusion with a mixture of carbonate of soda and nitre. From Slüdänka near Lake Baikal associated with lavroffite.—A substance containing as this does over 70 per cent. of a vanadate, with the balance a silicate corresponding to augite can scarcely be looked upon as a homogeneous simple mineral. It is here classed with the vanadates.

573 A. WALPURGITE. Walpurgin, *A. Weisbach*, Jahrb. Min., 1871, 870.

Monoclinic, in thin scaly crystals. G.=5·8. Lustre adamantine to greasy. Color pomegranate and wax-yellow. Composition $\dddot{\mathrm{R}}{}^4\,\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{As}} + 5\dot{\mathrm{H}}$ in which $\dddot{\mathrm{R}} = \frac{5}{8}\,\dddot{\mathrm{Bi}} + \frac{3}{8}\,\dddot{\mathrm{U}}$ (Winckler). No analysis is given. Occurs with trögerite and other uranium ores at the Weisser Hirsch Mine in Neustädtel near Schneeberg, Saxony.

323 A. WESTANITE. *C. W. Blomstrand*, Œf. Ak. Stockh., 1868, p. 197, in J. pr. Ch., cv. 341.

In radiated crystalline masses, sometimes in prismatic crystals. H.=2·5. Color brick red. An analysis gave:

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}$	$\dddot{\mathrm{Fe}}$	$\dot{\mathrm{H}}$
(42·53)	51·14	1·15	1·01	4·17=100·00
42·91	51·92		1·56	——

This composition is near wörthite, a hydrous fibrolite, but it differs from that mineral in inferior hardness.

B. B. swells up; infusible and turns white. Not acted upon by acids.

Associated with pyrophyllite at Westana, Sweden.

601 A. WINKWORTHITE. *H. How*, Phil. Mag., April, 1871.

In imbedded nodules, crystalline on fracture. Glistening. Colorless to white. Translucent. H. = 2–3. Composition: analyses 1. 2., H. How, l. c.:

	$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{B}}$	$\dddot{\mathrm{S}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{H}}$
1.	3·31	(10·13)	36·10	31·66	18·80=100
2.	4·98	(14·37)	31·51	31·14	18·00=100

In the closed tube gives water. B. B., decrepitates and fuses readily to a clear bead, coloring the flame green; on continued blowing froths, becomes opaque and no longer shows the green coloration.

Found in gypsum at Winkworth, Nova Scotia. How considers No. 1 to be represented by 11 $\dot{\mathrm{Ca}}$. 1$\ddot{\mathrm{Si}}$, 9$\dddot{\mathrm{S}}$, 3$\dddot{\mathrm{B}}$ and 20$\dot{\mathrm{H}}$, while No. 2 is the same with substitution of 8$\dddot{\mathrm{S}}$ and 4$\dddot{\mathrm{B}}$. He suggests that the mineral is intermediate between selenite and howlite. May it not be a mixture?

92 A. WOLFACHITE. *F. Sandberger*, Jahrb. Min., 1869, 313.

T. Petersen, Pogg. Ann. cxxxvii. 397. Orthorhombic, in small crystals coating niccolite Observed planes *I*, *m-ī*. H. = 5·5. G. = 6.372. Lustre metallic. Color silver-white to tin-white. Streak black. Analysis by Petersen (l. c.):

S	As	Sb	Pb	Ag	Fe	Ni	Co, Cu, Zn
14·43	38·46	13·17	1·32	0·12	3·71	29·53	traces=100.74

The lead and silver were believed to be due to a small amount of intermingled galena and dyscrasite. The results give the formula $\mathrm{Ni\,S^2 + Ni\,(As\,Sb)^2}$ exactly the same as given for the isometric corynite (p. 74), showing this compound to be dimorphous. Corynite has a lower density (5·95—6·03) and less hardness (4·5—5.). The pyrognostic characters are the same for both minerals and both are soluble in nitric acid. From Wolfach in Baden.

830 B. *Wollongongite.* *B. Silliman*, Am. J. Sci., II. xlviii. 85.

This name has been given provisionally to a hydro-carbon from New South Wales. Occurs in cubical blocks, without lamination. Fracture broad conchoidal. Color greenish to brownish-black. Lustre resinous. Translucent in thin shavings, showing under the microscope an amber-yellow light.

Alone in the tube does not melt but decrepitates and gives off oil and gas. Ignites readily and yields, when heated out of access of air, 82·5 volatile matter, coke 6·5, and when burned 11·0 per cent of ash. Insoluble in ether and benzole, but slightly acted upon by bi-sulphid of carbon.

550 A. ZEPHAROVICHITE. *E. Boricky*, Sitzb. Ak. Wien, lix. 593, 1869.

Crystalline to compact, horn-like in aspect. H. = 5·5. G. = 2·37. Color greenish, yellowish or grayish-white. Translucent. Fracture conchoidal. Composition:

	$\overset{\cdots}{\bar{\mathrm{P}}}$	$\dddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dddot{\bar{\mathrm{F}}}\mathrm{e}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{H}}$	Quartz
1.	35·56	29·77	——	1·07	0·41	26·70	5·46=98·97
2.	37·46	28·44	——	0.54	tr.	26·57	6 05=99·06
3.	37·80	29·60	0·85	1·38	——	28·98	0·46=99.07

Nos. 1 and 2 contained intermingled wavellite, and No. 3 an earthy gibbsite. Boricky thinks the analyses prove the mineral to be essentially a phosphate having the formula $\dddot{\bar{\mathrm{A}}}\mathrm{l}$ $\overset{\cdots}{\bar{\mathrm{P}}}$ + 6$\dot{\mathrm{H}}$, and that in analysis 2 this phosphate is mixed with $\frac{1}{17}$ of wavellite, while in No. 3 is associated with $\frac{1}{16}$ of gibbsite and $\frac{1}{33}$ of tribasic phosphate of lime. The formula $\dddot{\bar{\mathrm{A}}}\mathrm{l}$ $\overset{\cdots}{\bar{\mathrm{P}}}$ + 6$\dot{\mathrm{H}}$ differs from Callainite (p. 572) only in containing 1 atom more of water, and analysis 2. after deduction of the 6·04 of quartz, gives $\overset{\cdots}{\bar{\mathrm{P}}}$ 40·28, $\dddot{\bar{\mathrm{A}}}\mathrm{l}$ 30·57, $\dot{\mathrm{Ca}}$ 0·58, $\dot{\mathrm{H}}$ 28·56, a result which approaches the figures given by Damour in his analysis of callainite.

Occurs in sandstone at Trenic in Bohemia.

2. *Notes on a few previously described species.*

198. *Brookite.* A. Schrauf announces that his recent crystallographic studies have proved brookite to be monoclinic and isomorphous with wolframite (Jahrb. Min., 1871, 163).

636. *Caledonite.* Schrauf has found this species to be monoclinic in crystallization. He makes $a \wedge m = 132° 32'$, and $a \wedge c = 90° 30'$, a, m, c, being the planes so lettered in Miller's Mineralogy, and corresponding, a to i-$\bar{i}$, m to I, and c to O, in this work. (Jahrb. Min., 1871, 374.)

Ephesite, see Lesleyite below.

24. *Diamond.* P. v. Jeremejew has discovered minute crystals of diamonds irregularly distributed through plates of xanthophyllite from the Schischimskian Mountains near Slatoust. They are readily recognized when magnified 30 diameters, and with 200 diameters their crystalline form is seen to be that of the hexa-tetrahedron 3-$\frac{2}{3}$ combined with the tetrahedron, the first four being distinctly convex, while the tetrahedral plane is flat (like fig. 59 p. 21, except that there are also small flat tetrahedral planes). Most of the crystals are colorless. They are symmetrically disposed in their matrix, their trigonal intermediate axes being vertical to the foliation of the xanthophyllite. The green plates of this mineral, nearest the rounded masses of the talcose slate and serpentine enclose unusually large numbers of them and they are likewise found in the two rocks themselves. Jahrb. Min., 1871, p. 275 in Am. J. Sci., III. iii. 57.

Lesleyite. The mineral named lesleyite by I. Lea (see p. 800) has been analyzed by S. P. Sharples (Am. J. Sci., II. xlvii. 319) and J. L. Smith (ib. xlviii. 254). Sharples examined two varieties, one white (anal. 1), and the other red (anal. 3). Smith analyzed the white mineral (anal. 2).

	$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dddot{\bar{\mathrm{F}}}\mathrm{e}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{N}}\mathrm{a}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
1 white,	33·59	55·41	tr	——	tr	7·43	4·30=100·73
2 "	31·18	55·00	——	0·45	1·20	7·28	4·80=99.91
3 red,	47·00	33·27	2·84	——	——	9·97	6·71=99.79

The analysis of the red variety was made under Sharples's direction by C. W. Roepper. It is an entirely different substance from the white mineral, and was properly referred to pinite by Sharples.

Smith compares the composition of the white variety with that of his ephesite (see Min., p. 507) of which he gives the following new analysis.

	$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{N}}\mathrm{a}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
Ephesite	30·70	55·67	2·55	5·52	1·10	4·91=100.45

There is also a very close correspondence in the physical as well as in the chemical characters of the two minerals, and they are evidently closely related. Lesleyite is found associated with diaspore and both minerals have a peculiarity in regard to their hardness that suggests a want of homogeneity. They are easily scratched with a knife, but they both contain particles which scratch topaz. Under the magnifier they both present glistening scales which are soft and apparently micaceous. It is evident that the minerals are mixtures of corundum and probably diaspore with a mica similar to the damourite found at the lesleyite locality; and that the foliated soft mineral is damourite or a hydrous mica near that species.

Pattersonite. This substance, classed temporarily under the mica group in the supplement to this mineralogy (p. 801), has been analyzed by S P. Sharples with the following results (Am. J. Sci, II. xlvii. 309).

$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{F}}}\mathrm{e}$	$\dddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\mathrm{N}}\mathrm{a}$ $\dot{\mathrm{L}}\mathrm{i}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
30·20	14·88	20·55	1·28	tr	11·35	11·73=89.99

The potash is stated to have been determined by the difference (loss), but the analysis foots up, exclusive of the potash, only 78·64 leaving 21·36 for potash instead of 11·35. This large error runs through the calculated oxygen ratios, and hence is not typographical. In view of it, the analysis leads to no satisfactory conclusion. The percentages of silica, iron, alumina and water are very near those of prochlorite.

463. *Selwynite.* Ulrich now regards this species as belonging to the *pinite* group (Contrib. Min. Victoria, p. 24).

98. *Sylvanite.* Schrauf's recent crystallographic researches makes this species orthorhombic in crystallization. He says that he has observed the twins described by Kokscharof; and that the angles and planes are given rightly by Miller; and that he has observed 17 new planes. (Jahrb. Min., 1871, 394.)

Tridymite. This new variety of silicic acid, discovered by v. Rath (p. 805, this Min.) in Mexican porphyry, has been found in many localities in Europe; it is especially well characterized in the trachyte of Drachenfels and in the orthoclase-porphyry of Waldböckelheim.

610. *Wolframite.* Des Cloizeaux has shown that this species is monoclinic in crystallization. C. R. lxix. 868.

SECOND APPENDIX

TO THE

FIFTH EDITION

OF

DANA'S MINERALOGY,

BY

EDWARD S. DANA,

CURATOR OF THE MINERALOGICAL DEPARTMENT OF THE PEABODY MUSEUM, YALE COLLEGE.

COMPLETING THE WORK TO 1875.

NEW YORK:
JOHN WILEY & SONS,
15 ASTOR PLACE.
1882.

PREFATORY NOTE.

THIS Second Appendix to Dana's Mineralogy, prepared with the co-operation of the author, is designed to make the work complete up to January, 1875.

It includes descriptions of all species announced as new within the past seven years, with the exception of those contained in Appendix I., prepared by Prof. Brush. The names of the latter are, however, also included, with such new facts in regard to them as have been brought out since 1872.

In addition, references are given under the name of each species to all important articles relating to it that have appeared since the publication of the Mineralogy early in 1868. On account of the limited space and time at command, the work, in this latter respect, is, however, little more than an index, yet the attempt has been made to indicate so far as possible the character of each article—*i. e.*, whether it contains a description of crystals (*cryst.*), or an analysis (*anal.*), or a discussion of the chemical composition (*comp.*). Whenever new facts of special importance have been made known in regard to any species, this is noted at somewhat greater length.

An alphabetical arrangement has been adopted for convenience of reference. A list of the more important of recent mineralogical works is added, and also the titles of some memoirs which, owing to their general character, seemed to require a special mention.

For the explanation of *abbreviations*, see Dana's Min., pp. xxxv.-xlv. The black-faced figures, prefixed to names of new species, are intended to indicate their position as arranged in the classification adopted in the Mineralogy: it is not to be understood that these species are necessarily varieties of those near which they are thus made to stand.

NEW HAVEN, March, 1875

LIST OF MINERALOGICAL WORKS.

CRYSTALLOGRAPHY.

Frankenheim. Zur Krystallkunde, vol. i., 212 pp. 8vo, Leipzig, 1869.

Müller. Grundzüge der Krystallographie, 2d Ed., 64 pp. 8vo, Brunswick, 1868.

Quenstedt. Grundriss der bestimmenden und rechnenden Krystallographie, 443 pp. 8vo, Tübingen, 1873.

Sadebeck. Gustav Rose's Elemente der Krystallographie, 3d Ed., 181 pp. 8vo, Berlin, 1873.

Schrauf. Lehrbuch der physikalischen Mineralogie, vol. i., 253 pp. 8vo, 1866. Vol. ii., 426 pp. 8vo, Vienna, 1868.

DETERMINATIVE MINERALOGY.

Brush. Manual of Determinative Mineralogy, with an introduction on Blowpipe Analysis, 176 pp. 8vo, New York, 1875.

Elderhorst's Manual of Qualitative Blowpipe Analysis, edited by *H. B. Nason* and *C. F. Chandler*, 6th Ed., 312 pp. 8vo, Philadelphia, 1874.

Frazer. Tables for the Determination of Minerals, translated from the German of Weisbach, 117 pp. 8vo, Philadelphia, 1875.

Fuchs, C. W. C. Anleitung zum Bestimmen der Mineralien, 144 pp. 8vo, Heidelberg, 1868.

Helmhacker. Tafeln zur Bestimmung häufig vorkommender Mineralien mittelst der einfachsten Versuche, 66 pp. 8vo, Vienna, 1873.

Von Kobell. Tafeln zur Bestimmung der Mineralien, 10th Ed., 108 pp. 8vo, Munich, 1873.

Laube. Hülfstafeln zur Bestimmung der Mineralien, 53 pp. 12mo, Prague, 1872.

Plympton. The Blowpipe. A guide to its use in the determination of salts and minerals, 167 pp. 8vo, New York, 1874.

Senft. Analytische Tabellen zur Bestimmung der Mineralien und Gebirgsarten, 102 pp 8vo, Hannover, 1874.

DESCRIPTIVE MINERALOGY.

1868.

Senft. Die krystallinischen Felsgemengtheile, nach ihren mineralischen Eigenschaften, etc., 752 pp. 8vo, Berlin.

Websky. Die Mineral-Species nach den für das specifische Gewicht derselben angenommenen und gefundenen Werthen, 170 pp. 4to, Breslau.

1869.

Adam. Tableau Mineralogique, 102 pp. 4to, Paris.

Grimm. Die Lagerstätten der nutzbaren Mineralien, 233 pp. 8vo, Prague.

Senft. Lehrbuch der Mineralien und Felsartenkunde, 656 pp. 8vo, Jena.

Schrauf. Handbuch der Edelsteinkunde, 252 pp. 8vo, Vienna.

1870.

Höfer. Die Mineralien Kärnthens, 84 pp. 8vo, Klagenfurt.

Kokscharow. Materialien zur Mineralogie Russlands, vol. v., 397 pp 8vo, St. Petersburg, 1869. Vol. vi., 208 pp., 1870.

Landgrebe. Mineralogie der Vulkane, 396 pp. 8vo, Cassel and Leipzig.

Smith, J. A. Catalogue of the Principal Minerals of Colorado, 16 pp. 8vo, Central City.

Ulrich. Contributions to the Mineralogy of Victoria, 32 pp. 8vo, Melbourne.

1871.

Chapman. The Minerals and Geology of Central Canada, 205 pp. 8vo, Toronto.

Collins, J. H. Handbook to the Mineralogy of Cornwall and Devon, 182 pp. 8vo, London

Kenngott. Lehrbuch der Mineralogie, 203 pp. 8vo, Darmstadt.

Von Kobell. Die Mineralogie, leichtfasslich dargestellt, 4th Ed., 272 pp., Leipzig.

1872.

Brush, G. J. Appendix I. to Dana's Mineralogy, 5th Ed., 19 pp. 8vo, New York.

Egleston. Lectures on Mineralogy delivered at the School of Mines, Columbia College, 180 pp. 8vo, New York.

Fuchs. Die künstlich dargestellten Mineralien nach G. Rose's krystallo-chemischem Mineralsysteme geordnet, 174 pp. 4to, Haarlem.

1873.

D'Achiardi. Mineralogia della Toscana, vol. i, 276 pp., 1872. Vol. ii., 402 pp. 8vo, Pisa.

Von Dechen. Die nutzbaren Mineralien und Gebirgsarten im Deutschen Reiche, 806 pp. 8vo, Berlin.

Fischer. Kritische mikroskopisch-mineralogische Studien, 64 pp. 8vo, Freiburg, i. Br., 1869. Erste Fortsetzung, 64 pp., 1871. Zweite Fortsetzung, 96 pp., 1873.

Hessenberg. Mineralogische Notizen, No. viii., 46 pp. 4to, Frankfort, 1868, No. ix., 68 pp., 1870, No. x., 44 pp, 1871, No. xi., 35 pp., 1873.

Payot. Geologie et Mineralogie des environs du Mont Blanc.

Rosenbusch. Mikroscopische Physiographie der petrographisch wichtigen Mineralien, 398 pp. 8vo, Stuttgart.

Schrauf. Atlas der Krystall-Formen des Mineralreiches, II. Lief., Tf. xi.-xx., Vienna, 1871; III. Lief., Tf. xxi.-xxx., 1872; IV. Lief., Tf. xxxi.-xl., 1873.

Von Zepharowich. Mineralogisches Lexikon für das Kaiserthum Oesterreich, vol. ii., 436 pp. 8vo, Vienna.

Zirkel. Die mikroscopische Beschaffenheit der Mineralien und Gesteine, 502 pp. 8vo, Leipzig.

1874.

Behrens. Die Krystalliten. Mikroskopische Studien über verzögerte Krystall-Bildung, 115 pp. 8vo, Kiel.

Blum. Lehrbuch der Mineralogie (Oryktognosie), I., Abth., 4th Ed., 256 pp. 8vo, Stuttgart, 1873; II. Abth., 257-642 pp.

Des Cloizeaux. Manuel de Minéralogie, Tome Second, 1er Fasc., 208 pp. 8vo, Paris.

Domeyko. Mineralojia de Chile, Segundo Apéndice, 52 pp. 8vo, 1867. Tercéro Apéndice,* 1873. Cuarto Apéndice, 57 pp., Santiago, 1874.

Frenzel. Mineralogisches Lexicon für das Königreich Sachsen, 380 pp. 12mo, Leipzig.

Groth. Tabellarische Uebersicht der einfachen Mineralien nach ihren krystallographischen-chemischen Beziehungen geordnet, 120 pp. 8vo, Brunswick.

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* Through the kindness of Dr. Hunt I have had the benefit of a translation of the 3d Appendix, with notes by him.

JENTZSCH. Die geologische und mineralogische Literatur des Königreiches Sachsen und der angrenzenden Ländertheile, von 1835 bis 1873, systematisch zusammengestellt, 132 pp. 8vo, Leipzig.

NAUMANN. Elemente der Mineralogie, 7th Ed., 1868. 8th Ed., 1871. 9th Ed., 654 pp 8vo, Leipzig, 1874.

1875.

VOGELSANG. Die Krystalliten von Hermann Vogelsang, nach dem Tode des Verfassers herausgegeben von Ferdinand Zirkel, 175 pp. 8vo, Bonn.

GENTH. Report on the Mineralogy of Pennsylvania, about 150 pp., now in press.

Tschermak's mineralogische Mittheilungen (referred to as Tsch. Min. Mitth.) deserves to be mentioned as an important addition to the list of mineralogical journals. It is published quarterly at Vienna in connection with the *Jahrbuch der k. k. geol. Reichsanstalt*, though issued also independently. The first number appeared in the middle of 1871.

LIST OF MINERALOGICAL MEMOIRS.

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LIST OF NEW SPECIES

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1. *Native Elements.*

Kongsbergite	31

2. *Sulphids, Arsenids, etc.*

Arite	4	Horbachite	28
Arsenotellurite	5	Livingstonite	35
Chalcopyrrhotite	11	Luzonite (Enargite)	35
Famatinite	20	Oldhamite	42
Frenzelite	22	Schirmerite	50
Guadalcazarite	25	Spathiopyrite	52
Henryite	27	Valleriite	58

3. *Chlorids, etc.*

Bordosite	8	Erythrosiderite	19
Chlorocalcite	11	Tocornalite	56

4. *Oxyds.*

Asmanite	5	Hydrocuprite	28
Delafossite (Melaconite)	16	Magnochromite (Chromite)	36
Heterogenite	27	Meymacite	38
Hydrargyrite	8		

5. *Anhydrous Silicates.*

Agricolite	1	Microsommite	39
Ardennite (Dewalquite)	4	Trautwinite	56
Manganophyllite	37	Tschermakite	57
Maskelynite	37	Victorite (Enstatite)	18

6. *Hydrous Silicates.*

Allophite	2	Limbachite	34
Chalcomorphite	11	Maconite	36
Cossaite (Paragonite)	63	Nefidieffite	41
Culsageeite (near Jefferisite)	30	Rauite	47
Dudleyite	17	Resanite	48
Foresite	22	Seebachite (Herschelite)	50
Garnierite	23	Sterlingite (Damourite)	15
Grochauite	25	Strigovite	53
Hallite	26	Vaalite	58
Hygrophilite	29	Willcoxite	61
Kerrite	31	Zöblitzite	84

7. *Tantalates, Columbates.*

Koppite	32	Nohlite (near Samarskite)	41

8. *Phosphates, Arsenates, etc.*

Hebronite	27
Kjerulfine	31
Korarfveite (near Monazite)	32
Miriquidite	40
Rhagite	48
Rivotite	48
Stibioferrite	53
Uranospinite	58
Veszelyite	59
Wapplerite	60
Winklerite	61
Zeunerite	62

9. *Borates.*

Ludwigite	35
Priceite	45

10. *Tungstates, Vanadates, etc.*

Cuprotungstite	14
Uranosphærite	57

11. *Sulphates, etc.*

Bartholomite	6
Cupromagnesite	14
Dolerophanite	17
Ettringite	19
Guanovulite	64
Hydrocyanite	29
Maxite (Leadhillite)	38
Nitroglauberite	41
Syngenite (Kaluszite)	54

12. *Carbonates.*

Dawsonite	16
Schröckeringite	50

13. *Carbo-hydrogen Compounds.*

Aragotite	4
Bombiccite	8
Byerite	9
Siegburgite	51
Wheelerite	60

The following list includes additional names recently introduced into the science. They belong in part to previously described species, and in part to species which, in consequence of imperfect descriptions, cannot be definitely classified.

Aerugite, Arsenstibite, Bieirosite, Cacheutaite, Campbellite, Carbonyttrine, Cerbolite, Chalcomiclite, Chalypite, Clarite, Corkite, Cryoconite, Cuproapatite, Cuprovanadite, Dauberite, Dernbachite, Ferrotungsten, Glancespar, Glasbachite, Köhlerite, Mariposite, Milanite, Meerschaluminite, Pealite, Plumbocuprite, Plumbiodite, Pyrichrolite, Pyritolamprite, Rhodite, Scacchite, Simlaite, Tapalpite, Wachenrodite, Xanthiosite, Zirlite, Zonochlorite.

For some other new names not belonging to definite mineral species, see *crystallites*, p. 14, *microlites*, p. 39.

APPENDIX II.

Aarite. See **Arite.**

Acanthite, Min. p. 51.—Localities in Saxony, Frenzel, Min. Lex. Sachsen, p. 2.

Achtaragdite, Min. p. 478.—Description of crystals and analysis, *Hermann*, J. pr. Ch. civ., 104, 182, 1868. Description, Kokscharow, Min. Russl., v., 324.

Acmite and **Aegirite**, Min. p. 223, 224.—Relation to pyroxene, *Tschermak*, Tsch. Min. Mitth., 1871, 33.

Actinolite, Min. p. 232.—Brewster, N. Y., analysis, *Breidenbaugh*, Am. J. Sci., III., vi., 211, 1873.

Adamite, Min. p. 565.—Cap Garonne, analysis and description, *Damour*, C. R., lxvii., 1124; Pisani, C. R. l. 1001, 1870.

Aerugite. Adam, Tableau Min., 1869, p. 43. A doubtful arsenate of nickel ($\dot{\mathrm{N}}\mathrm{i}^5\,\overset{\cdots}{\bar{\mathrm{A}}}\mathrm{s}$) from Johanngeorgenstadt, analyzed by Bergemann (Dana Min. p. 548).

Aeschynite, Min. p. 522,—anal.: *Marignac*, Ann. Ch. Phys., IV., xiii., 5, 1868; *Hermann*, J. pr. Ch. cv., 105, 321; *Rammelsberg*, Pogg., cl., 214, 1873.

Agalmatolite, Min. p. 480.—China, Kenngott, Jahrb. Min. 1870, 782.

336 A. Agricolite. *Frenzel*, Jahrb. Min., 1873, 791, 947; 1874, 686; *Breithaupt* (references in Dana's Min., p. 391).

Monoclinic (Groth). C = 110°. In globular or semi-globular forms, with radiated or fibrous structure. Also in indistinct groups of crystals. Soft, heavy, brittle. Color hair-brown (Schneeberg) · colorless to wine-yellow (Johanngeorgenstadt). Lustre adamantine. greasy.

Composition same as for eulytite (q.v.) 2 $\dddot{\bar{\mathrm{B}}}\mathrm{i}$, 3 $\ddot{\mathrm{S}}\mathrm{i}$. Analysis, Frenzel, l. c.

$\ddot{\mathrm{S}}\mathrm{i}$	$\dddot{\bar{\mathrm{B}}}\mathrm{i}$	$\dddot{\bar{\mathrm{F}}}\mathrm{e}$		
16·67	81·82	0·90	=	99·39

Occurs at Johanngeorgenstadt on quarz, associated with bismuth, cloanthite, bismite; also at the mine Neuglück, Schneeberg.

The *arsenwismuth* of Breithaupt has until now been included with eulytite, but the investigations of Frenzel and Groth show that, though having the same composition, it is different in crystalline form, and hence is a distinct species.

Albertite, Min. p. 753.—Probable origin, *S. F. Peckham*, Am. J. Sci. II., xlviii., 362, 869.

Albite, Min. p. 348.—Saas, cryst., *F. Scharff*, Jahrb. Min., 1869, 342.
St. Gotthard, cryst., *Hessenberg*, Min. Not. ix., 40, 1870.
Media, Penn., anal., *Leeds*, Am. J. Sci., III., vi., 25, 1873.
Crystallographic memoir, with full list of planes, *Brezina*, Tsch. Min. Mitth., 1873, 19.
Crystallographic memoir, twinning laws, etc., *v. Rath*, Pogg. Ann. Erg., Bd. v., 425, 1870.
Crystals implanted in orthoclase, *Scacchi*, Atti Accad. Napoli, March 12, 1870.
Schneeberg, description of simple crystals, *J. Rumpf;* anal., *Ludwig*, Tsch. Min. Mitth., 1874, 97, 176.
See also Feldspar.

ALLANITE, Min. p. 285.—Schmiedefeld, Thüringer Wald (Schwarze Krux), cryst., **memoir** new forms, *Bauer*, Würtemberg. Nat. Jahresheft, 1872, 246.
Vesuvius (orthite), cryst., *v. Rath*, Pogg., cxxxviii., 492.
Finland (Erbo and Kyokslätt), Wiik, Œfv. Finsk. Vet. Soc., Helsingfors, xiii., 75, 1870–71.
Composition discussed, *Rammelsberg*, ZS. G. Ges., xxiv., 60, 1872.
Greenland, Fredrickshaab, anal., *Rammelsberg*, ZS. G. Ges., xxiv., 60, 1872.
Found in the Böhmer Wald, near Husinec, Krejci, Ber. Böhm. Ges., 1873, p. 360.
Amherst Co., Va., anal., *J. A. Cabell*, Ch. News, 1874, p. 141.

ALLOPHANE, Min. p. 419.—Dehrn (near Limburg), Nassau, anal., *v. Rath*, Pogg., cxliv., 393, 1871.
Northampton, England, *Hermann*, Q. J. G. Soc., xxvii., 234, 1871.

448 A. Allophite, *Websky*, ZS. G. Ges., xxv., 399, 1873.

In dense, micro-crystalline masses, on fracture dull, and easily polished to a greasy lustre by the hand. H. less than calcite. G. = 2·641 (Leffler). Color, pale grayish-green. In appearance very similar to pseudophite; distinguished from serpentine by its inferior hardness.

Analysis Leffler (l. c.).

$\ddot{Si}$	$\dddot{\overline{Al}}$	$\dddot{\overline{Fe}}$	$\dddot{\overline{Cr}}$	$\dot{Mg}$	$\dot{H}$	
36·23	21·92	2·18	0·85	35·53	2·97	= 99·68

Neglecting the water Leffler gives the formula $2(\dddot{\overline{Al}}\ \ddot{Si})+3(3\dot{Mg}\ \ddot{Si})$. If the water be reckoned in the oxygen ration for $\dot{R} : \dddot{\overline{R}} : \ddot{Si} : \dot{H} = 5 : 4 : 6\frac{2}{3} : 1$; or for all bases (including $\dot{H}$) to silica = 3 : 2. The water goes off only at a high temperature.

Occurs at Langenbielau, Silesia; also at Reichenstein. From a quarry of limestone occurring in the gneiss.

ALTAITE, Min. p. 44.—Red Cloud Mine, Colorado, anal., *Genth*, Am. Phil. Soc., Philad., xiv., 225, 1874.

ALUMINITE, Min. p. 658.—Brighton, *J. Howell*, Rep. Brit. Assoc., 1872, 108.
Kuchelbad, anal., *Stolbe*, Ber. Böhm. Ges., Prag, 1873, 335.

ALUNOGEN, Min. p. 649.—Iquique, Peru, anal., *Field*, J. Ch. Soc., vii., 259, 1869.

AMALGAM, Min. p. 13.—Chili, anal., Domeyko, 2d App., Min. Chili, p. 33, 1867.

AMBLYGONITE, Min. p. 545.—See Montebrasite, hebronite.

AMBLYSTEGITE, *v. Rath*, Pogg., cxxxviii., 531, 1869. Appendix I., p. 1.

AMBROSINE, *C. U. Shepard*. Appendix I., p. 1.

AMPHIBOLE, Min. p. 232.—Crystal of unusual habit, Härtlingen, Nassau, *Nies.*, Jahrb. Min., 1868, 53.
Peru, in dioryte, anal., *Achiardi*, Lettera a Carlo Regnoli, p. 11, Pisa, 1870.
Group of minerals, microscopically distinguished, *Tschermak*, Ber. Ak. Wien, lx., p. 5, 1869; relations to minerals of the pyroxene family. Tsch. Min. Mitth., 1871, 38.
With augite, at Vesuvius, anal., *v. Rath*, Pogg. Erg., vi., 229, 1873. Formed by sublimation at Vesuvius, Scacchi., Atti Accad. Sci. Napoli, Sept. 14, 1872.
Greenland, anal., *Janovsky*, Ber. Chem. Ges., Berlin, 1873, 1232.
South Sherbrooke, Canada, anal., *Harrington*, Geol. Survey, Canada, 1874, 201.
Altered to serpentine, Brewster, N. Y., *J. D. Dana*, Am. J. Sci. III., viii., 375, 1874.

ANALCITE, Min. p. 432.—Renfrewshire, analyses, *Young*, Ch. News, xxvii., 55, 1872.

ANATASE, Min. p. 161.—See octahedrite.

ANDALUSITE, Min. p. 371.—Ramsberg, Sweden, anal., *Igelström*, Jahrb. Min., 1871, 360
Composition, etc., *Rammelsberg*, ZS. G. Ges., xxiv., 87, 1872.
Anal. and description, *Kokscharow*, Min. Russl., v., 164, 170 (chiastolite).
Crystal from Delaware Co., Penn., *E. S. Dana*, Am. J. Sci., III., iv., p. 473, 1872.

TE, *Maskelyne*, Ch. News, xxiv., 99. Appendix I., p. 1.

ANGLESITE, Min. p 622.—Arizona, anal. of a compact form (*Tyson*) *Brush*, Am. J. Sci., III., v., 421.
Cerro Gordo, Cal., a compact variety, *Silliman*, Am. J. Sci., III., vi., 131, 1873.

ANHYDRITE, Min. p. 621.—Formation of, *G. Rose*, Ber. Ak. Berlin, July, 1871, 363.
Cryst. monograph, *Hessenberg*, Min. Not., x., 1, 1871.

ANKERITE, Min. p. 685.—Erzberg, crystallized, anal., *Reibenschuh*, Ber. Ak. Wien, lv., 648, 1867.
Vordernberg, Steiermark, cryst. (R ∧ R = 106° 7′), anal., *Zepharovich*, Jahrb. Min., 1868, 204.
Bohemia, anal., *Boricky*, Ber. Ak. Wien, lix., 613, 1869.
Call, in the Eifel, anal., *Schmidt*, Jahrb. Min., 1875, 89.

ANORTHITE, Min. p. 337.—From meteorite of Juvenas (France), cryst., *v. Lang*, Ber. Ak. Wien, lvi., 839, 1867.
Vesuvius, cryst., monograph, *v. Rath*, Pogg., cxxxviii., 449; ibid., cxlvii., 22.
Santorin, cryst., *Hessenberg*, Min. Not., viii., 31, 1868.
New law for twining, *Strüver*, Atti Accad. Sci., Torino, iv., 38, 1868; from Monte Somma, ib., vi., 358, 1871.
Pesmeda Alp, cryst., anal., *v. Rath*, Ber. Ak. Berlin, 1874, 749.
See also *Feldspar*.

ANTHOLITE, Min. p. 234.—Delaware Co., Penn., *Leeds*, Am. J. Sci., III., vi., 25, 1873.

ANTHOPHYLLITE, Min. p. 231.—Hermannschlag, anal., *Brezina*, Tsch. Min. Mitth., 1874, 247.

ANTIGORITE, Min. p. 465.—Zermatt, anal., *v. Kobell*, Ber. Ak. München, 1874, 165.

ANTILLITE. *Shepard*. Appendix I., p 1.

ANTIMONARSENNICKEL. *Petersen*, see arite.

APATITE, Min. p. 530.—Bolivia, anal., Domeyko, 2d App. Min. Chili, p. 44, 1867.
Offheim, anal., *Kosmann*, ZS. G. Ges., xxi., 795, 1869.
In large beds near Perth, Canada West, *Jackson*, Proc. N. Hist. Bost., xii, 88, 1868.
As a constituent of crystalline rocks, *Petersen*, J. pr. Ch., cvi., 145, 1869; as a secondary product in basalts, Jahrb. Min., 1873, 852.
Jumilla and Poloma, cryst. new forms, *Schrauf*, Ber. Ak. Wien, lxii., 745 et seq., 1870.
Schlaggenwald, crystallized holohedrally, *Schrauf*, Tsch. Min. Mitth, 1871, 105
Tyrol and Switzerland, cryst., note, *Klein*, Jahrb. Min., 1871, 485.
Var *francolite*, Cornwall, anal., *Mashelyne & Flight*, J. Ch. Soc., ix., 1, 1871.
Alathal, cryst. $\left(\frac{\frac{3}{2}\cdot\frac{3}{2}}{2}\text{ new}\right)$, *Strüver*, Atti Accad. Sci. Torino, iii., 125, 1867–8. Corbassera, Botino, Baveno, cryst., *Strüver*, ibid., vi., 363, et seq., 1871.
Untersulzbach, cryst. description, new forms, *Klein*, Jahrb. Min., 1872, 121.
Murcia, Spain, anal., *A. H. Church*, J. Ch. Soc., II., xi., p. 101, 1873.
See also Phosphorite.

APHROSIDERITE, Min. p. 502.—Saxeby, Sweden, anal., *Igelström*, B. & H. Zeit., 1868, xxvii., 187.
Note, *Nies*, Jahrb. Min., 1873, 320.

APHTHITALITE, Min. p. 615.—Vesuvius, character discussed, *Scacchi*, Atti Accad., Napoli (read), March, 1870.
Girgenti, cryst., *v. Rath*, Pogg., Erg. Bd. vi., 359, 1873.

APOPHYLLITE, Min. p. 415.—India, cryst. note, *Haughton*, Journ. R. Geol. Soc., Dublin, II., ii., 113, 1868.
Greenland, twin crystals, *Schrauf*, Ber. Ak. Wien, lxii., 699, 1870.
Maderanerthal, *Kenngott*, Jahrb. Min., 1873, 725.
From the basalt, cryst., and partial analysis, *Streng*, Jahrb. Min., 1874, 573.

AQUACREPITITE, *Shepard*, Am. J. Sci., II., xlvi., 256. Appendix I., p. 2.

ARAGONITE, Min. p. 694.—Cryst., twins, *Schrauf*, Ber. Ak. Wien, lxii., 734, 1870; from Sasbach, cryst., new forms, ibid., lxv., 250, 1873.

Waltsch, Bohemia, altered to hyalite, *Boricky*, Ber. Böhm. Ges., 1873, 65.

795 A. Aragotite.—*Durand*, Proc. Acad., Cal., iv., p. 218, 1872, (Am. J. Sci., III., vol. vi., 67).

A volatile hydrocarbon related to idrialite. It occurs at the New Almaden Mine, Cal., in bright yellow scales, impregnating a crystalline siliceous dolomite; also on cinnabar at the Redington Mine.

It contains no arsenic, nor sulphur, nor any metal. Insoluble in oil of turpentine, alcohol, and ether.

ARCANITE, Min. p. 615.—See APHTHITALITE.

284 A. Ardennite.—*Lasaulx* and *Bettendorf*, Ber. Nied. Ges. Bonn, xxix., p. 189, Nov. 24, 1872; Pogg. cxlix., 241, 1873. DEWALQUITE, Pisani, C. R., lxxv., 1542, Dec. 2, 1872; lxxvii., 329, 1873.

Orthorhombic. *a* (vert.)=0·3135, *b*=1, *c* (brach.) 0·4663. Observed planes i-$\bar{i}$, i-$\breve{i}$, I, i-$\breve{\frac{3}{2}}$, i-$\breve{2}$, 1-$\bar{i}$. 1 . 1·$\breve{\frac{3}{2}}$. $I \wedge I$ (over i·$\bar{i}$)=130° 0′, i-$\breve{\frac{3}{2}} \wedge i$-$\breve{\frac{3}{2}}$=145° 28′, i-$\breve{2} \wedge i$-$\breve{2}$=94° 0′. $1 \wedge 1$=150° 50′ and 114° 40′. 1-$i \wedge$ 1-i=112° 12′ (Pisani 112° 24 a′ ∧ a′). Above determinations by v. Rath.

Good crystals very rare, mostly in fragments without terminations. Habit much like ilvaite; 1-$\bar{i} \wedge$ 1-$\bar{i}$=112° 40′ for ilvaite,=112° 12′ for ardennite. Prismatic planes strongly striated. Cleavage, i-$\breve{i}$ perfect, I very distinct.

Pisani gives the following optical determinations. Acute bisectrix, positive, normal to the cleavage plane i-$\breve{i}$ (in which the optic axes are observed). Angle of axes in air: red rays=68° 58′, yellow = 66° 37′, green, 62° 18′ (mean). Des Cloizeaux found: red = 76° 7′–79° 9′, yellow 72° 55′, 74° 26′, green 68° 36′-70° 59′.

H. 6–7. G. = 3·620. Color yellow to yellowish-brown; in thin splinters translucent, red. Dichroic. Brittle and fragile.

Analyses 1, 2, 3, 4, Lasaulx and Bettendorf, Pogg., cxlix., 243, 245. 5. Pisani, C. R., lxxv., 1542. 6. same, ib., lxxvii., 329.

	$\ddot{\text{Si}}$	$\ddot{\bar{\text{Al}}}$	$\ddot{\bar{\text{Mn}}}$	$\dot{\text{Mn}}$	$\ddot{\bar{\text{Fe}}}$	$\dot{\text{Ca}}$	$\dot{\text{Mg}}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\text{V}}$	$\overset{\cdot\cdot\cdot\cdot\cdot}{\text{As}}$	Cu	ign.	
1.	29·65	22·91	30·12	——	1·91	1·66	3·82	7·50	——	——	——	
2.	29·60	26·68	28·69	——	1·88	2·00	——	4·84	——	——	——	
3.	29·60	23·50	——	25·88	1·68	1·81	3·38	9·20	——	tr(PO_5)	4·04	= 99 09
4.	29·89	——	——	26·03	2·21	2·28	3·47	9·09	——	tr "	3·10	
5.	28·70	28·36	——	26·40	2·94	4·30	4·32	1·80	——	1·30	0·98	= 99·10
6.	28·40	24·80	——	25·70	1·31	2·98	4·07	3·12	6.35	0·22	5·20	= 102·15

In analyses 1 and 2, L. & B. found 2 p. c. Pt., Pd., etc., which, as they afterward showed, came from platinum dishes used in the analysis, the water was overlooked. Analyses 3 and 4 were made subsequently, and by an improved method. The manganese is present in the form $\dot{\text{Mn}}$, as is shown by Pisani (not $\ddot{\bar{\text{Mn}}}$ as in analyses 1 and 2 of L. & B.).

B. B.—Easily fusible to a black glass. With borax gives a manganese bead. The water can only be driven off at a strong red heat.

According to Pisani the arsenic is readily recognized on heating the mineral in a matrass, mixed with carbonate of soda and cyanid of potassium, a ring of metallic arsenic being obtained. He explains the high percentage of vanadic acid obtained by Lasaulx on the ground that he has overlooked the arsenic.

Found near Ottrez (Salm Chateau) in the Ardennes, Belgium, with quartz (containing particles of pyrolusite) and albite.

Lasaulx first noticed this mineral under the name of *mangandisthen*, in consequence of a supposed resemblance to cyanite. This, as Pisani urges, is on several accounts an objectionable name, and is naturally superseded by the name *ardennite*, which too has the right of priority over *dewalquite*.

ARGENTITE, Min. p. 678.—Cryst., new forms, *Schrauf*, Ber. Ak. Wien, lxiii., 165, 1871.

ARGENTOPYRITE, Min. p. 39.—Cryst. memoir, *Schrauf*, Ber. Ak. Wien, lxiv., 192, 1871.

72 A. Arite. The arsenid of nickel, containing 27·8 p. c. antimony, described by Berthier from the Basses-Pyrénées (Dana, Min. p. 60), has been called aarite (more properly *arite*, Pisani) by Adam, Tableau Min., 1869, p. 40.

The same mineral has been subsequently investigated by Pisani (C. R., lxxvi., 239, 1873), and he concludes that it is merely a variety of breithauptite. An analysis gave him: As 11·5, Sb 48·6, Ni 37·3, Zn 2·4 = 101·5, corresponding to an arseniferous breithauptite. G. = 7·19. It is similar to the mineral from Allemont also described by Berthier (Dana Min. p. 60, anal. 4), which is an antimoniferous niccolite.

The name arite, however, may still be well retained for the antimonarsennickel of Petersen (Pogg., cxxxvii., 396, 1869), the analysis of which agrees very closely with that of Berthier for the Pyrenees mineral. The mineral described by Petersen occurs massive at the Wenzel mine, Wolfach, Baden, in a coarse granular limestone. It is sometimes accompanied by wolfachite. An analysis afforded: As 30·06, Sb 28·22, Ni 39·81, Co tr, Fe 0·96, S 1.77 = 100·82. H. = 5·5, G. = 7·50. B. B. fuses with a strong reaction for arsenic and antimony. With soda gives a magnetic globule.

ARSENIC (native), Min. p. 17.—Found in the argentiferous mines of San Augustin, State of Hildago, Mexico (H. = 2, G. = 7·24), La Naturaleza, xl., p. 313, 1873.

Marienberg, Saxony (arsenglanz), *Frenzel*, Jahrb. Min., 1873, 25; 1874, 677.

ARSENICAL cobalt. Appendix I., p. 1.

ARSENIOSIDERITE, Min. p. 76.—Anal., *Church*, J. Ch. Soc., II., xi., p. 102, 1873.

ARSENOPYRITE, Min. p. 78.—Schneeberg, anal., *Frenzel*, Jahrb. Min., 1872, 517.
Patosi, containing 4 p. c. Bi, anal., Domeyko 3d Appendix, Min. Chili, 1871.
Meymac, Corrèze (containing bismuth), anal., *Carnot*, C. R., lxxix., 479, 1874.
Schladming, anal., *Rumpf*, Tsch. Min. Mitth., 1874, 178, cryst. description, ibid., p. 231
See also Danaite.

33 A. Arsenotellurite, a name proposed by *Hannay* for a supposed new tellurid. It occurs in small brownish scales upon arsenical iron-pyrites. An analysis gave him (on ·6347 gr.) Te = 40·71, As = 23·61, S = 35·81, corresponding to the formula 2 TeS_2, As_2S_3. *No locality mentioned.*. J. Ch. Soc., II., xi., p. 989, 1873.

ARSENSTIBITE. Adam, Tableau Min., 1869, p. 42.—A hydrous arsenate of antimony, for which Pisani gives the formulas $\dddot{S}b^3\,\overset{\dddot{}}{\ddot{A}}s + 15\dot{H}$ and $\dddot{S}b^5\,\overset{\dddot{}}{\ddot{A}}s + 30\dot{H}$.

ASBESTUS, Min. p. 234.—Found at Pelham, Mass., *Adams*, Am. J. Sci., II., xlix., 271, 1870.

ASBOLITE, Min. p. 181.—Saalfeld, note, *v. Kobell*, Ber. Ak. München, 1870, 49.

231 B. Asmanite, *Maskelyne*, Phil. Trans., clxi., p. 361, 1871 (v. Rath, Pogg., Erg. Bd. vi, 382, 1873.

Orthorhombic. Occurring planes *O*. *I*. *i-ĭ*, $\frac{4}{3}$-*ĭ*, 1-*ĭ*, $\frac{2}{3}$-*ĭ*, $\frac{1}{2}$-*ĭ*, $\frac{1}{3}$-*i*, $\frac{2}{3}$, $\frac{1}{2}$, $\frac{1}{6}$. *a* (vert.) : *b* : *c* = 3·31320 : 1·0000 : 1·7437. $I \wedge I$ 120° 20′. $O \wedge 1\text{-}\breve{i} = 117° 46′$. $O \wedge \frac{1}{2}$: 117° 39′.

Cleavage *O* good, surface having a vitreous lustre, *I* difficult. Lustre generally resinous, resembling that of opal. Extremely brittle, especially in outer portions.

H. = 5·5. G. = 2·245. Optically bi-axial, divergence large, in air = 107°–107½° (approximately), being somewhat greater for red rays than blue. First bisectrix normal to *i-ĭ* (100), second normal to *O*. Double-refraction, positive.

Composition nearly pure silica, consequently the same as for quartz and tridymite. Analysis, Maskelyne, l. c. 1. On 0.3114 gr. 2. On 0·2653 gr.

	$\ddot{S}i$	$\dot{F}e$	$\dot{C}a$	$\dot{M}g$	
1.	97·43	1·12	0·58	1·51	= 100·64
2.	(99.21)	0·79 etc.			100·00

Found in the meteoric iron of Breitenbach, in very minute grains, generally much rounded and stained with iron on the surface.

It is mixed with bronzite (after the removal of the iron, troilite and chromite), and constitutes about one-third of the mixed siliceous minerals. Maskelyne suggests that the rounded character of the mineral and of the accompanying bronzite may be due to this having undergone superficial fusion, or having been softened by the intense heat generated by the rapid course of the meteorite in the air; an idea which, he says, seems to be supported by the brittleness of the outer portions of the grains.

ASPIDOLITE, *v. Kobell*, Ber. Ak. München. March, 1869. Appendix I., p. 2.
Found in gneiss near Snarum, Moravia, Tsch. Min. Mitth., 1871, 112.

ASTEROITE, *Igelström.* Appendix I., p. 2.

ASTROPHYLLITE, Min. p. 308.—Cryst., *Nordenskiöld*, Œfv. Ak. Stockh., xxvii., 561, 1870.

ATACAMITE, Min. p. 121.—New South Wales, cryst., *Klein*, Jahrb. Min., 1869, 347; 1871, 495; *v. Zepharovich*, Ber. Ak. Wien, lxiii., 6, 1871; ib., lxviii., 120, 1873.
Morphological study, *E. S. Dana*, Tsch. Min. Mitth., 1874, 103.
Anal., *J. A. Cabell*, Chem. News, xxviii., 272, 1873.
Anal., and discussion of composition, *Ludwig*, Tsch. Min. Mitth., 1873, 35 (42).
Altered to malachite, *Kokscharow*, Bull. Soc. Imp. St. Pet., xviii., 186, 1872; *Tschermak*, Tsch. Min. Mitth., 1873, 39.
A black oxy-chlorid of copper, differing somewhat from atacamite, is described by Domeyko (3d Append., Min. Chili, 1871). It was amorphous, grayish-black, without lustre. Compact to granular. Fracture even or subconchoidal. It takes a semi-metallic polish under the knife. Composition as obtained by Stuven, deducting impurities, CuCl 16·94, $\dot{\mathrm{C}}\mathrm{u}$ 68·67, $\dot{\mathrm{H}}$ 14·39.

ATELESTITE, Min. p. 392.—Schneeberg, cryst. description (monoclinic), *v. Rath*, Pogg., cxxxvi., 422.
Anal., essentially an arsenate of bismuth, *Frenzel*, Jahrb. Min., 1873, 794.

AUGITE, Min. p. 216.—In meteorites, *Rammelsberg*, Pogg., cxl., 320, 187-.
Relation to other minerals of pyroxene group, *Tschermak*, Tsch. Min. Mitth., 1871, 28.
Schönhof, Bohemia, in twins, from basalt, *Zepharovich*, Jahrb. Min., 1872, 59.
Occurring with hornblende at Vesuvius, anal., *v. Rath*, Pogg. Erg., Bd. vi., 229, 337, 1873.
See also pyroxene.

AURICHALCITE, Min. p. 712.—Found at Franklin, N. J., *Trautwine*, J. Frank. Inst., III., xiv., 374.

AUTUNITE (Kalkuranit), Min. p. 586.—Occurrence in phosphorite, *Wibel*, Jahrb. Min., 1873, 242. Cornwall, anal., *Church*, J. Ch. Soc., II., xiii., 109, 1875.

AXINITE, Min. p. 297.—Baveno, cryst., *Strüver*, Atti Accad. Torino, iii., 131, 1867–68.
Composition, *Rammelsberg*, ZS. G. Ges., xxi., 689, 1869.
Cryst., relation to glauberite, *Schrauf*, Ber. Ak. Wien, lxv., 244, 1872; cryst., ibid., lxii., 712, 720, 729; lxiv., 191.
Striegau, Silesia, cryst., *Websky*, Tsch. Min. Mitth., 1872, 1.
Bottallock, Cornwall, cryst. memoir, *Hessenberg*, Min. Not., xi., 30, 1873.

AZORITE, Min. p. 761.—St. Miguel, cryst., *Schrauf*, Ber. Ak. Wien, lxiii., 187, 1871.

AZURITE. Min. p. 715.—Nertschinsk, occurrence described, *Schrauf*, Tsch. Min. Mitth. 1871, 13.
Exhaustive cryst. memoir (homomorphous with epidote, p. 159), *Schrauf*, Ber. Ak. Wien, lxiv., 123, 1871.
Composition and paragenesis discussed, *Wibel*, Jahrb. Min., 1873, 245.

BABINGTONITE, Min. p. 227.—Baveno, cryst. description, *v. Rath*, Pogg., cxxxv., 583.
Devonshire, analysis and description, *Forbes*, Phil. Mag., IV., xxxvii., p. 328, 1869.
Herbornseelbach, Nassau, *v. Rath*, Pogg. Erg., v., 420, 1871; C. Jehn, Pogg., cxliv., 594; Jahrb. Min., 1872, 319.

BARETTITE: Bombicci, Jahrb. Min., 1868, 750. Appendix I., p. 3.

BARITE, Min. p. 616.—Hemimorphic crystals, *Reuss*, Ber. Ak. Wien, lix., 623, 1869.
Tavetsch, Graubünden, cryst., *Kenngott*, Jahrb. Min., 1870, 354.
Przibram, cryst., new forms, *Schrauf*, Ber. Ak. Wien, lxiv., 199, 1871.
Val Alvernia, etc., cryst., *Strüver*, Atti Accad. Sci. Torino, vii., p. 368, 1871.
Bohemia, cryst. memoir, *Helmhacker* (Denkschr. Ak. Wien), Tsch. Min. Mitth., 1872, 71.

687 A. Bartholomite, *Cleve*, Ak. H. Stockholm, IX., No. 12 (Nov., 1870), (Geol. West Indian Islands, p. 31).
Occurs with mendozite in yellow nodules composed of small needles Analysis, Cleve l. c

NaCl	$\dddot{\mathrm{S}}$	$\dddot{\mathrm{\bar{F}e}}$	$\dot{\mathrm{N}}\mathrm{a}$	$\dot{\mathrm{H}}$	$\dot{\mathrm{M}}\mathrm{g}$	
2·88	44·75	22·71	17·08	8·08	0·63	insol. 3·56 = 99·69

Deducting NaCl (2·88), $\dot{\mathrm{M}}\mathrm{g}\dddot{\mathrm{S}}+7\mathrm{Aq}$ (3·87), and insoluble matter (3·56), we obtain $\dddot{\mathrm{S}}$ 48·66, $\dddot{\bar{\mathrm{F}}\mathrm{e}}$ 25·41, $\dot{\mathrm{N}}\mathrm{a}$ 19·11, $\dot{\mathrm{H}}$ 6·82 = 100, corresponding to the formula $2\dot{\mathrm{N}}\mathrm{a}\,\dddot{\mathrm{S}}+\bar{\mathrm{F}}\mathrm{e}\dddot{\mathrm{S}}^2+2\dot{\mathrm{H}}$. Results from the alteration of pyrite. Locality St. Bartholomew, West Indies. It is closely related to botryogen.

BARYTOCELESTITE, Min. p. 620.—Greiner, Tyrol, analyses (*Ullik*) and description, *Zepharovich*, Ber. Ak. Wien, lvii., 740, 1867.

BASTNÄSITE, *Huot*. Appendix I., p. 2.

BEAUXITE, Min. p. 174.—Wollerdorf, analysis, *Strum*, B. & H. Zeit., xxii., 283, 1868.
Found in French Guiana, *Meunier*, C. R., lxxiv., 633, 1872.
Analyses and description, *H. Coquand*, Bull. Soc. G., xxviii., 98, 1871.
Genth, Am. Phil. Soc., Philad., xiii., 372, 1873.
See also wocheinite and zirlite.
Kokorije, anal., *John*, Verh. G. Reichs, 1874, 389.

BERAUNITE, Min. p. 558.—St. Benigna, Bohemia, analysis, Boricky, Ber. Ak. Wien, lvi., 6, 1867.
Saxony (near Scheibenberg), *Frenzel*, Jahrb. Min., 1873, 23.

BERYL, Min. p. 245.—Chili, anal. (0·8 p. c. $\dot{\mathrm{N}}\mathrm{i}$), Domeyko, 2d App. Min. Chili, p. 48, 1867.
Elba, cryst., *v. Rath*. ZS. G. Ges., xxii., 661, 1870; Achiardi, Nuovo Cimento, II., iii., Feb., 1870 ; analysis, *Bechi*, Boll. Com. Geol. Ital., 1870, 82.
Siberia, cryst. description, *Schrauf*, Ber. Ak. Wien, lxv., 255, 1872.
Remarkable crystal described (new forms), *Kokscharow*, Min. Russl., vi., 94.
Emerald, investigation of cause of color, *Williams*, Proc. Roy. Soc., London, xxi., 409, 1873.
Emerald, Muso mine, New Granada, anal., *Boussingault*, Ch. News, xx., 311, 1869.

BEYRICHITE, Liebe, Jahrb. Min., 1871, 840.

BIEIROSITE—Beudantite. Adam, Tableau Min., 1869, p. 49.

BINNITE, Min. p. 90.—Cryst., note, *Hessenberg*, Jahrb. Min., 1874, 842, 844.

BIOTITE, Min. p. 304.—Brewster, N. Y., altered to serpentine, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.
Morawitza, analysis, *Rumpf*, Tsch. Min. Mitth., 1874, 177.
Pargas, Ceylon, etc., analyses, Tsch. Min. Mitth., 1874, 239, 242.
See also Mica.

BISMITE, Min. p. 185.—Meymac, Corrèze, anal., *Carnot* thinks that bismuth ochre should be united to bismutite (Wismuthspath), and this name reserved for the true oxyd, C. R., lxxix., 478, 1874.

BISMUTH, Min. p. 19.—Found at Meymac, Corrèze, *Carnot*, C. R., lxxviii., 171; lxxix., 478, 1874.
Victoria, *Ulrich*, contrib. Min. Vict., 1870, p. 5.

BISMUTHINITE, Min. p. 30.—Beaver Co., Utah, occurrence described, *Silliman*, Am. J. Sci., III., vi., 127, 1873.
Cerro Gordo, containing 5 p. c. Cu, anal., Domeyko, 3d Append., Min. Chili, 1871.
Meymac, Corrèze, anal., *Carnot*, C. R. lxxix., 304, 1874.

BISMUTITE, Min. p. 716.—St. José, Brazil, note, *v. Kobell*, J. pr. Ch., II., iii., 469.
Haddam, Conn., *Shepard*, Am. J. Sci., II., l., 94.
Mexico, near Guanajuato, pseudomorph after scheelite (?), anal., *Frenzel*, Jahrb. Min., 1873, 801, 946; *Castillo*, Naturaleza, iii., p. 92, 1874. Oruro, Bolivia, ibid., 1874, 686.
Meymac, Corrèze, anal., *Carnot*, C. R., lxxix., 304, 1874.

BISMUTOFERRITE, Appendix I., p. 3.—A second analysis afforded, *Frenzel*, $\ddot{\mathrm{S}}\mathrm{i}$ 24·05, $\dddot{\bar{\mathrm{F}}\mathrm{e}}$ 33·12, $\dddot{\bar{\mathrm{B}}\mathrm{i}}$ 42·83 = 100·00. He regards it as without doubt a good species. J. Min., 1872, 516.

BLENDE, Min. p. 48.—See **SPHALERITE**.

BLOEDITE, Min. p. 643.—Stassfurt, cryst. and optical examination, *Groth* and *Hintze*, ZS G. Ges., xxiii., 670.
Stassfurt (simonyite, q. v., Appendix I., p. 14), *v. Rath*, Pogg., cxliv., 586 1871.

805 A. Bombiccite, *Bechi*, *Achiardi*, Min. Toscana, p. 358, 1873; *Bombicci*, **Mem. Ac. Sc** Bologna, II., ix., 1869; *Guareschi*, Boll. Com. Geol. Ital., 1871, 70.

Triclinic. $I \wedge i\text{-}\bar{i} = 174° 50'$, $1 \wedge i\text{-}\bar{i} = 159°$.
H. = 0·5–1. G. = 1·06. Transparent. Colorless.
Analysis, Bechi (after deducting impurities) l.c.

H	O	C
10·70	14·74	74·56 = 100·00

This corresponds to the formula $H^{12}OC^7$.
Softens with heat, and fuses at 75°, and at a higher temperature it volatilizes. Insoluble in water, but extremely soluble in sulphid of carbon; also soluble in ether and in alcohol.
Found in lignite at Castelnuovo d'Avane, in the upper valley of the Arno, Tuscany.
Achiardi refers to this species a fossil resin, described by Guareschi (l.c.) as found in the upper valley of the Arno. It occurs in irregular whitish-yellow masses, soft. It fuses easily, and burns with a smoky flame. Two analyses gave:

	H	O	C
1.	9·41	17·87	72·72 = 100·00
2.	9·12	13·94	76·94 = 100·00

These analyses lead to a formula essentially identical with that given for bombiccite.

BORACITE, Min. p. 595.—Stassfurt, crystallized, *Schultze*, Jahrb. Min., 1871, 844.
Cryst. note, *Schrauf*, Tsch. Min. Mitth., 1872, 114.

BORATES.—Found in Nova Scotia, *How*, Phil. Mag., IV., xli., 274, 1871.
Peru, analyses (with wide variations probably due to admixtures of $Ca\,Cl_2$ and $Ca\,SO_4$), *Walker*, Ch. News, xviii., 203, 1868; see also *Thiercelin*, Bull. Soc. Ch., xvii., 387, 1872.

BORAX, Min. p. 597.—Sierra Nevada, *Silliman*, Am. J. Sci., III., vi., 130, 1873; see also Jahrb. Min., 1874, 716.

144 A. Bordosite.—Ann. des Mines, VII., i., p. 412, 1872. Bertrand describes a mineral substance, color yellow to red, occurring with an amalgam rich in Hg and Ag, and resulting from its decomposition. It becomes dark rapidly on exposure to the air.

Analysis.	AgCl	Hg'Cl	HgO
	31·23	45·53	22·70 = 99·46

Bortrand regards the HgO as adventitious, and proposes for it the name HYDRARGYRITE, deducting this there remain AgCl 40·69, and Hg_2Cl 59·31 = 100, or AgCl + Hg_2Cl, to which he gives the name of BORDOSITE. Both species appear very uncertain. Locality Los Bordos in Chili.

BORNITE, Min. p. 44.—From the Ardennes, anal., *Koninck*, Bull. Acad. Belg., II., xxvii., 290, 1871.

BOULANGERITE, Min. p. 99.—Silbersand, near Mayen, anal., *v. Rath*, Pogg., cxxxvi., 430. (Var. Embrithrite), composition, *Frenzel*, J. pr. Ch., II., ii., 360.

BOURNONITE, Min. p. 96.—Liskeard, Cornwall, anal., *Wait*, Ch. News, xxviii., 752, 1873

BOUSSINGAULTITE, Min. p. 635.—Bechi gave the name boussingaultite (C. R., lviii., 583, 1864) to the double salt of ammonia and magnesia occurring at the boracic acid fumaroles of Tuscany. The same mineral has since been fully described by Popp (Ann. Ch. Pharm., Suppl. Bd., viii., 1, 1870), and has received from him the name *cerbolite*. It seldom occurs quite pure in nature, but on re-crystallization it is obtained in perfect crystals of monoclinic form. An analysis of material thus obtained gave: $\frac{2}{2}$, NH^4 9·38, $\dot{Mg}$ 11·05, $2\ddot{S}$ 44·39, $7\dot{H}$ 35·16 = 99·98, which affords the formula $NH_4O\ddot{S} + \dot{Mg}\,\ddot{S} + 6\dot{H}$. A number of analyses of the natural salt showed that $\dot{Fe}$, $\dot{Mn}$ and $\dot{Ca}$ may, in variable proportions, replace the $\dot{Mg}$

BRAGITE, Min. p. 525.—See FERGUSONITE.

BREITHAUPTITE.—See **ARITE.**

BREUNERITE, Min. p. 686. See **MAGNESITE.**

BROCHANTITE, Min. p. 664.—Schrauf (Ber. Ak. Wien, lxvii., 275, 1873) has thoroughly investigated this group of minerals, finding them to be isomorphous with malachite, and in crystalline form approximately monoclinic. He distinguishes four types. I. Brochantite from Rezbanya (in two varieties), Redruth, Cornwall, etc., triclinic. II. Warringtonite from Cornwall, and a variety from Rezbanya, monoclinic (?). III. From Nischne, Tagilsk, monoclinic-triclinic. IV. Rönigin from Russia, also a variety from Rezbanya, monoclinic or orthorhombic (anal. by *Ludwig* of this variety, Tsch. Min. Mitth., 1873, 36.)

BRONZITE, Min. p. 208.—In meteorites, *Rammelsberg*, Pogg., cxl., 316; from the chrysolite bombs of the Eifel, anal., same, ibid., cxli., 514, 1870.

From meteorite of Lodrau, cryst. and anal., *Tschermak*, Ber. Ak. Wien, lxi., 469, 1870.

Relation to other minerals of the pyroxene group, *Tschermak*, Tsch. Min. Mitth., 1871, 17.

From meteorite of Ibbenbühren, anal., *v. Rath*, Ber. Ak. Berlin, 1872, 33.

From basalt hills of Bohemia, anal., *Farsky*, Ber Böhm. Chem. Ges. (Zprávy, etc.), I., 26, 1872.

From the diamond rock of So. Africa, analyses, *Maskelyne & Flight*, Q. J. G. Soc., xxx., 411, 413, 1874.

Manayunk, Penn., anal., *Leeds*, Am. J. Sci., III., ix., 229, 1875.

See also *Enstatite.*

BROOKITE, Min. p. 164.—Cryst. (monoclinic, and isomorphous with wolframite), *Schrauf* Jahrb. Min., 1871, 163; 1873, 754 (Atlas der Krystall-Formen, Lief. IV.).

Urals, cryst., new forms, *v. Leuchtenberg*, Koksch. Min. Russl., vi., 204, 1870.

Found at Pfitsch Joch, Tyrol, Tsch. Min. Mitth., 1873, 49.

BRUCITE, Min. p. 175.—Altered by exposure to the air, *Hessenberg*, Min. Not., viii., 45, 1868.

Brewster, N. Y., pseudomorph after dolomite; altered to serpentine, *J. D. Dana*, Am. J Sci., III., viii., 375, 1874.

BUSTAMENTITE, Adam, Tableau Min., 1869, p. 67. An iodid of lead, Liebe, Jahrb. Min., 1867, 159.

830 F. Byerite.—A name given by Mallet (Am. J. Sci., III., ix., 146, 1875) to the mineral coal of Middle Park, Colorado. It belongs to the class caking-bituminous, and gave on analysis, 39·95 p.c. volatile matter (gas and tarry oil), 54·03 p.c. fixed residue (coke and ash), and 6·02 p.c. water. G. = 1.323. Color jet-black. Powder brown. It resembles albertite in the large amount of gas and tarry oil yielded by it, but differs in being heavier and in yielding no soluble products with bisulphide of carbon, ether, etc. It also resembles torbanite, but is heavier, does not crackle in the fire, and melts and intumesces when heated.

BYTOWNITE, Min. p. 340.—*Tschermak*, Pogg., cxxxviii., 162.

Shown to be a mixture, *Zirkel*, Tsch. Min Mitth., 1871, 61.

CABRERITE, Min. p. 561.—Anal. and description, *Frenzel*, Jahrb. Min., 1874, 682.

CACHEUTAITE. Adam, Tableau Min., 1869, p. 52. A doubtful variety of clausthalite from the Cacheuta mine, Mendoza, So. Amer., Dana, Min., p. 798.

CACHOLONG, Min. p. 199.—Analyzed by *Nordenskiöld*, Œfv. Ak. Stockholm, 1874, 3.

CACOXENITE, Min. p. 584.—St. Benigna, Bohemia, *Boricky*, Ber. Ak. Wien, lvi., 6, 1867.

CALAMINE, Min. p. 407.—Silesia, anal., *Wieser*, Verh. Geol. Reichs., 1871, 112.

Wythe Co., Virginia, anal., *Irby*, Ch. News, xxviii., 272, 1873.

CALAVERITE, Min. p. 795.—Red Cloud mine, Colorado, anal., *Genth*, Am. Phil. Soc. Philad., xiv., 229, 1874.

CALCITE, Min. p. 670.—In melaphyr on the Nahe, cryst., new forms, *v. Rath*, Pogg., cxxxv., 572.

Cryst. *Meyn*, *Rose*, ZS. G. Ges., xxiii., 456, 464.

Discussion of causes producing variety in forms, *Credner*, J. pr. Ch. II., i., 292, 1870.
Discussion of twins, *Scharff*, Jahrb. Min., 1870, 542.
Pseudomorphs in sandstone, Heidelberg, *Klocke*, Jahrb. Min., 1869, 714; at Sievring, near Vienna, *Brezina*, Jahrb. G. Reichs., xx., 1, 1870.
Pseudomorph after apophyllite, *Streng*, Jahrb. Min., 1870, 425.
An apparently hemimorphic crystal, *Bauer*, ZS. G. Ges., xxiv., 397, 1872.

Striegau, cryst. (with R^{17}, $-\frac{7}{8}R^{\frac{4}{7}}$, $-\frac{7}{8}R$), *Websky*, Tsch. Min. Mitth., 1872, 63.
Lake Superior, cryst., *Hessenberg*, Min. Not., ix., 1, 1870; Canary Is., ib., ix., 9; Bleiberg, ibid., x., 37, 1871; Iceland, ib., xi., 9, 1873; Andreasberg, xi., 17, 1873.
Stalactites from Niemschitz, from Erzberg, cryst., *Vrba*, Lotos, Dec., 1872.
Lake Superior, a remarkable twin, *v. Rath*, Pogg., clii., 17; Alston Moor, cryst. (R^4), ibid., Erg. Bd. v., 438.
Cryst., drilling (2R), *E. S. Dana*, Tsch. Min. Mitth., 1874, 180.
Brewster, N. Y., altered to serpentine, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.
From the melaphyr at Cänisdorf, cryst., new forms, *Schnorr*, Jahrb. Min., 1874, 636.
Catalogue of planes given by *Des Cloizeaux*, translated into Naumann's Symbols, *Hessenberg*, Jahrb. Min., 1874, 849.
Schneeberg, remarkable association with quartz, *v. Rath* and *Frenzel*, Ber. Ak. Berlin, 1874, 683.

CALEDONITE, Min. p. 625.—Red Gill, Cumberland, cryst., *Hessenberg*, Min. Not., ix., 48, 1870.
Leadhills, anal. by *Maskelyne* and *Flight;* they conclude that the mineral is really free from carbonic acid, and corresponds in composition to the formula $5\dot{P}b\dddot{S} + 3\dot{C}u\dot{H} + 2\dot{P}b\dot{H}$. J. Ch. Soc., II., xii., 101, 1873.
Rezbana, cryst., *Schrauf*, Ber. Ak. Wien, lxiv., 173; lxv., 241. See Appendix I., p. 18.

Campbellite. See CHALYPITE.

CANCRINITE, Min. p. 329.—Comp., *Kenngott*, Verh. Min. Ges. St. Pet., II., vii.

CARBONYTTRINE. *Adam*, Tableau Min., 1869, p. 24. Synonym of *tengerite*, Dana Min., 1868, p. 710.

CARNALLITE, Min. p. 118.—Westeregeln, anal., *Reinwarth*, Jahrb. Min., 1874, 618.
Stassfurt, containing thallium, *Hammerbacher*, Ann. Ch. Pharm., clvxxii., 82, 1875.

CARPHOLITE, Min. p. 419.—Found at Wippra in the Harz, anal., *Lossen*, ZS. G. Ges., xxii., 455, 1870.

CASSITERITE, Min. p. 157.—Found at Winslow, Me., *Jackson*, Proc. N. Hist. Bost., xii., 267, 1869.
New South Wales, occurrence described, *Ulrich*, Q. J. G. Soc., xxix., 5, 1873.
Found in large quantities in Queensland, Am. J. Sci., III., v., 137, 1873.

CELESTITE, Min. p. 619.—Anal., and discussion of products of decomposition, *Ullik*, Ber. Ak. Wien, lvii., 929, 1868.
Found in tertiary rocks of Egypt, Phil. Mag., IV., xxxviii., 162, 1869.
Pseudomorphs, *Scacchi*, Atti Acad. Sci., Napoli, March, 1870.
Cryst. memoir (many figures), *Auerbach*, Ber. Ak. Wien, lix., 549, 1869.
Monte di Zoccolino, Italy, anal., *Achiardi*, Boll. Com. Geol. Ital., 1871, 135.
Found near Hannover Lindener Berg, *Guthe*, Jahrb. Min., 1870, 480.
Rüdersdorf, etc., cryst. and analyses, with a discussion of the influence of isomorphous admixtures on the crystalline form, *Arzruni*, ZS. G. Ges., xxiv., 477, 1872.

CERARGYRITE, Min. p. 114.—Andreasberg, in crystals, *v. Groddeck*, Jahrb. Min., 1869, 445.
Domeyko has described a related mineral from the Cordillera of Dehesa. It contains beside AgCl also Ag_2Cl and Cu_2Cl, though in varying proportions, as shown by the analyses. Its color is ash-gray, and it does not alter at all on exposure to the light. Sectile like horn-silver. 3d Append. Min. Chili, 1871.

Cerbolite. See BOUSSINGAULTITE.

CERITE, Min. p. 413.—Bastnäs, cryst., shown to be orthorhombic, $I \wedge I = 90° 4'$, $i\text{-}\breve{i} \wedge 1\text{-}\breve{i} = 129° 8'$, anal., *Nordenskiöld*, Œfv. Ak. Stockholm, xxvii., 551, 1870, xxx., 13, 1873.

CEROLITE, Min. p. 470.—Saxony, anal., *Frenzel*, Jahrb. Min., 1873, 789.

CERUSSITE, Min. p. 700.—Kurlibaba (Bukowina), cryst., *Zepharovich*, Ber. Ak. Wien lxii., 439, 1870.

Cryst. memoir, *Kokscharow*, Min. Russl., vi., 100.

Cryst., new forms, and discussion of twins, *Schrauf*, Tsch. Min. Mitth., 1873, p. 203.

CHABAZITE, Min. p. 434.—Discussion of composition, with analyses, *Kenngott*, J. pr. Ch., II., i., 123; *Rammelsberg*, Pogg., cxlii., 476; anal., ZS. G. Ges., xxi., 84.

CHALCOLITE, Min. p. 585.—See TORBERNITE.

CHALCOMICLITE. A name used by Blomstrand for a mineral having the composition 3CuS, FeS^3, and hence synonymous with bornite (see Rammelsberg Min. Chem., p. 115). Œfv. Ak. Stockholm, xxvii., p. 24, 1870.

370 A. Chalcomorphite, v. Rath, Pogg. Ann., Erg. Bd. vi., p. 376, 1873.

Hexagonal, *a* (vert.) = 1·8993. Occurring planes *O*, *I*, 1. *O* : 1 = 114° 24′. Cleavage, *O* distinct. H. = 5. G. = 2·54. Lustre vitreous. Pyr., gives water in a matrass, becoming white and lustreless. B.B., fuses with difficulty on the edges, curling up like skolecite. Soluble in HCl with the separation of gelatinous silica.

	$\ddot{\mathrm{S}}\mathrm{i}$	$\dddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{H}}$ (and some $\ddot{\mathrm{C}}$)
Analysis (l. c.) on 0·26 gr.	25·4	4·0	44·7	16·4

loss, in part $\dot{\mathrm{N}}\mathrm{a}$, 9·5 = 100·00.

From the Laacher See, also from Niedermendig in the Eifel. Occurring in cavities in limestone-inclosures in the lava.

CHALCOPHYLLITE, Min. p. 571.—Cornwall, analyses, *Church*, J. Ch. Soc., II., viii., 168, 1870.

CHALCOPYRITE, Min. p. 65.—Cryst. memoir, *A. Sadebeck*, ZS. G. Ges., xx., 595, 1868; even apparently holohedral forms are really hemihedral, same, ib., xxiv., 181, 1872.

Tuscany, analyses, Boll. Com. Geol. Ital., 1873, 239.

68 A. Chalcopyrrhotite, Blomstrand, Œfv. Akad. Stockholm, xxvii., p. 23, 1870.

Massive. Color like that of pyrite with a tinge of brown. Hardness nearest that of chalcopyrite. G. = 4·28.

Analysis (l. c.)

	Fe	Cu	S	residue
$\frac{3}{2}$	48·22	12·98	38·16	0·74 = 100·09

which gives the formula Fe^4CuS^6 or $\left.\begin{matrix}2FeS\\CuS\end{matrix}\right\}\bar{F}e\,S^3$

Occurs at Nya Kopparberg, Sweden, in small imbedded portions with magnetite, spalerite. calcite, as well as chondrodite, the mineral most characteristic of the locality.

Chalypite. A name given by Shepard to a compound of iron and carbon found by Forchhammer as a leading constituent of the Niakornak iron. The carbon varied from 7·23 – 11.06 p. c., corresponding to the formula CFe^2 (Am. J. Sci., II., xlviii., 28, 1867). Meunier uses the name (Ann. Ch. Phys., IV., xvii., 36, 1869), and introduces another, **Campbellite,** for a similar compound, C. = 1·50 p. c., seemingly contained in the Campbell Co., Tenn., meteoric iron, which was analyzed by J. L. Smith (Am. J. Sci., II., xix., 159, 1855).

CHAMASITE, Min. 16.—In meteoric iron, *Meunier*, Ann. Ch. Phys., IV., xvii., 32.

CHILDRENITE, Min. p. 579.—Tavistock, anal., *Church*, J. Ch. Soc., II., xi., p. 103, 1873.

CHLORITE. See RIPIDOLITE, PROCLORITE.

CHLORITOID, Min. p. 504.—Chatham Co., No. Carolina, anal., *Genth*, Am. Phil. Soc. Philad., xiii., 399, 1873.

138 A. Chlorocalcite. Scacchi, Rend. R. Accad. Sc. Napoli, Oct., 1872 (ZS. G. Ges., xxiv., 505).

Isometric. In small crystals with cubic, octahedral and dodecahedral planes. Transparent, sometimes stained a light violet. Very soluble, deliquescing readily. Analysis gave 58·76 p. c. $CaCl_2$, the residue consisting of the chlorides of potash, soda and manganese.

Isomorphous with the chlorides of potash and soda.

Found at Vesuvius in the bombs thrown out during the eruption in April, 1872.

CHONDRODITE, Min. p. 363.—Composition discussed, *Kenngott*, Nat. Ges. Zürich, xiv., 162, 1869.

Pargas, crystals identical with humite, type II,, *Kokscharow*, Min. Russl., VI., 73 et. seq

Nya-Kopparberg, crystals belonging to humite, type II., *v. Rath*, Pogg., cxliv., 563, 1871.

Found in the Böhmerwald, near Husine, *Krejci*, Ber. Böhm. Ges. Prag, 1873, 360.

Brewster, N. Y., anal., *Breidenbaugh*, Am. J. Sci., III., vi., 212; altered to serpentine, *J. D. Dana*, ibid., viii., 375, 1874; preliminary notice of crystals, in which it is shown that while the majority belong to the second type (humite), there are also some which are of *type III.* The same planes occur, as on humite, with a large number of other new forms, the kind of hemihedrism is the same, and the angles are nearly identical. *E. S. Dana*, ibid., ix., 63, 1875.

See also Humite.

CHROMITE, Min. p. 153.—Analyses, Koksch., Min. Russl., V., 161, 1867.

Analyses, *Clouet*, Ann. Ch. Phys., IV., xvi., 90.

Monterey Co., Cal., anal., *E. Goldsmith*, Proc. Ac. Philad., 1873, 365.

Hungary, analyses, *Hoffmann*, Jahrb. Min., 1873, 873.

See Magnochromite.

CHROMPICOTITE, *J. Petersen*, J. pr. Ch., cvi., 137. Appendix I., p. 3.

CHRYSOBERYL, Min. p. 155.—Helsingfors, anal., *F. J. Wiik*, Jahrb. Min., 1868, 184. Cryst., ibid., 1869, 356.

Russia, cryst., new forms, *Klein*, Jahrb. Min., 1869, 548; 1871, 479.

Isomorphous with chrysolite, *Sadebeck*, Ber. Ges. Berlin, May 17, 1870; Jahrb. Min., 1870, 628.

CHRYSOLITE, Min. p. 256.—Laacher See, cryst., *v. Rath*, Pogg., cxxxv., 579; Vesuvius, twin, ibid., p. 581.

Bourbon Isles, red variety in lava, *Fuchs*, Jahrb. Min., 1869, 577.

As constituent of rocks, *Boué*, Ber. Ak. Wien, lvi., 254; same, with analyses, *Tschermak*, ibid., p. 261; from meteorite of Lodran, anal., *Tschermak*, ib., lxi., 467, 1870.

Cryst. memoir, *Kokscharow*, Min. Russl., VI., 1, 1870.

From the Pallas iron, anal., *v. Baumhauer*, Versl. Med. Ak. Amsterdam, v., 362, 1871; from Tjobe (India), meteorite, anal., same, ib., vi., 54, 1872.

From some basalts of Bohemia, anal., *Farsky*, Ber. Chem. Ges. Böhm. (Zprávy, etc.), 1872, 22.

In labradorite rocks of N. Hampshire, anal., *E. S. Dana*, Am. J. Sci., III., iii., 49, 1872.

Snarum, anal., Pogg., cxlviii., 329, 1873.

CHRYSOTILE, Min. p. 465.—See SERPENTINE.

CHUSITE, Min. p. 258.—Character doubtful, *Rosenbusch*, Jahrb. Min., 1872, 169.

CINNABAR, Min. p. 55.—Province of Lucca, cryst., showing that it is tetartohedral like quartz, *Achiardi*, Boll. Com. Geol. Ital., 1871, 163. Min. Tosc., II., p. 282.

Pseudomorph after barite, *Durand*, Cal. Acad. Sci., iv., 211, 1872.

Clarite. Sandberger has given this name to a supposed new mineral occurring at the Clara mine, near Schapbach, Kinzigthal. The chief constituents were found to be sulphur, antimony, arsenic and copper. Color dark steel-gray. Apparently orthorhombic, with cleavage perfect in one (macrodiagonal) direction. Occurs altered to chalcopyrite; also affords covellite as a result of decomposition. In addition to these minerals, tetrahedrite has been found at the same mine, and in larger quantities barite, fluorite, psilomelane and limonite. Jahrb. Min., 1874, 960.

CLAUSTHALITE, Min. 42, 798.—Mendoza, *Domeyko*, 2d App. Min. Chili, p. 30, 1867; 4th App., p. 21, 1874. *Stelzner*, Tsch. Min. Mitth., 1873, 254.

CLINOCHLORE, Min. p. 497.—Belonging to a "clino-hexagonal" system, *Schrauf*, Tsch Min. Mitth., 1874, 161.

Chester Co. Penn., anal., *Neminarz*, Tsch. Min. Mitth., 1874, 176.

COAL, analyses, showing the presence of sulphur in addition to that combined with the iron (as FeS_2), *Wormley*, Ohio Geol. Report, 1870, p. 412.

COBALTITE, Min. p. 17.—Thermo-electrical character, *Rose*, Pogg., cxlii., 1, 1871; *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 156, 1874.

COERULEOLACTITE, *Petersen*, Jahrb. Min., 1871, 353—Appendix I., p. 3.

Dr. Genth has observed a similar mineral with wavellite at General Trimble's iron mine, near White Horse Station, Chester Valley R. R., Chester Co., Penn (the locality erroneously called "Steamboat"). It is in cryptocrystalline, botryoidal, incrustations of a pale greenish blue or sky-blue color. An analysis of nearly pure material gave him: $\ddot{\mathrm{P}}$ 36·31, $\bar{\ddot{\mathrm{A}}}\mathrm{l}$ 38·27, Ċu 4·25, $\dot{\mathrm{H}}$ = 21·70, quartz 0·54 = 101·07. G. = 2·696. Neither the wavellite nor any other associated mineral contains copper, so that Dr. Genth regards it as probably belonging to the constitution of the mineral (priv. contrib.).

COLUMBITE, Min. p. 515.—Bodenmais, composition, *Hermann*, J. pr. Ch., ciii., 127, 1868; II., ii., 2, 113.

Composition, *Rammelsberg*, ZS. G. Ges., xxi., 555, 1869.

From New England, *Shepard*, Am. J. Sci., II., l., 90, 1870.

Relation to wolframite, *Jeremejew*, Jahrb. Min., 1873, 421; also *Groth* and *Arzruni*, Pogg., cxlix., 235, 1873.

San Roque, Argentine Republic, anal., Siewert, Tsch. Min. Mitth., 1873, 224.

COPIAPITE, Min. p. 655.—Anal., Domeyko, 4th Append. Min. Chili, p. 7, 1874.

COPPER, Min. p. 14.—Wallaroo, *Schrauf*, Tsch. Min. Mitth., 1872, 55; artificial crystals, ibid., 1873, 290.

Cryst. note, *Zerrenner*, Tsch. Min. Mitth., 1874, 94.

Remarkable crystal, *Kokscharow*, Verh. Min. Ges. St. Pet., II., vii. (Jahrb. Min., 1873, 421).

COQUIMBITE, Min. p. 650.—Atacama, anal., Domeyko, 4th Append. Min. Chili, p. 6, 1874.

CORKITE. Adam, Tableau Min., 1869, p. 49. A synonym of beudantite, Levy (Dana Min., p. 589).

CORNWALLITE, Min. p. 569.—Analyses by *Church*, confirming it as a good species; but giving a smaller amount of $\dot{\mathrm{H}}$ (about 8 p. c.) than in the analysis by *Lerch* (l. c.), J. Ch. Soc., II., vi., 276, 1868.

CORUNDOPHILITE, Min. p. 504.—Chester, Mass., anal., *Eaton*, Am. J. Sci., II., xlvi., 256, 1868.

CORUNDUM, Min. p. 137.—Pelham, Mass., *Adams*, Am. J. Sci., II., xlix., 271.

No. Carolina, Am. J. Sci., III., iii., 301; same, *Shepard*, ibid., iv., 109, 172, 1872; same (also Montana), occurrence described, *J. L. Smith*, ib., vi., 180.

Chester Co., Penn., Proc. Acad. Philad., 1872, 238, 266.

Ceylon (sapphire), cryst., *Klein*, Jahrb. Min., 1871, 486.

No. Carolina, complete description of occurrence, analyses, and enumerarion of various minerals as alteration products, *Genth*, Am. Phil. Soc. Philad., xiii., 361, 1873.

COSALITE, Min. p. 797.—Found at Rezbanya, *Frenzel*, Jahrb. Min., 1874, 681.

COTUNNITE, Min. p. 117.—Vesuvius, *Scacchi*, Atti Accad. Sci. Napoli, (read) March, 1870.

CROCIDOLITE, Min. p. 243.—Altered to Faserquarz, *Wibel*, Jahrb. Min., 1873, 367.

CRONSTEDTITE, Min. p. 503.—Cornwall, analyses, and cryst. description (an illustration of hemimorphism of a very interesting kind), *Maskelyne* and *Flight*, J. Ch. Soc., II., ix., 9, 1871.

Crycconite. Kryokonit, *Nordenskiöld*, Œfv. Ak. Stockholm, 1871, 293; 1874, 3. (Pogg., Ann., cli., 161, 1874; Geol. Mag., ix., 355, 1872.)

Nordenskiöld has given the name cryoconite to the powder found by him in Greenland covering the surface of land ice, as also at a distance of 30 miles from the coast. It formed a layer of gray powder, sometimes several millimetres in thickness, and often agglomerated into small round balls of loose consistency. Under the microscope it was seen to consist for the most part of colorless, crystalline, angular grains; there were also some organic particles, some transparent fragments showing cleavage surfaces (feldspar?), green crystalline fragments (augite?), and black, opaque magnetic particles. An analysis gave *G. Lindström* (l. c.)

$\ddot{\mathrm{Si}}$	$\dddot{\overline{\mathrm{Al}}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mn}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{Na}}$	$\dddot{\overline{\mathrm{P}}}$	Cl
62·25	14·93	0·74	4·64	0·07	5·09	3·00	2·02	4·01	0·11	0·06

water, organic matter (ignited at 100°) = 2·86, hygroscopic water 0·34 = 100·12.

Nordenskiöld states that the amount of foreign constituents (named above) is very small, so that *if the transparent grains all belong to the same mineral*, its composition can be deduced from the analysis, the oxygen ratio for $\dot{\mathrm{R}} : \ddot{\mathrm{R}} : \ddot{\mathrm{Si}} = 2 : 3 : 14$, and the formula as given by him is $2\dot{\mathrm{R}}\,\ddot{\mathrm{Si}}^2 + \dddot{\overline{\mathrm{Al}}}\ddot{\mathrm{Si}}^3 + \dot{\mathrm{H}}$. Its specific gravity was 2·63 (21° C.), hardness inconsiderable, and crystalline form monoclinic. The magnetic particles contain metallic iron, with cobalt and probably nickel. In regard to the source of the powder, the conclusion arrived at is that it must either have come from Jan Mayen, or from some unknown volcanic region in the interior of Greenland, or else it must be of *cosmical origin.*

The oxygen ratio given is a very unlikely one, and there seems to be no sufficient ground for considering the material essentially homogeneous, as claimed by Nordenskiöld. The composition is very closely that of an oligoclase-trachyte, so that the cryoconite may be properly, as he calls it, a "trachytic dust."

CRYOLITE, Min. p. 126.—Manufacture of soda from, *J. L. Smith*, Chem. News, xxiii., 270, 1871.

CRYPTOMORPHITE, Min. p. 599.—Extensive deposits in Nevada, Am. J. Sci., III., iv., 146. —See Priceite.

Crystallites. A name given by Vogelsang to the forms, often observed especially in igneous rocks, which show a regular arrangement or grouping, but have not the properties of crystals, particularly not their regular exterior form. They seem to form an intermediate step between amorphous matter and true crystals. See Vogelsang,—DIE KRYSTALLITEN, Bonn, 1875, this App. p. vi. To the crystallites, Vogelsang has given a variety of names according to their form or appearance: *Globulites* (Vogelsang, p. 13), *margarites* (p. 19), *longulites* (p. 21, 112), *sphärolites* (p. 131), *cumulites* (p. 134), *globosphärites* (p. 134), *belonosphärites* (p. 135), *felsosphärites* (p. 135), *granosphärites* (p. 135). See also *Ferrite*, *Opacite*, *Viridite.*

CUBANITE, Min. p. 65.—Found at Tunaberg, Kafveltorp, Sweden, analyses, *Cleve*, Geol. För. Förh. Stockholm, I., 105, 1873.

Culsageeite. See JEFFERISITE.

CUPRITE, Min. p. 133.—Liskeard, Cornwall, cryst. ($\frac{3}{2}$-$\frac{3}{2}$ new), *Schrauf*, Tsch. Min. Mitth., 1871, 106.

CUPROAPATITE. Adam, Tableau, Min., 1869, p. 45. An apatite from Chili, containing 20·93 p. c. $\dot{\mathrm{Cu}}$; analyzed by Field (Dana Min., p. 532.)

669 A. Cupromagnesite. *Scacchi*, Rend. R. Accad. Sc. Napoli, Oct., 1872 (ZS. G. Ges., xxiv., 506). Found at Vesuvius as a product of the eruption of April, 1872, in bluish-green crusts, consisting of copper vitriol and sulphate of magnesia. From the solution crystals are obtained having the composition $(\dot{\mathrm{Cu}}\ \dot{\mathrm{Mg}})\,\ddot{\mathrm{S}} + 7\,\dot{\mathrm{H}}$, and isomorphous with iron vitriol.

CYANITE, Min. p. 375.—No. Carolina, with corundum, *Genth*, Proc. Am. Phil. Soc. Philad., xiii., 381, 1873.

CYANOCHALCITE, *Hermann*, J. pr. Ch., cvi., 65.—Appendix I., p. 4.

CYANOTRICHITE, Min. p. 666.—Cap Garonne, note by Pisani, C. R., lxx., 1004, 1870.

CYMATOLITE, Min. p. 455.—Optical characters, *Bauer*, ZS. G. Ges., xxvi., 186, 1874.

CUPROSCHEELITE, Min. p. 606.—Chili, analyses, Domeyko, 2d Append. Min. Chili, p. 3 1867.

615 A. Cuprotungstite. Tungstate de cuivre, *Domeyko*, Ann. des Mines, VI., xvi., p 587, 1869. Cuprotungstite, *Adam*, Tableau Min., 1869, p. 32.

Amorphous, forming crusts of one or two mm. thickness, enveloping small, hard, glittering kernels of cupreous scheelite (the latter green in color).

Color yellowish-green. Streak bright greenish-yellow. Analyses of fragments taken with a knife from different crusts.

	$\dddot{\mathrm{W}}$	$\dot{\mathrm{Cu}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Ca}}$	residue ($\ddot{\mathrm{Si}}$)	$\dot{\mathrm{H}}$
1.	55·7	——	4·2	2·1	2·4	4·5
2.	56·48	30·63	2·53	2·00	3·87	4·62=100·13
3.	55·54	28·15	3·62	1·00	6·00	4·62= 99·03

Analysis (2) was made on what was regarded as the purest material. Part of the iron probably belongs with the residue ($\ddot{\mathrm{Si}}$). The composition is expressed by the formula $\dddot{\mathrm{W}}^3\dot{\mathrm{Cu}}$, there being also some $\dddot{\mathrm{W}}^3\dot{\mathrm{Ca}}$ present.

On charcoal blackens, and fuses easily to a black globule, slightly porous, and with an uneven surface. In the closed tube gives water, at a red heat loses 4½ p. c. Easily decomposed by nitric acid, even in the cold, giving a yellow residue soluble in ammonia, and a solution strongly colored by copper.

Found near the copper mines of Llannico in the environs of Santiago, Chili. The cuproscheelite (Dana Min. p. 606) associated with the cuprotungstite had sometimes a rich dark green color, also a clear green color with a tint of yellow; lustre vitreous or resinous, with an imperfect lamellar structure. H.=4. An analysis gave:

$\dddot{\mathrm{W}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Cu}}$	$\dot{\mathrm{Ca}}$	ign	insol.
(76·00)	1·55	5·10	15·25	1·70	0·40=100

The ordinary scheelite also occurs at the same locality, but is easily distinguished by its superior hardness.

CUPROVANADITE. Adam, Tableau Min., 1869, p. 33. Syn. of chileite, 1853, Dana Min., p. 612.

DAMOURITE, Min. p. 487.—Horrsjöberget, anal., *Igelström*, Œfv. Ak. Stockh., xxv., 37, 1868.

As a result of decomposition, anal., *Tschermak*, Ber. Ak. Wien, lviii., 16, 1868.

Salm Chateau, anal., *Koninck* and *Davreux*, Bull. Acad. Roy. Belg., II., xxxiii., 324, 1872.

Optical character, *Bauer*, ZS. G. Ges., xxvi., 183.

No. Carolina, associated with corundum, analyses, *Genth*, Am. Phil. Soc. Philad., xiii., 384, 1873.

A variety of damourite has been called **STERLINGITE** by *J. P. Cooke* (Mem. Am. Ac. Boston, 1874, p. 39).

It agrees with *damourite* in physical properties, but differs in the value of the optic-axial angle. Biaxial divergence about 70° (damourite 10°-12°), plane of axes parallel to the shorter diagonal. Dispersion small. Analysis by C. E. Munroe. (l. c.)

$\ddot{\mathrm{Si}}$	$\dddot{\overline{\mathrm{Al}}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
43·87	36·45	3·36	10·86	5·19

Regarding the water as basic with the protoxides, the atomic ratio becomes $\ddot{\mathrm{Si}} : \dddot{\overline{\mathrm{R}}} : \dot{\mathrm{R}} = 4 : 3 : 1$ (as in damourite).

Found at Sterling, Mass., associated with spodumene in the vein of a large bowlder rock. (This same name was given by Alger to the zincite of New Jersey.)

DANAITE (arsenopyrite), Min. p. 78.—Relation to glaucodot, *Tschermak*, Ber. Ak. Wien, lv., 447, 1867.

San Jose, anal., Domeyko 2d App. Min. Chili, p. 13, 1867.

Shown to possess positive and negative thermo-electrical varieties, *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 152, 1874.

DATOLITE, Min. p. 380.—Isomorphous with euclase and gadolinite, *Rammelsberg*, ZS. G. Ges., xxi., 807. See Euclase.

Andreasberg, anal., *Lemberg*, ZS. G. Ges., xxiv., p. 250, 1872.

Bergen Hill, cryst. monograph, new forms, *E. S. Dana*, Am. J. Sci., III., iv., 16, 1872.

Arendal, Toggiana, etc., cryst., enumeration of all known planes; with the addition of some new ones, *E. S. Dana*, Tsch. Min. Mitth., 1874, 1.

Santa Clara, Cal., associated with garnet and idocrase, *J. L. Smith*, Am. J. Sci., III., viii., 434, 1874.

DAUBERITE, Adam, Tableau Min., 1869, p. 64. Synonym of zippeite, Haidinger, Handb.. 1845. Dana Min., p. 667.

Dawsonite, *B. J. Harrington*, Can. Nat., vol. vii., p. 305, 1874.

Monoclinic with $C = 105°$? In thin bladed crystals, sometimes somewhat fibrous. Double-refracting. H. = 3. G. = 2·40. Lustre vitreous. Color white. Transparent to trans lucent.

Analysis (l. c.) Harrington.

	$\ddot{\bar{\mathrm{Al}}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$	$\ddot{\mathrm{C}}$	$\ddot{\mathrm{Si}}$	
1.	32·84	tr	5·95	20·20	0·38	11·91	29·88	0·40	= 101·56
2.	32·68 ($\ddot{\bar{\mathrm{Fe}}}$ tr)	0·45	5·65	20·17		[10·32]	30·72		= 100·00

The two analyses, made at different times, show considerable constancy of composition, and seem to point to "a hydrous carbonate of alumina, lime and soda, or perhaps a compound consisting of a hydrate of alumina combined with carbonates of lime and soda."

There is approximately the quantity of water required to form a di-hydrate of alumina, and nearly enough carbonic acid to form a neutral carbonate of lime and bicarbonate of soda. If it be a carbonate of alumina, it gives the mineral peculiar interest as being a compound, not surely identified hitherto either in nature (see hovite, Dana Min., p. 709), nor in the laboratory.

DECHENITE, Min. p. 609.—Cryst., *Schrauf*, Ber. Ak. Wien, lxiii., 167, 1871.

178 A. Delafossite, *C. Friedel*, C. R., lxxvii., p. 211, 1873.

In small crystalline plates, cleavable into thin opaque lamellæ. H. = 2·5, G. = 5·07. Color dark gray like graphite, with a more decided metallic lustre. Streak blackish-gray.

An analysis gave Friedel (l. c.)

$\dot{\bar{\mathrm{Cu}}}$	$\ddot{\bar{\mathrm{Fe}}}$	$\ddot{\bar{\mathrm{Al}}}$
47·45	47·99	3·52 = 98.96

This corresponds to $\ddot{\bar{\mathrm{Fe}}}$,$\dot{\bar{\mathrm{Cu}}}$, (but is it not a mixture?)

B.B. Fusible with difficulty, coloring the flame green. Easily soluble in HCl, even in the cold.

Found on yellowish-white lithomarge from the region of Katharinenburg, Siberia, perhaps also from Bohemia. Named for the mineralogist Delafosse.

DELESSITE, Min. p. 497.—Filling cavities in an amygdaloid, Nova Scotia, anal., *How*, Phil. Mag., IV., xxxvii., 269.

DERNBACHITE. Adam, Tableau Min., 1869, p. 49. A synonym of beudantite, *Levy*, (Dana Min., p. 589).

DESCLOIZITE, Min. p. 609.—Wheatly mine, Penn., *J. L. Smith*, Am. J. Sci., II., xlviii., 137, 1869.

Note by *Kenngott*, Jahrb. Nat. Ges. Zürich, xvi., 137, 1871.

Cryst., *Schrauf*, Ber. Ak. Wien, lxiii., 167, 1871.

Dewalquite. See ARDENNITE.

DEWEYLITE, Min. p. 469.—Probably derived from the decomposition of albite, anal., *Leeds*, Am. Chemist, iv., 64, 1873.

DIABANTACHRONNYN, *Liebe*, Jahrb. Min., 1870, 1.—Appendix I., p. 4. See also *Kenngott*, Jahrb. Min., 1871, 51.

DIALLAGE, Min. p. 215.—Relation to minerals of the pyroxene group, *Tschermak*, Min. Mitth., 1871, 25; Streng, ibid., 1872, 274.

DIAMOND, Min. p. 21.—Occurrence described, *Kokscharow*, Min. Russl., V., 373; VI., 190 et seq.

Found at Dlaschkovitz, Bohemia, *Schafarik*, Pogg., cxxxix., 188, 1870; ibid., cxl., 336; *Zepharowich* throws doubt upon the matter, ibid., cxl., 652.

Views on the origin of, W. B. Clarke, Ch. News, xxiv., 16, 40, 64, 78.

Probably exists with the platinum of Oregon, *Wœhler*, Am. J. Sci., II., xlviii., 441.

Probable existence in the gold washings of California, with zircons and topaz, *Silliman*, Am. J. Sci., III., v., 384; found at Cherokee, Butte Co., Cal., same, ib., vi., 133, 1873.

Behavior on heating, Rose, Pogg., cxlviii., 497; v. Schrötter, Ber. Ak. Wien, lxiii., 462, 1871; Baumhauer, Vers. Need. Ak. Amsterdam, II., vii., 200, 1873.

A uniaxial crystal, Schrauf, Tsch. Min. Mitth., 1873, 289.

Knop has shown that the supposed diamonds of Jeremejew do not exist in the xantophyllite (Jahrb. Min., 1871, 275; Appendix I., p. 19). On the contrary, the appearances are due, not to inclosed crystals, but to cavities which, says Knop, owe their existence to the corroding influence of acids either in nature or in the laboratory (Jahrb. Min., 1872, 785).

DIAPHORITE, *Zepharovich*, Ber. Ak. Wien, lxiii., 130; Appendix I., p. 4.

DIASPORE, Min. p. 168.—Chester Co., Penn., anal., *Sharples*, Am. J. Sci., II., xlvii., 319, 1868.

Urals, near Mramorsk, anal., containing P_2O_5, *Hermann*, J. pr. Ch., cvi., 70, 1869.

Chester, Mass., containing phosphoric acid, *Shepard*, Am. J. Sci., II., l., 96, 1870.

No. Carolina, occurrence described, *Genth*, Am. Phil. Soc. Philad., xiii., 372, 1873.

DIMORPHITE (Scacchi), Min. p. 28.—*Kenngott* suggests that both types of this species are to be referred to orpiment (auripigment), Jahrb. Min., 1870, 537.

DIOPSIDE, Min. p. 214.—From the chrysolite bombs of the Eifel, *Rammelsberg*, Pogg., cxli., 516.

Relation to minerals of the pyroxene group, *Tschermak*, Tsch. Min. Mitth., 1871, 21.

DIOPTASE, Min. p. 248.—Composition, *Rammelsberg*, ZS. G. Ges., xx., 536, 1868.

DOLOMITE, Min. p. 681.—Brewster, N. Y., altered to serpentine; to brucite; pseudomorph after chondrodite, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.

Pseudomorph after garnet, *Laube*, Lotos, xxii., 209, 1872.

Analyses, *Lemberg*, ZS. G. Ges., xxiv., 218 et seq., 1872.

DOMEYKITE, Min. p. 36.—Analyses, *Frenzel*, Jahrb. Min., 1873, 26.

Zwickau, Weisbach, Jahrb. Min., 1873, 64.

634 B. Dolerophanite, *Scacchi*, Note Mineralogiche, p. 22, Napoli, 1873. Extract from Atti Acad. Sci. Napoli, v. (read 1870).

Monoclinic. Observed planes, $i\text{-}i$, $i\text{-}\grave{\imath}$, O; $-\frac{1}{3}\text{-}i$, $\frac{1}{3}\text{-}i$, $\frac{2}{3}\text{-}i$, $1\text{-}i$, $\frac{3}{2}\text{-}i$; 1, -3; $\frac{3}{2}\text{-}\frac{3}{2}$; $-\frac{5}{3}\text{-}\frac{5}{3}$, $-5\text{-}\frac{5}{3}$, $\frac{1}{3}\text{-}\grave{3}$, $1\text{-}\grave{3}$; $-\frac{7}{9}\text{-}\frac{7}{3}$. $C = 113° 52'$. a (vert.) : b : $c = 0{\cdot}9962 : 1 : 0{\cdot}6753$. $i\text{-}i \wedge 1 = 70° 3'$, $i\text{-}\grave{\imath} \wedge 1 = 141° 5'$, $O \wedge 1 = 110° 9'$. Crystals small, rarely having a diameter of more than two millimetres. Well polished. Opaque. Color brown. Powder brownish-yellow.

Composition $Cu_2\ddot{S}$. Analyses:

	$\dot{C}u$	$\dddot{S}$	insoluble	loss	
1.	62·27	36·07	1·22	0·44	= 100.
2.	65·20	33·49	1·31		= 100.

A little $\dot{C}u\dddot{S}$ accompanying the dolerophanite is probably the occasion of the excess of $\dddot{S}$.

Kept for some time in water, the crystals dissolve in part, giving a blue solution; they preserve their form, however, though the color changes from brown to bluish. Dissolves easily in nitric acid. B.B., fuses, leaving a black scoriaceous residue. Unaltered at a temperature of 260°. With the fluxes gives reaction for copper.

Found by Scacchi at Vesuvius, having been produced by sublimation during the eruption of October, 1868. The name is derived δολερός, fallacious, φάινω, to appear.

See also Hydrocyanite.

459 A. Dudleyite, Genth, Am. Phil. Soc. Philad., xiii., p. 404, 1873.

Has the form of margarite, from the alteration of which it has been made. Color soft bronze, or brownish-yellow; lustre, pearly.

Analysis (l. c.)

$\ddot{S}i$	$\overline{\dddot{A}}l$	$\overline{\dddot{F}}e$	$\dot{F}e$	$\dot{M}g$	$\dot{L}i$	$\dot{N}a$	$\dot{K}$	ign	
32·42	28·42	4·99	1·72	16·87	0·19	1·52	0·56	13·43	=100·12

Oxygen ratio $\dot{R} : \dddot{R} : \ddot{Si} : \dot{H} = 6 : 12 : 14 : 10$ nearly, or $2(3\,\dot{R}, 2\ddot{Si}) + 4(\dddot{R}, 3\ddot{Si}) + 10\,\dot{H}$.
Exfoliates slightly on heating, and fuses with difficulty to a brownish-yellow blebby mass. Easily decomposed by hydrochloric acid with separation of silica in scales. Found at the Cullakenee Mine, Clay Co., N. Carolina, and in larger quantity with margarite at Dudleyville, Alabama.

DUFRENITE, Min. p. 583.—St. Benigna, Bohemia, anal., *Boricky*, Ber. Ak. Wien, lvi., 6, 1867.

DUFRENOYSITE, Min. p. 92.—Switzerland, anal., Chem. News, xxx., 103, 1874.

DURANGITE, Brush, Am. J. Sci., II., xlviii., 179. Appendix I., p. 4.—Note on composition, *Kenngott*, Jahrb. Min., 1870, 783. Cryst. description, *Des Cloizeaux*, Ann. Ch. Phys., iv., 1875.

DYSCRASITE, Min. p. 35.—Appendix I., p. 5.

EMBOLITE, Min. p. 117.—Chili, several analyses by Mœsta (Marburg, 1869) quoted by Domeyko, 3d Append., Min. Chili, 1871.

ELÆOLITE, Min. p. 327.—Investigated microscopically, *Zirkel*, Jahrb. Min., 1870, 810.

EMBRITHRITE, Min. 99.—See *Boulangerite*.

EMERALD, Min. 245.—See *Beryl*.

EMPLECTITE, Min. p. 86.—Christophsan, near Freudenstadt, anal., *Petersen*, Jahrb. Min., 1869, 847.

ENARGITE, Min. p. 107.—Morning Star Mine, Cal., anal., *Root*, Am. J. Sci., II., xlvi., 201, 1868.
Peru, anal., *Achiardi*, Lettera a Carlo Regnoli sopra alcuni Min. del Peru, p. 19, Pisa, 1870. See also Domeyko, 2d App. Min. Chili, p. 20, 1867.
Occurrence in southern Utah described, Silliman, Am. J. Sci., III., vi., 126, 1873.
Famatina Mts., Argentine Republic, analyses and description of occurrence, *Stelzner*, Tsch. Min. Mitth., 1873, 241, 249 ; Catamarca, anal., Domeyko, 3d App., Min. Chili. See *Famatinite*, *Luzonite*.

ENSTATITE, Min. p. 208.—In meteoric iron of Breitenbach, cryst. form described, *v. Lang*, Ber. Ak. Wien, lix., 848, 1869 (Pogg., cxxxix., 315, 1870): analysis by *Maskelyne*, Proc. Roy. Soc., xvii., 370, 1869 (Phil. Trans., clxi., 360, 1871).
In Shalka meteorite, anal., *Maskelyne*, Phil. Trans. clxi., 366, 1871 ; in Busti (Inda) meteorite, same, Proc. Roy. Soc., xvii., 151, 1869–70.
From some basalts of Bohemia, anal., *Farsky*, Ber. Böhm. Chem. Ges., i., 27, 1872 (Zpravy, etc.).
In meteorites, *Rammelsberg*, Pogg., cxl., 315 ; *J. L. Smith*, Am. J. Sci., III., v., 108, 1873.
Brewster, N. Y., analysis, Breidenbaugh, Am. J. Sci., III., vi., 211, 1873 ; altered to serpentine, *J. D. Dana*, ibid., viii., 375, 1874.
See also *Bronzite*.

234 A. Victorite, *Meunier*, Ber. Ak. Wien, lxi., p. 26, 1870.
Occurs in needle-like crystals in cavities in the meteoric iron from Cordillere, Deesa, Chili. Crystals 0·3 mm. in length and 0·07 in width, appearing under the microscope as six-sided prisms with four-sided pyramids ; they are grouped together in a rosette. Examined crystallographically by Des Cloizeaux, as follows:
$I \wedge i\text{-}\breve{\imath}$ $(g'm)=134^\circ\ 3'\text{–}20'$; $i\text{-}\bar{\imath} \wedge i\text{-}\breve{\imath}$ $(gh')=90^\circ\ 40'$; $(g'm)=46^\circ$; $I \wedge i\text{-}\bar{\imath}$ $(mh')=137^\circ\ 20'$; $I \wedge I$ $(mm')=93^\circ\text{–}93^\circ\ 40'$; $I \wedge i\text{-}\bar{\imath}$ $(h'm)=136^\circ\ 25'\text{–}135^\circ\ 40'$; $I \wedge i\text{-}\breve{\imath}$ $(g'm)=134^\circ, 134^\circ\ 40'$; $I \wedge I$ (over $i\text{-}\breve{\imath}$) $(mm)=88^\circ\ 40'$. In polarized light shows bright colors. Fracture conchoidal, no cleavage observed. Colorless (showing absence of iron). B.B. infusible, not attacked by acids. Meunier considers the victorite as a variety of enstatite entirely free from iron.

EOSITE, *Schrauf*, Ber. Ak. Wien.—Appendix I., p. 5.

EPIBOULANGERITE, *Websky*, ZS. G. Ges., 1869, 747.—Appendix I., p. 5.

EPIDOTE, Min. p. 281.—Cryst. memoir, homomorphous with azurite, *Schrauf*, Ber Ak. Wien, lxiv., 159, 1871.
Striegau, cryst. description (new forms), *E. Becker*, Koskch. Min. Russl., V., 366.

Composition discussed, Kenngott, Jahrb. Min., 1871, 449.

Untersulzbach, cryst. description, *Brezina*, Tsch. Min. Mitth., 1871, 49; *C. Klein*, Jahrb. Min., 1872, 113, 132; optical properties determined with great precision, *Klein*, ibid., 1874, 1; analyses, *Rammelsberg*, ZS. G. Ges., xxiv., 69; xxiv., 649; *Ludwig*, ibid., xxiv., 465 (Tsch. Min. Mitth., 1872, 187); *v. Drasche*, Jahrb. Min., 1872, 120; *v. Kottal*, Ber. Ak. Wien, lxvi., 200, 1872: see also Jahrb. Min., 1873, 422.

The analyses of Ludwig (l. c.) show the presence of about 2 p. c. of water as an essential constituent of epidote. In this Rammelsberg finally coincides (l. c.). According to the former the composition is expressed by the formula $Si_6\,Al_6\,Ca_4\,H_2\,O_{26}$ (earlier obtained by Tschermak, and Kenngott); this gives the oxgyen ratio for $\dot{\mathrm{H}}$, $\dot{\mathrm{R}}$, $\bar{\bar{\mathrm{R}}}$, $\ddot{\mathrm{S}}\mathrm{i}=1:4:9:12$.

EPIGENITE.—Appendix I., p. 5.

EPIPHANITE, Igelström, Œfv. Ak. Stockh., 1868, 29.—Appendix I., 6.

EPISTILBITE, Min. p. 443.—Glatz, Silesia, cryst. *Rammelsberg*, ZS. G. Ges., xxi., 95; *Websky*, ibid., xxi., 100, 1869.

Lünddsdörrsfjall, Sweden, anal. (result somewhat doubtful, possibly a new mineral), *Igelström*, Jahrb. Min., 1871, 361.

ERSBYITE, Min. p. 361.—Pargas, analyses, *v. Rath* concludes that this mineral should be placed in the scapolite group, Pogg., cxliv., 384; Wiik, Œfv. Finsk. Vet. Soc., xiii., 79, 1870–71. See also *Wiik*, Œfv. Finsk. Vet. Soc., xiv., 26, 1871–72.

ERYTHRITE, Min. p. 558.—Wittichen, Baden, anal., *Petersen*, Pogg., cxxxiv., 86.

148 A. Erythrosiderite, *Scacchi*, Rend. R. Acc. Sci. Napoli, Oct., 1872 (ZS. G. Ges., xxiv., 505). Orthorhombic, with two zones affording angles 110° and 92°. Color red. Very soluble. Composition expressed by the formula $2KaCl+Fe_2\,Cl_6+2\dot{\mathrm{H}}$. Found at Vesuvius imbedded in the lava of April, 1872, and undoubtedly formed by sublimation at that time.

Related to Kremersite.

ESMARKITE, Des Cloizeaux has shown that there are two minerals, from the same locality, which have borne this name. One is a true praseolite (fahlunite, Dana, Min., p. 485), the other in crystalline form, and in composition, approaches very near to anorthite, Ann. Ch. Phys., IV., xix., 176, 1870.

688 A. Ettringite, *Lehmann*, Jahrb. Min., 1874, 273.

Hexagonal. *a* (vert.)=0·9434. Occurring planes *O*, *I*, 1, ½. $I \wedge 1=137°\,27'$, $1 \wedge \frac{1}{2}=162°\,14'$. In minute needle-like prismatic crystals, seldom more than 3 mm. in length, thickness $\frac{1}{10}$ to ½ mm. Cleavage prismatic perfect. H.=about 2. G.=1·7504. In appearance very similar to chalcomorphite.

Analysis, Lehmann, l. c. (on 0·3623 gr.).

$\ddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dddot{\bar{\mathrm{S}}}$	$\dot{\mathrm{H}}$	loss (probably $\dddot{\bar{\mathrm{S}}}$)		
7·76	27·27	16·64	45·82	2·51	=	100·00

Lehmann gives the formula $\ddot{\bar{\mathrm{A}}}\mathrm{l},\ 3\dddot{\bar{\mathrm{S}}}+6\,(\dot{\mathrm{C}}\mathrm{a}\ \dot{\mathrm{H}})+26$ aq.

Occurs in cavities in the limestone-inclosures in lava of the Bellenberg at Ettringen and Mayen, in the district of Laach.

EUCLASE, Min. p. 379.—Isomorphous with datolite and gadolinite, Rammelsberg, ZS. G. Ges., xxi., 807, 1869.

The isomorphism of datolite and euclase was proved by J. D. Dana in 1854 (Am. J. Sci., II., xvii., 215): moreover the similarity in chemical composition (exhibited by Rammelsberg) was brought out in Dana's Mineralogy, 1868. pp. 362, 363 (Am. J. Sci., II., xlix., 400, 1870). The statement in Groth, Tabellar. Uebersicht der Min., 1874, 91, is consequently to be corrected.

EUDIALYTE, Min. p. 248.—(=eucolite), cryst. *Nordenskiöld*, Œfv. Ak. Stockholm, 1870, xxvii., 559.

EULYTITE, Min. p. 391.—Description, with correction of chemical formula, *v. Rath*, Pogg., cxxxvi., 416.

From Johanngeorgenstadt (*not* from Braunsdorf, Saxony, Min. p. 392), anal., *Frenzel*, Jahrb. Min., 1873, 791.

EUPHYLLITE, Min. p. 488.—Associated with corundum, *Genth*, Am. Phil. Soc. Philad. xiii., 391, 1873.

EURALITE, *Wiik*, Jahrb. Min., 1869, 357.—Appendix I., p. 6.

EUXENITE, Min. p. 521.—Eydland, near Lindernäs, anal., *Rammelsberg*, ZS. G. Ges., xxi. 561; anal., same, Pogg., cl., 207, 1873.
Hitteroë, anal., *Jehn*, Jahrb. Min., 1872, 319; Pogg. Ann., cxliv., 595, 1871.

FAHLERZ, Min. p. 100.--See *Tetrahedrite.*

FAHLUNITE, Min. p. 484—(or a related mineral) in the Eozoon, and in paleozoic crinoids, Am. J. Sci., III., i., 378, 379, 1871.
Nova Scotia, *How*, Phil. Mag., IV., xxxvii., 270.

132 B. Famatinite, *Stelzner*, Tsch. Min. Mitth., 1873, p. 242.
Massive, sometimes reniform. Fracture uneven, somewhat brittle. H. = 3·5. G. = 4·57. Color mixture of copper-red and gray. Streak black.
Composition $4(3Cu_2S, Sb_2S_5) + 3(Cu_2S, As_2S_5)$, or an antimonial enargite (see luzonite). Analyses 1, 2, Siewert, l. c.; 1, from the Mejicana Upulunzos mine; 2, from the Mejicana Verdiona mine.

		S	Sb	As	Cu	Fe	Zn	Gangue
1.	$\frac{2}{2}$	29·17	21·23	4·07	44·12	0·82	0·59	—— = 100·00
2.	$\frac{2}{2}$	29·63	20·54	3·63	45·34	0·51	0·59	0·63 = 100·87

Pyr. In the closed tube decrepitates, giving off sulphur readily, and on stronger heating also some sulphid of antimony. On charcoal gives off white fumes of antimony, leaving a black, brittle metallic globule. Occurs with enargite, chalcopyrite, pyrite, etc., in the Famatina Mts., Argentine Republic.
It has also been found by Hübner at Cerro de Pasca, Peru (Frenzel, Jahrb. Min., 1874, 685; Tsch. Min. Mitth., 1874, 279).

FASSAITE, Min. p. 216.—Pseudomorph after vesuvianite, *Döll*, Tsch. Min. Mitth., 1874, 85.
Pseudomorph after monticellite, Tyrol, *v. Rath*, Ber. Ak. Berlin, 1874, 747.

FAUJASITE, Min. p. 433.—Annerod, pseudomorph after palagonite, *Streng*, Jahrb. Min., 1874, 576.

FELDSPAR GROUP, Min. p. 352.—In diorytes (Schriesheim, labradorite), ZS. G. Ges., xx., 365.
Discussion of composition, *Tschermak*, Ber. Ak. Wien (lx., 145, 1869); Pogg., cxxxviii., 162; cxli., 174; cxlii., 464; *Rammelsberg*, ZS. G. Ges., xxiv., 138; *v. Rath*, Pogg., cxliv., 219, 375: cxlvii., 274; clii., 39; Erg. Bd. vi., 378.
Cryst. relation of the different species, *v. Rath*. Pogg., cxxxv., 454; compound crystals from Sangerhausen, same, Pogg., cxxxviii., 537, 1869; crystals from Elba, same, and analysis, ZS. G. Ges., xxii., 652, 1870.
Relations of the species, cryst. and chem., *Streng*, Jahrb. Min., 1871, 598, 715.
Decomposition of, *J. Lemberg*, ZS. G. Ges., xxii., 335, 1870. Analyses, ibid., xxiv., 188, 1872; *Beyer*, Arch. Pharm., II., cl., 193.
From granites, Scotland, analyses, *Haughton*, Phil. Mag., IV., xl., 59, 1870.
India, from granite, *Ormsby*, Journ. R. Geol. Soc. Ireland, II., iii., 26, 1871.
Analyses, *Cleve*, Ak. H. Stockholm, ix., No. 12, Nov., 1870 (Geol. West India Is, p. 29).
In dolerytes, anal., *Sandberger*, Ber. Ak. München, 1873, 143.
Tuscany, cryst. memoir, *Achiardi*, Boll. Com. Geol. d'Italia, 1871, 208, 261.
Finland, *Wiik*, Œfv. Finsk. Vet. Soc., xiv., 26. 1871-72.
Altered to penninite (pseudophite), *Zepharovich*, Tsch. Min. Mitth., 1874, 7.
Trachytic rocks of Transylvania, analyses, *Doelter*, Tsch. Min. Mitth., 1874, 13 et seq.
Verespatak, anal., *Sipocz*, Tsch. Min. Mitth., 1874, 175.
With corundum, No. Carolina, *Genth*, Am. Phil. Soc. Philad., xiii., 375; *J. L. Smith* Am. J. Sci., III., vi., 185.
Manhattan Is., New York, analyses, Schweitzer, Amer. Chem., iv., 443, 1874.
Analyses, *Petersen*, Jahrb. Min., 1874, 269.
Fournier mine, Canada, anal., *Harrington*, Geol. Surv., 1874, 198.
See also *Albite*, *Andesite*, *Anorthite*, *Oligoclase*, *Orthoclase*, *Tschermakite.*

Des Cloizeaux has recently investigated the optical properties of the triclinic feldspars (C. R., lxxx., Feb. 8, 1875). The principal results obtained by him are contained in the following table, in which *Bx* stands for *bisectrix:*

	ALBITE.	OLIGOCLASE.	LABRADORITE	ANORTHITE
Acute bisectrix	always +	generally — sometimes +	always +	always —
Angle made by the + Bx. with a normal to *i-ĭ* (*g*)	15°	18° 10′	30° 40′	Position of the Bx. has no simple relation to the planes observed on the crystals.
Same, with a normal to *O* (*p*)	78° 35′	68°	56°	
Angle made by the line in which the plane of the optic-axes cuts *i-ĭ*, with edge *i-ĭ* / *O*(*g′*, *p*)	20°	Line parallel to the edge *O*, *i-ĭ*.	27°–28°	
Same, with edge *i-ĭ*/*I*(*g′*/*m*)	96° 28′ (front)	" "	37° 23′–36° 25′	
Ordinary dispersion	$\rho<v$(+ Bx.)	$\rho<v$(+ Bx.)	$\rho>v$(+ Bx.)	$\rho<v$(− Bx.)
Dispersion parallel or perpendicular to plane of polarization	*Inclined;* probably also slight *horizontal.*	*Crossed;* also slight *inclined.*	*Crossed;* also slight *inclined.*	*Inclined.*
Appar'nt optic-axial angle (in air)				
—— for red rays	80° 39′	89° 35′	88° 15′	84° 58′
—— for blue rays	81° 59′	88° 31′	87° 48′	85° 59′
	(Roc tourné)	(Sunstone. Tvedestrand)	(Labrador)	(Somma)

The axial divergence is quite constant for albite, labradorite and anorthite, but varies for oligoclase even in different sections taken from the same specimen. Des Cloizeaux concludes from his observations that labradorite and oligoclase have an equal right with albite and anorthite to be considered independent species, contrary to the views presented by Tschermak. Andesite he concludes to be altered oligoclase, while tschermakite (q. v.) is identical with albite.

FERGUSONITE, Min. p. 524.—Composition discussed, *Hermann*, J. pr. Ch., cvii., 129, 1869. *Tyrite*, *bragite*, anal., *Rammelsberg*, Pogg., cl., 203, 1873.

FERRITE. A name proposed by *Vogelsang* (ZS. G. Ges., xxiv., p. 529, 1872) for the amorphous oxide of iron (hydrous), which in red or yellow particles plays an important part in many rocks, and whose composition is as yet undetermined.

FERROILMENITE (columbite), *Hermann*, J. pr. Ch., II., ii., 118.

Ferrotungsten. See TAMMITE.

FIBROFERRITE, Min. p. 656.—Atacama, anal., Domeyko, 4th Append. Min. Chili, p. 7, 1874.

FIBROLITE, Min. p. 373.—Delaware Co., Penn., analyses, associated with corundum; *Genth*, Am. Phil. Soc. Philad., xiii., 380, 1873.

FICHTELITE, Min. p. 735.—Found in peat near Sobeslau, *Krejci*, Ber. Böhm. Ges., 1873 344.
Discovered in a log of Pinus Australis, Alabama, *Mallet*, Am. J. Sci., III., iv., 419.

FIORITE, Min. p. 199.—Anal., Chem. News, xxviii., 272.

FLUOCERITE, Min. p. 126.—Broddbo, cryst., *Nordenskiöld*, Œfv. Ak. Stockholm, xxvii. 550, 1870.

FLUORITE, Min. p. 123.—Coloring matter microscopically investigated, Bull. Soc. Imp Mosc., xl., 228.
Urals, cryst. description, *Kokscharow*, Min. Russl., v., 197.
Artificial, *Scheerer*, J. pr. Ch., II., vii., 63.
Münsterthal, cryst., *Klocke*, Jahrb. Min., 1874, 731.
Saxon localities, *Frenzel*, Min. Lex. für Sachsen, p. 109.

392 A. Foresite, *v. Rath*, Pogg., clii., p. 31, 1874. Cookeite, *Achiardi*, Min. Toscana II., p. 236; Boll. Com. Geol. d'Italia, 1874, 306.

Orthorhombic. In crystalline crusts on tourmaline, or lining cavities. Crystals very minute, prismatic in habit, with planes *i-ī*, *i-ĭ*, *O* and 1. Angles obtained (approximate) $O \wedge 1 = 132°$, $i\text{-}\bar{\imath} \wedge 1 = 121°$. Form resembling stilbite, with which it seems to be isomorphous. Cleavage parallel to *i-ĭ*, distinct; lustre on this face, pearly. G. = 2·405. Color white.

Analysis 1. v. Rath, l. c. 2. Bechi, Min. Tosc., II., 236. 3. Pullè and Capacci, Boll. Com. Geol. Ital., 1874, 311.

		$\ddot{\mathrm{Si}}$	$\ddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{M}}\mathrm{n}$.	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\mathrm{N}}\mathrm{a}$	$\dot{\mathrm{K}}\mathrm{a}$	$\dot{\bar{\mathrm{B}}}\mathrm{e}$	$\dot{\mathrm{H}}$
1.	½	49·96	27·40	——	5.47	0·40	1·38	0.77	——	15.07 = 100.45
2.		44·60	36·00	1·02	5·50	0·02	2·33	0·72	0·71	9·18 = 100·08
3.		44·60	38·00	1·02	5·50	0·20	3·33	0·72	0·71	6.00 = 100·08

For his analysis v. Rath deduces the formula $\dot{\mathrm{N}}\mathrm{a}_2$, $3\dot{\mathrm{C}}\mathrm{a}\ 8\ddot{\bar{\mathrm{A}}}\mathrm{l}\ 24\ddot{\mathrm{Si}}\ 24\dot{\mathrm{H}}$. Oxygen ratio for $\dot{\mathrm{R}} : \ddot{\bar{\mathrm{R}}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 1 : 6 : 12 : 6$ (stilbite $= 1 : 3 : 12 : 6$).

B. B. Expands and melts. With difficulty decomposed by HCl, even after ignition. The water goes off in part at 100°–110° C., after continued heating at 200° the mineral loses 5–5½ p. c., and to drive off the whole amount present (15·06 p. c. and 15.09 in two trials) a strong red heat was required.

Found at San Piero in Campo, Island of Elba, in cavities in the granite, with tourmaline, lepidolite, quartz, feldspar. It occurs, as a secondary product, along with heulandite and stilbite, covering these minerals.

A mineral from the same locality, with the foresite of v. Rath, associated in the same way, and similar in physical properties (anal. 2), was referred provisionally by Achiardi (l. c.) to cookeite (cuccheite), although with a question as to the propriety of so doing. It is like cookeite (*Brush*, Dana's Min., 1868, p. 489) in manner of occurrence, but, as mentioned by Achiardi, has a very different chemical composition. (Could a confounding of the relative amounts of $\ddot{\mathrm{Si}}$ and $\ddot{\bar{\mathrm{A}}}\mathrm{l}$ have suggested the identity of the Elba mineral with cookeite, viz.: $\ddot{\mathrm{Si}}$ 35, $\ddot{\bar{\mathrm{A}}}\mathrm{l}$ 45 (cookeite), $\ddot{\mathrm{Si}}$ 45, $\ddot{\bar{\mathrm{A}}}\mathrm{l}$ 36 (foresite). Pullè and Capacci first suggested that the species was new in an article entitled 'Un Viaggio nell' Arcipelago Toscano,' published in a Florence newspaper (1874).

FRANKLINITE, Min p. 152.—Found at Centerville, near Paterson, N. J., Am. J. Sci., II., xlviii., 138, 1869. [This observation was erroneous, Brush.]

Pseudomorph after calcite, *Leeds*, Am. Chemist, iv., 4, Oct., 1873.

FREIESLEBENITE. See DIAPHORITE.

30 A. Frenzelite.—Selenwismuthglanz, *Castillo*, Naturaleza II., 174, 1873, Jahrb. Min., 1874, 225; *Frenzel*, Jahrb. Min., 1874, p. 679. Frenzelite, *Dana*.

Massive, structure fine-granular, foliated to fibrous. Orthorhombic? In minute, needle-like crystals, irregular, strongly striated vertically. Crystals sometimes single imbedded in galapektite, sometimes grown together, forming semi-compact masses. Cleavage distinct, parallel to *i-ĭ*.

H. =2 (Castillo), 2·5–3 (Frenzel). G. =5·15 (Castillo), 6·25 (Frenzel). Color bluish-gray. Streak, gray, grayish black shining. Lustre metallic. Soft, malleable.

Analysis, Frenzel l. c.

Se	Bi	S		
24·13	67·38	6·60	=	98·11

This corresponds to the formula $Bi_2\ Se_3$, where some of the Se is replaced by S, or more strictly $2Bi_2\ Se_3 + Bi_2S_3$. A partial examination on a very small quantity gave Rammelsberg Bi=65·4, Se=16·7. He suggests the presence of Zn, which is not confirmed by Frenzel. B. B. fuses on charcoal with a blue flame, giving a strong odor of selenium. With iodid of potassium gives a fine red coating, even without the addition of sulphur, thus proving that it is already present. Decomposed by aqua regia on slow heating.

Found at Guanajuato, Mexico.

Frenzel has given the first complete description of this species, in fact he speaks of having been aware of its existence for some years, so that it may well receive his name.

GADOLINITE, Min. p. 293.—*Rammelsberg*, ZS. G. Ges., xxi., 807, 1867. See Euclase.

Crystalline form (=monoclinic), optical properties and chem. composition, Des Cloizeaux, Ann. Ch. Phys., IV., xviii., 305, 1869.

Radauthal Harz, cryst. description, *v. Rath*, Pogg., cxliv., 576, 1871.

GAHNITE, Min. p. 149.—**Franklin, N. J.**, description and analysis, (*Adam*) *G. J. Brush*, Am. J. Sci., III., i., 28.

GALENITE, Min. p. 40.—Tiefen glacier, anal., *v. Fellenberg*, Jahrb. Min., 1869, 373.

Province of Lucca, Italy, cryst., *Achiardi*, Boll. Com. Geol. Ital., ii., 160, 1871.

Localities in Saxony, *Frenzel*, Min. Lex. Sachsen, Jahrb. Min., 1874, 425.

Positive and negative varieties, thermo-electrically, *Stefan*, Ber. Ak. Wien, li., 260, 1865; *Schrauf* and *Dana*, ibid., lxix., 155, 1874.

Cryst. monograph, *Sadebeck*, ZS. G. Ges., xxvi., 617, 1874.

GARNET, Min. p. 265.—Spessartite, crystallized, Aschaffenburg; massive, Pfitsch, Tyrol, analyses, *v. Kobell*, Ber. Ak. München, 1868, 292; almandite, No. Carolina, anal., *same*, ibid., p. 295, 1868.

Cantoira, valley of Lanzo, *Strüver*, Atti Accad. Sci. Torino, iii., 129, 1867–8.

From lava of the Herchenberg, Burgbrohl, *Wolff*, Jahrb. Min., 1868, 605.

Granatfilz, Zermatt, anal., *v. Fellenberg*, Jahrb. Min., 1868, 745.

Jordansmühl, Silesia, colorless variety, cryst. ($\frac{6}{6}\frac{4}{3}$-i), anal., *Websky*, ZS. G. Ges., xxi., 753, 1869.

Frugard, white variety, resembling quartz, anal., Nordenskiöld, Œfv. Ak. Stockholm, xxvii., 565, 1870.

Elba, cryst., anal., *v. Rath*, ZS. G. Ges., xxii., 638, 660, 1870.

Mexico, anal., *Damour*, Ann. Ch. Phys., IV., xxiii., 159, 1871.

Tuscany, occurrence described, analyses, *Achiardi*, Boll. Com. Geol. Ital., 1871, 168.

Altered to chlorite, *Niedzwiedzki*, Tsch. Min. Mitth., 1872, 162.

Grossular, Monzoni, anal., *Lemberg*, ZS. G. Ges., xxiv., 249, 1872.

From eklogyte, Eppenreuth, etc., *v. Gerichten*, Jahrb. Min., 1874, 434.

Cryst., enumeration of all occurring planes with the localities, *Bauer*, ZS. G. Ges., xxvi., 119, 1874.

416 A. **Garnierite**, *Garnier*, Bull. Soc. G., II., xxiv., p. 448 (1867), *A. Liversidge*, J. Chem. Soc., II., xii., 613, July, 1874.

Amorphous, enclosed between thin plates of silica, which has filled fissures in the original material. H.=2·5. G.=2·27.

Color bright apple-green. Streak pale green. Touch not unctuous. Adheres to the tongue.

Analysis (l. c.) Liversidge.

	$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{A}}\mathrm{l}}\dddot{\bar{\mathrm{F}}\mathrm{e}}$	$\dot{\mathrm{Ni}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$	$\dot{\bar{\mathrm{H}}}$		
$\frac{2}{2}$	47·24	1·67	24·01	21·66	tr	5·27	=	99·85

Liversidge suggests the formula $(\dot{\mathrm{Mg}}\dot{\mathrm{Ni}})_{10}\,\ddot{\mathrm{Si}}_8+3\dot{\bar{\mathrm{H}}}$.

In the closed tube gives off water, becoming gray; with borax gives a nickel bead. On immersion in water breaks to pieces with a sharp crackling sound, the fragments having a conchoidal fracture.

Occurs in veins traversing a serpentine rock near Noumea, capital of New Caledonia; associated with chromic iron and steatite.

Liversidge calls attention to the relation of this species to alipite, and suggests at the same time that it is probably a result of decomposition and consequently hardly deserves a new name, proposing, however, in case it prove to exist in large quantities, the name from the locality (*i.e.*, *noumeaite*). A private contribution from Mr. W. B. Clarke (from whom Mr. Liversidge obtained his specimen) states that the mineral was discovered by Garnier in 1865, and should properly receive the name *garnierite*, especially as it was found at Mont d'Or, before the town of Noumea existed. In the Bull. Soc. G., II., xxiv., 448 (1867), Garnier in an article on New Caledonia mentions the occurrence of a hydrous magnesian silicate (=gymnite) in the veins of the serpentine, and adds that it is sometimes colored green through the presence of a silicate of nickel (*i. e.*, the so-called garnierite ?). It is hence probably a mixture. If an analysis of the similar material by Leibius (Sydney Herald, Sept. 23, 1874) is correct ($\ddot{\mathrm{Si}}$ 48·90, $\dot{\mathrm{Mg}}$ 10·93, $\dot{\mathrm{Ni}}$ 6·46, $\dddot{\mathrm{S}}$ 0·83, $\dddot{\bar{\mathrm{F}}\mathrm{e}}+\dddot{\bar{\mathrm{A}}\mathrm{l}}$=15·13, $\dot{\bar{\mathrm{H}}}$=17·75), it would imply an entire want of constancy of composition.

GEHLENITE, Min. p. 370.—Orawitza, anal., *Janovsky*, Ber. Chem. Ges., Berlin, 1873, 1455; *v. Zepharovich*, Ber. Ak. Wien, lxix., 26, 1874.

Monzoni, anal., *Lemberg*, ZS. G. Ges., xxiv., p. 248, 1872.

GEIERITE, Min. p. 77.—(= löllingite), Wolfach, Baden, anal., *Petersen*, Pogg., cxxxvii., 391, 1869. See also Jahrb. Min., 1869, 315.

GENTHITE, Min. p. 471.—Webster, No. Carolina, anal., *Dunnington*, Ch. News, **xxv.** 270, 1872.

GEYSERITE. **PEALITE** is a name given by Dr. Endlich to a variety of geyserite (opal) from the silicious deposits of the Upper Geyser basin of Firehole river. An analysis gave him $\ddot{\mathrm{Si}} = 95{\cdot}84$, $\dddot{\mathrm{Al}}$ tr, $\dddot{\mathrm{Fe}}$ 2·68, $\dot{\mathrm{Mg}}$, $\dot{\mathrm{Ca}}$, $\dot{\mathrm{Na}}$, $\dot{\mathrm{Li}}$, tr., ign $1{\cdot}50 = 100{\cdot}02$. The specimen had a milk-white color, crypto-crystalline structure, semi-vitreous aspect. G. = 2·49. Another kind was greenish-brown to greenish-white in color; amorphous; lustre vitreous. G. = 2·0816 It contained 6·3 p. c. water. (Hayden's U. S. Geol. Survey, 6th Ann. Rep.) Am. J. Sci. III., vi., 66.

GERSDORFFITE, Min. p. 72.—Lempälä, Finland, *Wiik*, Oefv. Finsk. Vet. Soc., xiii., 75, 1870–71.

GIESECKITE, Min. p. 479.—Occurrence, with other minerals, in Brittany, *de Limur*, Bull. Soc. G., III., i., 166, 1874.

429 A. **GILBERTITE**, Min. p. 798.—Frenzel has investigated the hitherto doubtful gilbertite, and concludes that it is really a good species belonging to mica group. It occurs at the various tin mines of the Erzgebirge (Saxony and Bohemia), Zinnwald, Ehrenfriedensdorf, etc.

Frenzel mentions two varieties: The first (*a*) is of a greenish to yellowish-white color; translucent. H. = 1. G. = 2·65–2·72. It occurs massive, with a dense to crystalline structure, filling all the cavities between the cassiterite and wolframite. The second variety (*b*) occurs in spherical or stellate forms, and also in groups of six-sided tabular crystals. It is, moreover, found pseudomorph after scheelite and apatite. H. = 3. G. = 2·82. According to Fischer the mineral shows itself under the microscope to be homogeneous. Analyses 1. and 2. of variety *a*; 1. from Ehrenfriedensdorf, 2. from Pobersbau. 3. variety *b*, from Ehrenfriedensdorf.

	$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ka}}$	$\dot{\mathrm{Na}}$	Fl	$\dot{\mathrm{H}}$
1.	48·96	30·96	2·24	0·26	1·97	8·47	1·65	1·04	3·83 = 99·38*
2.	48·10	32·30	3·30	0·40	1·12	10·02	——	0·81	4·09 = 100·14*
3.	48·10	31·55	3·10	1·30	1·33	8·62	2·14	0·88	3·52 = 100·54

* Contains also traces of manganese.

The water is given off only at an elevated temperature. B. B., fuses in fine splinters, coloring the flame slightly red. (Compare analyses of margarodite, Min. p. 310.)

GISMONDITE, Min. p. 418.—Found near Baumgarten, east of Giessen, *Streng*, Jahrb. Min., 1870, 430; cryst. description, same, ibid., 1874, 578.

GLASBACHITE, Adam, Tableau Min., 1869, p. 52.—A doubtful selenid of lead from Glasbach, analyzed by Kersten. See *Zorgite*, Dana Min., p. 43.

Glancespar, Pogg. Ann., cxlvii., p. 272.—Vom Rath has investigated this mineral, first mentioned by v. Dechen in his Geognost. Führer in das Siebengebirge, p. 154, Bonn, 1861. Occurs in small prismatic fragments in the basalt of the Siebengebirge. Form a rhombic prism having an acute angle of 88¼°; cleavage distinct with pearly lustre, angle on prismatic face = 134° 7′ H. between quartz and feldspar. G. = 3·150.

Analysis v. Rath (l. c.) on 0·7 gr.

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dddot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Ca}}$
36·7	57·9	4·4	0·7	0·8 = 100·5.

Part of the CaO, MgO, and Fe_2O_3 are due to impurities (augite, magnetite), and deducting these we obtain the formula $\dddot{\mathrm{Al}}\ddot{\mathrm{Si}}$, or that of cyanite, from which it differs in prismatic angle and specific gravity. B.B., infusible.

The form given is exactly that of andalusite ($I \wedge I = 88° \, 12'$ andalusite, $= 88° \, 15'$ glancespar), and the specific gravity is identical, as is the composition also. In cleavage it seems to be somewhat different.

GLAUBERITE, Min. p. 627.—Relation to axinite, Schrauf. See Axinite.

Westeregeln, near Stassfurt, cryst., new forms, Zepharovich, Ber. Ak. Wien, lxix., 16, 1874.

GLAUCODOT, Min. p. 80.—Anal., relation to arsenopyrite, *Tschermak*, Ber. Ak. Wien, lv., 447, 1867.

Hakansbö, anal., *v. Kobell*, Ber. Ak. München, 1867, 276.

Thermo-electrical properties, crystals shown to be positive internally, but having an outer portion (2 mm. thick) which is negative. These two portions also show considerable variation in specific gravity. G. 5·905 and 6·011. *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 153, 1874.

GLAUCONITE, Min. p. 462.—Russia, analyses, Kupffer, Jahresb. Chem., 1871, 1307.

Anvers, anal., *Dewalque*, Soc. Geol. Belg., Dec., 1874, p. 3.

GLAUCOPYRITE, Sandberger, J. pr. Ch., II., i., 230. Appendix I., p. 6.

GMELINITE, Min. p. 436.—Andreasberg, cryst., *H. Guthe* (Jahrb. Nat. Ges. Hannover, 1871, p. 520), Jahrb. Min., 1871, 752.

GOLD, Min. p. 3.—Scotland, occurrence described, *Lindsay*, Trans. Edinburgh G. Soc., i., 105, 1868.

In Great Britain, *D. Forbes*, Phil. Mag.. IV., xxxvii., 321, 1869.

Vancouver's Is., and west Africa, analyses, *Wibel*, Jahrb. Min., 1873, 244.

GÖTHITE, Min. p. 169.—"Silicious nodular brown hematite," from the carboniferous limestone beds, near Cookstown, Co. Tyrone, Ireland, *Hardman*, R. Geol. Soc. Dublin, II., iii., 150, 1873.

GRAMMATITE, see nephrite.

GRAPHITE, Min. p. 24.—Behavior on being heated, *Rose*, Pogg., cxlviii., 497, 1872.

In meteoric irons, *Meunier*, Ann. Ch. Phys., IV., xvii., 46, 1869.

Wythe Co., Va., anal., *Goldsmith*, Amer. Ac. Philad., 1874, p. 73.

GREENOCKITE, Min. p. 59.—Cryst., *Kokscharow* (Bull. Ac. Imp. Russl., xv., 219, 1871), Jahrb. Min., 1871, 894.

458 B. Grochauite, Websky, ZS. G. Ges., xxv., p. 395, 1873. See also Bock, Inaug. Dissert., Breslau, 1868.

Monoclinic? In small, six-sided, tabular crystals, rough and allowing no measurements, the edges being rounded off by irregular planes. Optically biaxial, angle of axes about 20° to 30°. Double refraction weak, probably positive. Cleavage basal easy, forming thin soft plates.

Analysis, Bock (l. c.).

$\ddot{\mathrm{Si}}$	$\overset{\cdots}{\mathrm{Al}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{H}}$
28·20	24·56	5·27	30·94	12·15 = 101·12.

Oxygen ratio for $\dot{\mathrm{R}} : \overset{\cdots}{\mathrm{R}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 4 : 3 : 4 : 3$.

Occurs mixed with a chromic spinel (magnochromite, q. v.), also in cavities crystallized, in serpentine at Grochau, south of Frankenstein, in Silesia.

65 B. Guadalcazarite. Schwefelselenquecksilber, *Castillo* and *Burkhart*, Jahrb. Min., 1866, 411. Guadalcazite, *Adam*, Tableau Min., p. 59. Guadalcazarite, *Petersen*, Tschermak's Min. Mitth., 1872, p. 69; *Burkhart*, ibid., 243.

Massive, cryptocrystalline. H. = 2. G. = 7·15. Lustre greasy-metallic. Color deep black. Streak bluish-black to black.

Composition 6HgS + ZnS, with some of the sulphur replaced by selenium and the zinc by cadmium.

Analysis, Petersen (l. c.)

S	Se	Hg	Zn	Cd	Fe
14·58	1·08	79·73	4·23	tr	tr = 99·62

Pyr. On charcoal first decrepitates, giving off mercurial fumes, and a selenium odor; on continued blowing the white deposit of oxyd of zinc and also a distinct cadmium reaction. In the open tube deposits a sublimate, gray to black, of Hg, S, and Se, giving off sulphurous acid, while the yellowish oxyd of zinc remains behind. Soluble in aqua regia, with the separation of some sulphur. In composition it is not very unlike cinnabar, but quite different in physical properties.

Occurs at Guadalcazar, Mexico, with cinnabar, quartz and barite. This mineral was first mentioned by Castillo and Burkhart (l. c.), but no complete description was given. (Dana Min. p. 109.) According to Castillo it crystallizes in rhombohedrons, also occurs imbedded. Lustre metallic. Color lead-gray, granular. H. = 3. G. = 6·69–7·165. The qualitative examination gave Castillo essentially the same results as those since obtained by Petersen.

GUANO, and guano minerals. See Appendix I., p. 6.

GUARINITE, Min. p. 383.—Shown to be orthorhombic, not tetragonal in cryst. form, *v. Lang*, Tsch. Min. Mitth., 1871, p. 81. The same result was obtained earlier by Guiscardi, see Brezina in Tsch. Min. Mitth., 1874, 285.

GÜMBELITE, *v. Kobell*, Ber. Ak. München, March 5th, 1870.—Appendix I., p. 6.

GYPSUM, Min. p. 637.—Loss of water on heating, *How*, Phil. Mag., IV., xxxix., 279, 1870.
Cryst. memoir, *Hessenberg*, Min. Not., x., 30, 1871 ; Jahrb. Min., 1874, 831.
Cryst., *Scharff* (Senckenberg, Ges., viii., 39), Jahrb. Min., 1871, 881.
Cryst., twins, *Schrauf*, Ber. Ak. Wien, lxiii., 157, 1871.
Cryst., new forms ($\frac{4}{3}$-$\imath$, $\frac{8}{3}$-$\imath$), *Brezina*, Tsch. Min. Mitth., 1872, 17.

445 C. Hallite, *Leeds*, Journ. Frank. Inst., III., lxii., 70. *J. P. Cooke*, Mem. Am. Ac. Boston, 1874, p. 59.

Hexagonal? Occurs in large rough six-sided prisms with easy micaceous cleavage. Color in some varieties green, in others yellow.

G. (yellow) = 2·402, (green) = 2·398.

Analyses (l. c.) Munroe, 1. green var., 2. yellow.

		$\ddot{\mathrm{Si}}$	$\ddot{\bar{\mathrm{Al}}}$	$\bar{\mathrm{Fe}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{H}}$
1.	$\frac{3}{2}$	35·89	7·45	8·78	1·13	31·45	0·46	14·33 = 99·49
2.	$\frac{3}{2}$	35·26	7·58	9·68	0·32	31·51	0·61	14·78 = 99·74 (Mn tr)

Oxygen ratio for $\dot{\mathrm{R}} : \ddot{\bar{\mathrm{R}}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 2 : 1 : 3 : 2$—the two varieties are identical.

Exfoliates somewhat on heating; decomposed by hydrochloric acid after ignition.

A foreign mineral is interspersed between the leaves of the hallite, in spear-shaped, very narrow forms, and lying in parallel lines, crossing at angles of 60° and 120°, like the magnetite in the Pennsbury mica. The mass of this interspersed mineral was too small to affect the analysis essentially.

Found at East Nottingham, 3 miles south of Oxford, Chester Co., Penn., in nests or pockets in the serpentine formation. Named from Mr. John Hall, of Philadelphia.

This name has been previously used as a synonym of aluminite, Dana Min., p. 658.

HALLOYSITE, Min. p. 475.—Elba, anal., Achiardi, Nuovo Cimento, II., iii., Feb., 1870.
Tüffer, anal., *Rumpf*, Tsch. Min. Mitth., 1874, 282.

A variety of halloysite from Maidanpek, Serbia, has been called milanite by Tietze (Jahrb. G. Reichs, 1870, 588). An analysis gave $\ddot{\mathrm{Si}}$ 44·96, $\ddot{\bar{\mathrm{Al}}}$ ($\bar{\mathrm{Fe}}$) 25·20, $\dot{\mathrm{H}}$ 29·50 = 99·66. The amount of water is a little large.

HAMARTITE, see *Bastnäsite*, Appendix I., p. 7, p. 2.

HARMOTOME, Min. p. 439.—Cryst. memoir, shown to be monoclinic, *Des Cloizeaux*, Ann. Ch. Phys., IV., xiii., 417, 1868.
Cryst., *Rammelsberg*, ZS. S. Ges., xx., 589, 1868.
Strontian, Argyllshire, of unusual form, anal. (*Reynolds*), *Scott*, Q. J. G. Soc., xxvii., 374, 1871.

HARTITE, Min. p. 736.—Cryst. (triclinic) and anal., *Rumpf*, Ber. Ak. Wien, lx., 91.

HATCHETTITE, Min. p. 731.—In Silurian of Bohemia, *Boricky*, Ber. Ges. Böhm., 1873, Jan. 10th.

HAUYNITE, Min. p. 332.—Marino, near Rome, cryst., *Hessenberg*, Min. Not., viii., 43, 1868.
Composition, *Kenngott*, J. pr. Ch., cvi., 363, 1869.
In basalts, *Möhl*, Jahrb. Min., 1872, 77.
Relation to nosite (nosean) and lapis lazuli, *Vogelsang*, Vers. Med. Ak. Amsterdam, II, vii., 161, 1873.

503 B. Hebronite, *v. Kobell*, Ber. Ak. München, 1872, 284.

The *montebrasite* of Des Cloizeaux (C. R., lxxiii., 306, 1247) was announced in Appendix I., p. 11, to be identical with amblygonite, the statement being founded upon the results of analyses by Pisani (C. R., lxxiii., 1479) and v. Kobell (Ber. Ak. München, Feb. 3, 1872); it is moreover confirmed by a subsequent analysis by Rammelsberg (Ber. Chem. Ges. Berlin, 1872). Des Cloizeaux, however, has investigated the matter further (C. R., lxxv., 114; lxxvi., 319, 1873). He has found that, while the original montebrasite is identical with amblygonite, the mineral from Hebron, Me., differs from the latter in optical character (amblygonite, Saxony $\rho > \upsilon$; hebronite, Maine, $\upsilon > \rho$), and in having a third cleavage surface inclined upon the other two (making 105 together as in amblygonite) at an angle of 135°-136° and 89°. They differ somewhat moreover in chemical composition (see below). Des Cloizeaux has also identified a mineral agreeing with that from Hebron at Montebras, and upon this ground he proposes to *transfer* the name montebrasite to this. V. Kobell (l. c.), on the other hand, considers such a course as likely to lead to great confusion, and proposes, wisely as it seems, to let the name montebrasite drop entirely, and to call the Hebron mineral, if it be a distinct species, *hebronite*. In this proposal he is supported by Rammelsberg, ZS. G. Ges., xxv., 59, 1873.

Analyses of hebronite: 1. G. = 3·01; 2. G. = 3·029, Pisani, C. R., lxxv, 79, 1872; 3. von Kobell (l. c.), G. = 3·06; 4. amblygonite, Rammelsberg, Ber. Chem. Ges. Berlin, 1872, 78.

	F	$\ddot{P}$	$\ddot{Al}$	$\dot{Li}$	$\dot{Na}$	$\dot{H}$		
1. Hebron,	5·22	46·65	36·00	9·75	——	4·20	= 101·82	Pisani.
2. Montebras,	3·80	47·15	36·90	9·84	——	4·75	= 102·44	Pisani.
3. Auburn, Me.,	5·50	49·00	37·00	7·37	1·06	4·50	= 103·43	v. Kobell.
4. Penig,	9·44	48·00	36·26	6·68	3·29	$\dot{K}$ 0·43	= 104·10	Ramm.

As will be seen by comparison with analysis 4, of normal amblygonite, the hebronite differs in containing less fluorine and soda, while it has about 4 p. c. of water. The true nature of the mineral, even if it be a good species, cannot be regarded as satisfactorily settled, as Rammelsberg remarks.

HELVETAN, Min. p. 801.—Simmlar has obtained for helvetan the following analysis: $\ddot{Si}$ 67·07, $\ddot{Al}$ 13·05, $\ddot{Fe}$ 4·43, $\dot{Ca}$ 2·38, $\dot{Mg}$ 2·18, $\dot{K}$ 7·37, $\dot{Na}$ 1·69, $\dot{H}$ 1·85 = 100·02. He calls it a feldspar with the habit of a mica, Jahrb. Min., 1868, 348.

HELVITE, Min. p. 264.—Cryst. and description, *Kokscharow*, Min. Russl., v., 320.

HEMATITE, Min. p. 140.—In the Pennsbury mica (= magnetite, q. v.), *Rose*, Pogg., cxxxviii., 190.

Keswick, Cumberland, Elba, cryst. description, *Hessenberg*, Min. Not., viii., 33, 41; ix., 52, 1870.

Traversella, cryst. memoir, *Strüver*, Atti Accad. Sci. Torino, vii., 377, 1872.

Peculiar striation, due to twining, *Bauer*, ZS. G. Ges., xxvi., 186, 1874.

Henryite, Endlich, Engineering and Mining Journal, Aug. 29, 1874.

Tetragonal (?). In octahedrons, also massive. Cleavage lateral perfect, basal less so. H. = 2-2·5. Color brass-yellow. Lustre bright. Composition (no analysis published) 3PbTe + FeTe. Locality, Red Cloud mine, Colorado.

Dr. Genth asserts that Henryite "is undoubtedly nothing but an altaite with an admixture of pyrite." See Schirmerite.

HESSITE, Min. p. 50.—California, anal., *Genth*, Am. J. Sci., II., xlv., 311.

Colorado, *Silliman*, Am. J. Sci., III., viii., 27, 1874; anal., *Genth*, Am. Phil. Soc. Philad., xiv., 226, 1874.

HERCYNITE, Min. p. 148.—Analysis of a magnesia-iron spinel, *Wolle*, Am. J. Sci., II., xlviii., 350, 1868.

HERSCHELITE, Min. p. 437.—Victoria, anal. and description of crystals, *Ulrich*, Contrib Min. Victoria, p. 26, 1870. See Seebachite.

218. Heterogenite, *Frenzel*, Journ. für prakt. Ch., II., v., p. 404, 1872.

Amorphous, massive in globular, reniform masses, with little lustre. H. 3. G. 3·44 Color black, blackish to reddish-brown; streak dark-brown.

Analysis (after deduction of foreign constituents, Cu, Bi, etc.).

$\ddot{Co}$	O	$\dot{H}$		
72	5·98	21·33	=	99·31

Composition $\dot{\mathrm{C}}\mathrm{o}\ 2\ddot{\bar{\mathrm{C}}}\mathrm{o}+6\dot{\mathrm{H}}$, it being a product of the decomposition of smaltite (Speiskobalt).

Pyr. In matrass gives water. B. B. fuses with difficulty on the edges, coloring the flame green ; after ignition it is weak magnetic. Gives a cobalt reaction with the fluxes. Soluble in dilute hydrochloric acid, with evolution of chlorine, leaving a residue.

Occurs sparsely with calcite and pharmacolite in cobalt and nickel veins at Schneeberg.

HEULANDITE, Min. p. 444.—Composition discussed, *Rammelsberg*, ZS. G. Ges., xxi., 93, 1868.

Lunddörrsfjäll, Sweden, anal., *Igelström*, Jahrb. Min., 1871, 361.

HISINGERITE, Min. p. 489.—Gap Mine, Penn., anal., *T. D. Rand*, Proc. Ac. Philad., 1872, 304.

Cornwall, analyses (differing somewhat from previous results), *Church*, J. Ch. Soc., II., viii., 3.

81 A. Horbachite, *Knop*, Jahrb. Min., 1873, 523. In crystalline masses, showing an imperfect cleavage direction with a brighter metallic lustre than on the ordinary fracture surfaces. H. 4·5. G. 4·43. Color resembling pyrrhotite but darker, pinchbeck-brown to steel-gray. Streak black.

Analysis on pure material (as proved by the microscope), 1. Wagner (l. c.), 2. Rammelsberg (G.=4·7), Pogg., cxxi., p. 361.

	S	Fe	Ni		
1. $\frac{4}{4}$	45·87	41·96	11·98	=	99·81
2.	40·03	55·96	3·86	=	99·85

Analysis 1. gives $Fe_8Ni_2S_{15}$ or $4FeS_3+NiS_3$. It is claimed by Knop to be the first discovery of a sesquisulphid in nature, though the analysis by Rammelsberg shows that there is a very considerable variation in composition.

Decomposed rather easily under the influence of air and water, forming iron and nickel vitriol. Occurs with chalcopyrite in irregular masses in the serpentinized gneiss at Horbach in the Black Forest.

HORNBLENDE. See AMPHIBOLE.

HORTONOLITE, *Brush*, Am. J. Sci., II., xlviii., 17. Appendix I., p. 7.

HOWLITE, Min. p. 598.—From Nova Scotia, *How*, Phil. Mag., IV., xxxvii., 270, 1869 ; xxxix., 278, 1870.

HÜBNERITE, Min. p. 603.—Relation to wolframite, *Des Cloizeaux*, Ann. Ch. Phys., IV., xix., 175, 1870 ; *Groth* and *Arzruni*, Pogg., cxlix., 235, 1873.

HUMITE, Min. p. 363.—Vesuvius, complete cryst. memoir, showing the relation of the three types, with many figures, *v. Rath*, Pogg., Erg. Bd. v., 321, 1871 ; chemical investigation with several analyses, *v. Rath*, ibid., Erg. Bd. vi., 385, 1873 ; cxlvii., 246. See also chondrodite.

HYALITE, Min. p. 199.—Associated with corundum, No. Carolina, *Genth*, Am. Phil. Soc., Philad., xiii., 373, 1873.

Pseudomorph after apatite, aragonite at Waltsch, *Boricky*, Ber. Böhm, Ges., 1873, 64, 65.

HYALOPHANE, Min. p. 346.—Composition, *Kenngott*, Jahrb. Nat. Ges. Zürich, 1869, 373.

HYALOSIDERITE, Min. p. 256.—Sasbach, Kaiserstuhlgebirge, *Rosenbusch*, Jahrb. Min., 1872, 49, et seq.

HYDRARGYLLITE, Min. p. 177.—Chester Co., Penn., anal., *Hermann*, J. pr. Ch., cvi., 68, 72, 1869.

HYDRARGYRITE. See BORDOSITE.

Hydrocuprite. Genth has given the name hydrocuprite to a new mineral found at Cornwall, Lebanon Co., Penn. He gives the following description (priv. contrib.) :

Amorphous, orange-yellow to orange-red ; forms very thin coatings, sometimes rag-like, upon magnetite ; soft.

On heating loses water and becomes black; contains water and cuprous oxide. A sufficient quantity for analysis could not be obtained, but its composition is probably $\bar{C}u\dot{H}$. Besides the amorphous coatings, the cuprite variety, *chalcotrichite*, from Cornwall, sometimes assumes an orange-yellow color, so that on the same piece acicular crystals of a fine crimson color can be seen gradually changing to an orange-yellow. It is therefore very probable that the orange crystals are pseudomorphs of hydrocuprite after cuprite.

634 A. Hydrocyanite. Idrociano, *Scacchi*, Note Mineralogiche, I., p. 26, 1873; extract from Atti Accad. Sci. Napoli, v., 1870.

Orthorhombic. Observed planes, i-$\breve{i}$, i-$\breve{2}$, I, 2-$\breve{i}$, 1-$\breve{i}$, 1-$\bar{i}$, 1, $\frac{1}{2}$; a (vert.) : b : c = 0·7968 0·5650 : 1 or 1·7691 : 1 : 1·4104. Fundamental angles, $I \wedge I$ = 121° 4′; i-$\breve{i} \wedge$ 1-$\breve{i}$ = 128° 33′ i-$\breve{i} \wedge$ 1 = 114° 25′; i-$\breve{i} \wedge \frac{1}{2}$ = 108° 2′.

Color pale green, brownish or yellowish, also sky-blue. Translucent.

An analysis (l. c.) gave $\dot{C}u$ 49·47, $\dddot{S}$ 50·30, loss 0·40 = 100·00, which corresponds to the formula $\dot{C}u\dddot{S}$.

Completely soluble in water. Effloresces very readily in contact with the air. When preserved in the matrix untouched the crystals will remain two or three days without sensible alteration, but upon being detached, or even touched, they change color almost immediately. In the alteration the crystals first show a blue color, then split to pieces slowly, and separate into minute granules, which seem to be crystals, though too small to allow of their form being determined. The cause of the efflorescence in this case is the absorption of the water from the atmosphere, not the loss of water, as is generally true. The change when complete results in the production of chalcanthite ($\dot{C}u\dddot{S}$ + 7$\dot{H}$).

In the prismatic zone the crystals show no immediate relation to allied sulphates; the angles of the brachydomes, however, agree quite closely, 1-$\breve{i} \wedge$ 1-$\breve{i}$ = 77° 6′, hydrocyanite; 75° 52′, celestite; 75° 35′, anglesite; 74° 34′, barite.

Found by Scacchi at Vesuvius, having been produced by sublimation at the time of the eruption of October, 1868. The name is derived from the ὕδωρ, *water*, κύανος, *azure blue*; an unfortunate name, suggesting a *hydrous* mineral and one relating to cyanite. See also Dolerophanite.

HYDROHALITE. Adam, Tableau Min., 1869, p. 69. A hydrous chlorid of sodium, described by Mitscherlich, Hausmann Min., p. 1459, 1847.

HYDROMAGNESITE, Min. p. 707.—Kraubat, Steiermark, cryst. and anal., *Tschermak*, Tsch. Min. Mitth., 1871, 113.

HYDROPHILITE. Adam, Tableau Min., 1869, p. 69. Chlorid of calcium. Hausmann Min., p. 1460, 1847.

HYDROZINCITE, Min. p. 711.—Auronza, Lombardy, anal., *Cossa*, Atti Accad. Sci. Torino, vi., 189, 1870–71.

442 B. Hygrophilite, *Laspeyres*, Tsch. Min. Mitth., 1873, p. 147.

Cryptocrystalline. Occurring in scales; double-refracting. H. 2–2·5. G. 2·670. Color greenish-gray to yellowish-gray, in consequence of the presence of minute pores, properly transparent. Often contains minute cubes of pyrite. Lustre and feel greasy. Streak greenish-white.

Analysis, Laspeyres (l. c.)

	$\ddot{S}i$	$\dddot{\bar{A}}l$	$\dddot{\bar{F}}e$	$\dot{C}a$	$\dot{M}g$	$\dot{K}$	$\dot{N}a$	$\dot{H}$
$\frac{2}{2}$	48·42	38·06	3·26	1·15	1·72	5·67	1·36	9·02 = 102·67

It belongs to the pinite group. Oxygen ratio for $\dot{R}$: $\dddot{\bar{R}}$: $\ddot{S}i$: $\dot{H}$ = (approximately) 1 : 5 : 9 : 3.

B. B. Fuses rather easily to a white enamel, which, with cobalt solution, takes a blue color. Very hygroscopic. In water falls to pieces gradually like clay. Soluble in hydrochloric acid.

Occurs in large irregular masses distributed in a sandstone, or silicious conglomerate in the neighborhood of Halle an der Saale.

HYPERSTHENE, Min. p. 209.—Cryst. form, *v. Lang*, Pogg., cxxxix., 319, 1870.

Iridescence and dichroism, *Kosmann*, Jahrb. Min., 1869, 368, 532; 1871, 501.

Mt. Dore, Auvergne, cryst., Des Cloizeaux, ZS. G. Ges., xxv., 566; *v. Rath*, Pogg., clii. 27.

See also *Amblystegite*, Appendix I., p. 1.

Hypochlorite, Min. p. 392.—*Frenzel*, Jahrb. Min., 1872, 515.

Hypotyphite (Breithaupt, arsenglanz), Min. p. 18.—Analysis by Frenzel, Jahrb. Min., 1874, 677.

Idocrase, Min. p. 276.—See **Vesuvianite.**

Ilmenite, Min. p. 143.—See **Menaccanite.**

Ilsemannite, *Höfer*, Jahrb. Min., 1871, 566.—Appendix I., p. 7.

Ilvaite, Min. p. 296.—Elba, cryst., *v. Rath*, ZS. G. Ges., xxii., 710, 1870; Achiardi Nuovo Cimento, II., iii., Feb., 1870.
(Lievrite), composition, *Rammelsberg*, ZS. G. Ges., xxii., 897, 1870.
Nassau, cryst., *v. Rath*, Pogg., Erg., v., 424, 1871.

Iolite, Min. p. 299.—(cordierite), Ramsberg, Sweden, anal., *Igelström*, Jahrb. Min., 1871, 360.
Laacher See, cryst., *v. Rath*, Pogg., clii., 40, 1870.

Iron, Min. p. 15.—Native iron has been found at Camp Creek, Montana, in small angular fragments (largest ½ inch in length) slightly covered with rust. It showed on etching no Widmannstädtean figures, but developed a finely granular structure. Occurs in the bed rock of the gold placers, covered by six feet of gravel; associated with native lead, (q. v.), *Genth*, Am. Phil. Soc. Philad., xi., 443, 1873.
Crystalline structure of meteoric iron, *Tschermak*, Ber. Ak. Wien, lxx., Nov., 1874.

Isoclasite, *Sandberger*, J. pr. Ch., II., ii., 125.—Appendix I., p. 7.

Isopyre, Min. p. 392.—A mixture, containing more or less opal, *Maskelyne* and *Flight*, J. Ch. Soc., II., x., 1049, 1872.

Itacolumite, Min. p. 195.—Ch. News. xxii., 111, 266, 1870.

Ivigtite, *Rand*, Proc. Acad. Philad., 1868, 142.—Appendix I., p. 7.

Jacobsite, *Damour*, C. R., lxix., 168. Appendix I., p. 8.

Jalpaite, Min. p. 39.—Tres Puntas, anal., *Bertrand*, Ann. d. Mines, VII., i., 413, 1872.

Jamesonite, Min. p. 90.—Sierra de Famatina, Argentine Republic, anal., *Siewert*, Tsch. Min. Mitth., 1873, 247.

Jefferisite, Min. p. 494.—No. Carolina, with corundum, analyses, *Genth*, Am. Phil. Soc. Philad., xiii., 392, 1873.
West Chester, Penn., study of optical character, *Cooke*, Mem. Am. Ac. Boston, 1874, 44.
Culsageeite is a variety of jefferisite described by J. P. Cooke (Mem. Am. Ac. Boston, 1874, p. 48). It very closely resembles the jefferisite from West Chester, Pa., though the color is much lighter, and it is somewhat more friable; the optical properties are the same.
Three analyses gave the following results:

$\ddot{\text{Si}}$	$\dddot{\bar{\text{Al}}}$	$\dddot{\bar{\text{Fe}}}$	$\dot{\text{Fe}}$	$\dot{\text{Mg}}$	$\dot{\text{H}}$
37·58	19·73	5·95	0·58	25·13	11·09=100·06
37·43	19·75	5·95	0·58	25·58	11·09=100·38
37·10	20·22	5·95	0·58	25·07	11·09=100·01

Oxygen ratio for $\dot{R} : \dddot{\bar{R}} : \ddot{Si} : \dot{H} = 2 : 1 : 1 : 1$. G. = 2·225. These results agree closely with analyses by Genth (l. c.) of the same mineral.
From the Culsagee Mine, near Franklin, Macon Co., N. Carolina.
See also Vermiculite.

Jeffersonite, Min. p. 215.—Franklin, N. J., anal., *Pisani*, C. R., lxxvi., 237, 1873.

Jeypoorite, Min. p. 47 (*Syepoorite*, bad orthogr., *Ross*).—This mineral has been investigated by W. A. Ross with the following results, previous examinations having been made, according to him, upon mixtures: Occurs in small crystalline beads, isometric (Miller), showing the cube, octahedron, and pyritohedron. Color silver-white. Streak blue-black, and semi-metallic, not magnetic. Blowpipe analysis gave 83·2 and 82·5 p. c. cobalt, with evidences of the presence of arsenic and antimony. Ross gives the following as a probable guess at the composition: cobalt 82, antimony 7, arsenic 6, sulphur 5 = 100.

Occurs in a dark gray sand, consisting of one-tenth pyrrhotite, considerable quartz, some chalcopyrite, etc. From the copper mines of Khetree, Jeypoor, province of Rajpootana, India. Proc. Roy. Soc., xxi., 292, 1873.

JORDANITE, Min. p. 88.—Cryst., new forms, *v. Rath*, Pogg., vi., 363, 1873.
Binnenthal, analyses ($As_2 Pb_4 S_7$), *Sipöcz*, Tsch. Min. Mitth., 1873, 29, 131.
Nagyag, cryst., description and anal., *Tschermak*, *Ludwig*, Tsch. Min. Mitth., 1873, 215.

JULIANITE, *Websky*, ZS. G. Ges., 1871, 486.—Appendix I., p. 8.

KAINITE, Min. p. 642.—See PICROMERITE.

KALKURANITE. See AUTUNITE.

Kaluszite. See SYNGENITE.

KAMACITE. See CHAMASITE.

KAOLIN, Min. p. 473.—Chili, analyses, Domeyko 2nd App. Min. Chili, p. 49, 1867.
A related mineral, anal., from the porphyry of Stein, *Ullik*, Tsch. Min. Mitth., 1873, 197.
Composition, anal., *Schloessing*, C. R., lxxix., 473, 1874.

KARSTENITE, Min. p. 621.—Lüneburg, cryst., Miller, Phil. Mag., IV., xlvii., 124, 1874.

KEROLITE. See CEROLITE.

447 A. Kerrite, *Genth*, Amer. Phil. Soc. Philad., xiii., p. 396, 1873.

In fine scales, presenting no definite shape under the microscope. Very soft. G. = 2·303 (Chatard). Color pale greenish-yellow, with tint of brown; lustre pearly.

Analysis (l. c.), Chatard (material shown by microscopic examination to be pure).

	$\ddot{\text{Si}}$	$\dddot{\bar{\text{Al}}}$	$\dddot{\bar{\text{Fe}}}$	$\dot{\text{Fe}}$	$\dot{\text{Ni}},\dot{\text{Co}}$	$\dot{\text{Mg}}$	ign.
$\frac{2}{2}$	38·29	11·41	1·95	0·32	0·25	26·40	21·25 = 99·87

The oxygen ratio for $\dot{\text{R}} : \dddot{\bar{\text{R}}} : \ddot{\text{Si}} : \dot{\text{H}} = 5{\cdot}4 : 3 : 10{\cdot}3 : 9{\cdot}5$ or $6 : 3 : 10 : 10$, which would give $2(3\dot{\text{R}}, \ddot{\text{Si}}) + (\dddot{\bar{\text{R}}}, \ddot{\text{Si}}) + 10\,\dot{\text{H}}$.

Exfoliates upon heating, but not to such an extent as jefferisite. B.B. fuses to a white enamel. Decomposed by HCl with separation of silica in pearly scales. Found as an apparent result of the alteration of chlorite at the corundum locality, Culsagee Mine, near Franklin, Macon Co., No. Carolina. Named from Prof. Kerr, State Geologist.

KIESERITE, Min. p. 641.—Hallstadt, anal., *Wieser*, Verh. Geol. Reichs, 1871, 8, p. 130; anal., and cryst. description, *Tschermak*, Ber. Ak. Wien, lxiii., 315, 1871.

495 A. Kjerulfine, v. Kobell, Journ. pr. Ch., II., vii., p. 272, 1873.

Massive, cleavage imperfect in two directions, approximately 90°. H. 4–5. G. 3·15. Translucent in fine splinters. Color pale red. Lustre greasy. Fracture uneven.

Analysis (l. c.), after deduction of SiO_2 (1·50 p. c.) and $Al_2O_3 + Fe_2O_3$ (5·40 p. c.).

$\dot{\text{Mg}}$	$\dot{\text{Ca}}$	$\dot{\text{Na}}$	Fl	$\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\text{P}}}$
40·86	5·96	1·28	5·28	46·62 = 100

Formula, $2\,\dot{\text{Mg}}_3\overset{\cdot\cdot\cdot\cdot\cdot}{\bar{\text{P}}} + \text{CaFl}$, where some lime is replaced by soda. Stands near wagnerite, but differs in the large percentage of Fl and almost entire absence of lime.

Occurs at Bamle, Norway.

KLAPROTHOLITE, Jahrb. Min., 1868, 415.—Appendix I., p. 8.

KNEBELITE, Min. p. 260.—Sweden, *Igelström*, B. u. H. Zeit., xxix., 91, 870; xxx., 149, 1871.

KOCHELITE, *Websky*, ZS. G. Ges., xx., 250, 1868.—Appendix I., p. 8.

KÖHLERITE. Adam, Tableau Min., 1869, p. 71.—Synonym of onofrite, Dana Min., p. 56.

KOKSCHAROFFITE, Min. p. 242.—(?) No. Carolina, with corundum, anal., Genth, Am. Phil. Soc. Philad., xiii., 373, 1873.

KOLLOPHAN. Sandberger, J. pr. Ch., II., ii., 129.—Appendix I., p. 9.

10 A. Kongsbergite, *Pisani*, C. R., lxxv., p. 1274, 1872.

An amalgam of silver and mercury occurring with arquerite (analysis l. c. Ag. 86·3, Hg 3·7) at Kongsberg, Norway. Analyses (l. c.) 1. crystalline; 2. crystals.

		Ag	Hg
1.	$\frac{2}{2}$	95·26	4·74
2.	$\frac{2}{2}$	94·94	5·06

These give the formula $Ag_{18}Hg$ (Ag 95·10, Hg 4·90). Pisani suggests the possibility that the occurrence may be accidental, but if not so, and if found at other localities, he suggests the name *Kongsbergite*.

471 A. Koppite, *Knop*, Jahrb. Min., 1875, 67 (ZS. G. Ges., xxiii., 656, 1871).

Occurs with apatite and magnoferrite in a granular limestone near Schelingen, Kaiserstuhlgebirge, Baden. Color brown. Transparent.

Analyses, 1. Bromeis (quoted by Knop from Handwörterb. d. Chemie, VI., 708): 2. Knop (l. c.)

	$\ddot{C}b$	$\dddot{M}o$	$\ddot{T}h$	$\dot{C}e$	$\dot{F}e$	$\dot{M}n$	$\dot{C}a$	$\dot{M}g$	$\dot{K}$	$\dot{N}a$	Fl	$\dot{H}$	
1.	62·03	1·43	10·81		4·48	1·42	14·80	1·58	——	2·37	1·16	1·50	= 101·58
2.	61·90	——	$\dot{C}e$ 10·10 ($\dot{D}i$,$\dot{L}a$)		1·80	0·40	16·00	——	4·23	7·52	——	——	

Each of the determinations of Knop was made on a separate quantity of the mineral. Rammelsberg obtained $\ddot{C}b$ 62·46, $\dot{C}e$ 6·69, $\dot{L}a$,$\dot{D}i$ 3·00. Knop writes the formula 5$\dot{R}$ 2$\ddot{C}b_2$, neglecting a small amount of fluorine. This mineral has been hitherto called pyrochlore, but Knop separates it from that species on the ground that it contains no titanic acid and little or no fluorine. Named in honor of Prof. Kopp, of Heidelberg.

496 A. Korarfveite, *F. Radominski*, C. R., lxxviii., p. 764, 1874. A name proposed provisionally for a phosphate of cerium containing fluorine near monazite. It occurs in albite with gadolinite, hjelmite, and beryl at Korarfet near Fahlun, Sweden (there called monazite).

In imperfect crystals, or crystalline masses often very large; one cleavage perfect. Double refracting (Des Cloizeaux). G. 4·03. Color yellow passing into brown. Fracture vitreous, translucent. Streak grayish-yellow.

Analysis (l. c.) made upon impure material, and consequently needing confirmation.

$\dot{C}e$ $\dot{L}a$ $\dot{D}i$	$\dot{C}a$	$\dot{M}g$	$\ddot{\bar{F}}e$	Fl	$\bar{\ddot{P}}$	$\dot{H}$	
67·40	1·24	tr	0·32	4·35	27·38	tr	= 100·69

B. B., infusible. Partially attacked by HCl with evolution of Cl. Completely decomposed by sulphuric acid and bisulphate of potash.

KOTSCHUBEITE, Min. p. 497.—Relation to *kämmererite*, etc., *v. Leuchtenberg*, Bull. Soc. Imp. St. Pet., xiii., 34, 1869.

Kryokonite. See CRYOCONITE.

LABRADORITE, Min. p. 341.—Examination of the cause of the iridescence, *Vogelsang*, Arch. Néerland, iii., 32, 1868.

Exhaustive cryst. and microscopic investigation by *Schrauf*, in which he shows the presence of inclosed crystals of augite, hematite, and magnetite (with picotite?). He also describes two varieties of microscopic inclosures to the presence of which the color is due; the first he calls MICROPLAKITE. They form rectangular tabular crystals ($a \wedge a = 90°$, $a \wedge$ secondary plane$=153\frac{1}{2}°-153°$) and lie in a position perpendicular to that of the augite needles. By transmitted light they are grayish-yellow to brownish, by reflected light reddish-green to green and blue (the colors of thin media). Schrauf says that in most of their properties they agree with magnetite, though their apparent insolubility is against that idea. The second kind of inclosures he calls MICROPHYLLITE, they form indistinct crystalline scales, and lie parallel to the direction of the augite crystals; they are from ·05 to ·1 mm. in length, and ·02 to ·04 in breadth; their true nature is doubtful. Ber. Ak. Wien, lx., Dec., 1869.

Labrador, analyses of two varieties; violet (with 11·14 p. c. $\dot{C}a$) and white (with 9·4 p. c. $\dot{C}a$), *Oudemanns*, J. pr. Ch. cvi., 56, 1869.

Narödal, analyses, *v. Rath*, Pogg., cxxxvi., 424; cxxxviii., 171; *Tschermak*, ibid., cxxxviii., 162; *Rammelsberg*, ibid., cxxxix., 178; ibid., cxli., 174.

Waterville, N. Hampshire, analyses, *E. S. Dana*, Am. J. Sci., III., iii., 48, 1872.

Greenland, anal., *Janovsky*, Ber. Chem. Ges. Berlin, 1873, 1454.

Verespatak, cryst., anal., and description of products of decomposition, *Tschermak*, Tsch. Min. Mitth., 1874, 269. See also *Feldspar*.

Lampadite, Min. p. 181.—(Kupfermanganerz), Chili, anal., *Frenzel*, Jahrb. Min., 1873, 801.

Lanarkite, Min. p. 628.—Analyses, *Maskelyne* and *Flight*, giving the formula $\dot{P}b\dddot{S}+\dot{\bar{P}}$ with no water and no carbonic acid, J. Ch. Soc., II., xii., 103.

Pisani has analyzed l. from Scotland and finds, as above, no carbonic acid, except as due to impurity, he gives the formula $\dot{P}b^2\dddot{S}$; he adds the results of an optical examination, C. R., lxxvi., 114; *Jannettez*, ib., p. 1420, 1873.

Corrected angles given by *Schrauf*, Tsch. Min. Mitth., 1873, 137.

Langite, Min. p. 665.—Anal., *Maskelyne* and *Flight*, Ber. Ch. Ges. Berlin, 1870, 934.

Lapis Lazuli, Min. p. 331.—(lasurstein), "a mixture of granular calcite, paralogite (=ekebergite) and an isometric, ultramarine mineral, which is generally blue, or violet sometimes also colorless, and in the last case assumes a blue color on heating,"—thorough microscopic examination and discussion of relation to hauynite and nosite (nosean), *Vogelsang*, Vers. Med. K. Akad. Amsterdam, II., vii., 161, 1873. The same matter has been previously investigated by Fischer (Krit. Mikr. Stud., 1869, p. 40).

Laumontite, Min. p. 399.—Cryst. description, *Kokscharow*, Min. Russl., v., 156.

Anal., *v. Fellenberg*, Jahrb. Min., 1869, 373.

St. Bartholomew, anal. (*Nordström*), Ak. H. Stockholm, IX., No 12, Nov., 1870 (Cleve, Geol. W. India Is., p. 30, 1870).

Caporciano (=caporcianite), anal., *Bechi*, *Achiardi*, Boll. Com. Geol., Ital., 1871, 139.

Laurite, Min. p. 74.—With platinum from Oregon, *Wœhler*, Am. J. Sci., II., xlviii., 441, 1868.

Lavroffite, Min. p. 216.—Composition and description, a diopside colored green by 4·20 p. c. of vanadate of lime, *Hermann*, J. pr. Ch., II., i., 444; Koksch. Min. Russl., vi., 206.

Laxmannite, *Nordenskiöld*, Pogg., cxxxvii., 209.—Appendix I., p. 9.

Lazulite, Min. p. 572.—Vesuvius, note, *v. Rath*, Pogg., cxxxviii., 491.

No. Carolina, with corundum, *Genth*, Am. Phil. Soc. Philad., xiii., 404, 1873.

Lead, Min. p. 17.—Native, found with native iron (q. v.) in the bed rock of the gold placers, covered by 6 feet of gravel, at Camp Cr., Montana. Occurs in irregular and rounded flattened pieces, from the size of a pin head to ½ inch; coated with massicot, probably also by cerussite; shows crystalline structure. The solution contained gold, but no silver, *Genth*, Am. Phil. Soc. Philad., xi., 443, 1870.

Pflücker also speaks of the occurrence of native lead in rounded grains at many localities, S. W. of Huancavelica (Peru). It contains little silver, but considerable antimony, Domeyko 3d App. Min. Chili, 1871.

Leadhillite, Min. p. 624.—Relation to susannite (q. v.), *Kenngott*, Jahrb. Min., 1868, 319.

Composition discussed, relation to *maxite* (q. v.), *Hintze*, Pogg., clii., 256.

Anal., *Bertrand*, Bull. Soc. Ch., xix., 67, 1873; *Laspeyres*, Jahrb. Min., 1873, 292.

Lepidolite, Min. p. 314.—Eulenlohe, Fichtelgebirge, *Sandberger*, Ber. Ak. München, 1871, 93.

Lesleyite, Min. p. 800.—Appendix I., p. 18.

Lettsomite, Min. p. 666.—See **Cyanotrichite**.

Leucaugite, Min. p. 216.—Amity, N. Y., anal., *Leeds*, Am. J Sci., III., vi., 24, 1873.

LEUCHTENBERGITE, Min. p. 500.—Chem. composition, *Kenngott*, Jahrb. Min., 1868, 203

LEUCITE, Min. p. 334.—Microscopic structure, *Zirkel*, ZS. G. Ges., xx., 97, 1868; Jahrb. Min., 1870, 809; *v. Lasaulx*, Jahrb. Min., 1872, 408.

Contains rubidium and caesium, *J. L. Smith*, Am. J. Sci., II., xlix., 335, 1870.

Vesuvius, anal., *v. Rath*, Pogg., cxlvii., 264; enveloped in sanidin, ibid., Erg. Bd., vi., 381 and 198; see also *Scacchi*, Atti Accad. Napoli, v., March, 1870; Sept. 14, 1872.

Vesuvius, shown by accurate measurements, as well as by the presence of striated faces (due to twining), to be *tetragonal*. The ordinary crystals show the planes 1, 4·2, also 2-*i* and *I*; $i \wedge i$ $(=4{\cdot}2 \wedge 4{\cdot}2)=133°\ 58'$; *a* (vertical)$=0{\cdot}52637$; composition face 2-*i*. Also anal., *v. Rath*, Pogg., Erg. Bd., vi., 198, 1873 (or Jahrb. Min., 1873, 113).

Note by *Scacchi*, Boll. Com. Geol. Ital., 1873, 183.

LEUCOPHANITE, Min. p. 260.—Cryst., *Nordenskiöld*, Œfv. Ak. Stockh., 1870, xxvii., 557 Cryst., *Bertrand*, Ann. d. Mines, VII., iii., 24. Cryst., v. Lang, Tsch. Min. Mitth., 1871, p 82.

LEUCOPYRITE, Min. p. 77 (=löllingite, Dana)—and löllingite, anal., Przibram, *Zepharovich*, Lotos, Jan., 1870.

In Dana's Mineralogy, 1868, the names, leucopyrite and löllingite previously used as synonyms, were given, leucopyrite to the mineral with the composition $FeAs_2$, and löllingite to the compound Fe_2As_3 (supposed to include the arsenical pyrites from Lölling, not then known to have been analyzed). It appears, however, that a little earlier, Zepharovich (Verh. Min. Ges. St. Pet., II., iii., 1867) had found the Lölling mineral to have the composition $FeAs_2$, and hence proposed for it the name löllingite, reserving Shepard's name, leucopyrite, for the Fe_2As_3. The names as given by Zepharovich have the priority, and should be received. In another printing from the stereotype plates (6th sub-edition) of Dana's Min. the change will be made. It is to be added, however, that there was no "confounding of the names" (Naumann, Min., p. 611, 1874) in Dana's Mineralogy.

LEVYNITE, Min. p. 431.—Richmond, Vict., comp., *Kenngott*, Jahr. Nat. Ges. Zürich, xvi., 132, 262, 1871.

LIGNITE, Min. p. 755.—Pecton Co., N. S., anal. and description, *How*, Phil. Mag., IV., xxxvii., 264.

414 A. Limbachite, Frenzel, Jahrb. Min., 1873, 789; Min. Lex. Sachsen, p. 184.

Massive. G. = 2·395. Lustre greasy. Color grayish to greenish-white. Not hard nor brittle. Does not adhere to the tongue.

Analyses, Frenzel (l. c.)

$\ddot{\mathrm{Si}}$	$\ddot{\bar{\mathrm{A}}}\mathrm{l}$	$\ddot{\bar{\mathrm{F}}}\mathrm{e}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\mathrm{H}}$
41·42	22·09	——	23·67	12·47 = 99·65
42·03	19·56	1.46	25·61	12·34 = 101·00

Frenzel gives the formula $3\dot{\mathrm{M}}\mathrm{g}\ 2\ddot{\mathrm{Si}} + \ddot{\bar{\mathrm{A}}}\mathrm{l}\ddot{\mathrm{Si}} + 3\dot{\mathrm{H}}$. Hence in oxygen ratio it stands very near cerolite (Kerolith), from which species Frenzel has separated it, though, as he shows, the analyses vary much. $\dot{\mathrm{R}} : \ddot{\bar{\mathrm{R}}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 1 : 1 : 3 : 1$.

Occurs at Limbach, filling cavities or fissures in serpentine.

A similar mineral, occurring in serpentine at Zöblitz, has been called ZÖBLITZITE by Frenzel (Min. Lex. Sachsen, p. 351). Massive. Color light-yellow. An analysis gave Melling (l. c. and Jahrb. Min., 1873, 789), $\ddot{\mathrm{Si}}$ 47·13, $\ddot{\bar{\mathrm{A}}}\mathrm{l}$ 2·57, $\dot{\mathrm{F}}\mathrm{e}$ 2·92, $\dot{\mathrm{M}}\mathrm{g}$ 36·13, $\dot{\mathrm{H}}$ 11·50 = 100·25.

LIMBILITE, Min p. 258.—Rosenbusch thinks that the limbilite of de Saussure cannot be regarded as a result of the decomposition of chrysolite, but rather of the glassy matter of such a rock as has been called by him limburgite, Jahrb. Min., 1872, 169.

LIME-WAVELLITE, *Kosmann*, ZS. G. Ges., xxi., 795, 1869.—Appendix I., p. 9.

LIMONITE, Min. p. 172.—Pseudomorph after cerussite, *Kosmann*, ZS. G. Ges., xxi., 644, 869.

LINARITE, Min. p 663.—Cumberland, exhaustive cryst. memoir, with many new forms, *Kokscharow*, Min Russl., v., 206.

Chili, Domeyko 2d App. Min. Chili, p. 32, 1867; *Bertrand*, Ann. d. Mines, VII., i., 414, 1872.

Rezbanya, cryst. memoir, *Schrauf*, Ber. Ak. Wien, lxiv., 172 (1871); lxv., 241, 1872.

LITHIOPHORITE, Appendix I., p. 9.—*Laspeyres*, Jahrb. Min., 173, 1869.

29 A. Livingstonite, *Mariano Barcena*, Naturaleza, iii., 35. 1874; iii., p. 172, 1875, Am. J. Sci., III., viii., p. 145, 1874; ix., p. 64, 1875.

In prisms, and columnar groups much like stibnite, and apparently isomorphous with it. H. = 2 (Breithaupt's scale). G. = 4·81. Color bright lead-gray. Streak *red* (not black as with stibnite). Analysis, Barcena (l. c.)

S	Sb	Hg	Fe
29·08	53·12	14·00	3·50 = 99·70

Whence the atomic ratio for the sulphur, antimony, mercury and iron, 18·17 : 8·7 : 1·4 · 12 = (nearly) 15 : 7 : 1 : 1, or $4SbS_3 + HgS + FeS^2$. Fuses at the first touch of the blowpipe flame, giving off white fumes in abundance. Not sensibly attacked by cold nitric acid, but dissolved in the warm acid with a white residue.

Occurs at Huitzuco, State of Guerrero, Mexico, in a matrix of carbonate and sulphate of lime, together with sulphur, cinnabar, stibnite and valentinite.

LÖLLINGITE, Min. p. 76 (= leucopyrite, Dana).—Reichenstein, Silesia, anal. (containing gold), Güttler, Jahrb. Min., 1871, 81.

Chañarcillo, anal., Domeyko 3d Append. Min. Chili, 1871.

Dobschau, Hungary, anal., *Niedzwiedzki*, Tsch. Min. Mitth., 1872, 161.

See also Leucopyrite.

595 A. Ludwigite, *G. Tschermak*, Tsch. Min. Mitth., 1874, p. 59.

In finely fibrous masses, the fibres generally short and in a parallel position, so that on the fresh fracture it has a silky lustre. H. = 5. G. = 3·907–3·951 (lighter colored variety), 4·016 (dark-colored variety). Color blackish-green, and again almost perfectly black with a tinge of violet. Tough. Streak dark-green, of a somewhat lighter color than the mineral itself. In microscopic splinters transparent, with a greenish-brown color.

Analysis, Ludwig and Sipöcz, l. c. 1. (mean of 7 partial analyses) G. = 3·951, color dark-green. 2. G. = 4·016, black.

	$\dddot{B}$	$\dddot{\mathrm{Fe}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$
1.	16·09	39·92	12·46	31·69 = 100·16*
2.	15·06	39·29	17·67	26 91 = 98·93*

* Traces of manganese.

For analysis 2. Tschermak gives the formula $2\dot{\mathrm{Mg}}\dddot{B} + \dot{\mathrm{Fe}}\dddot{\mathrm{Fe}}$, which corresponds also to analysis 1, though here a little $\dot{\mathrm{Mg}}$ takes the place of some $\dot{\mathrm{Fe}}$.

A microscopic examination proved the absence of magnetite in the material analyzed, though magnetite and also sometimes calcite are generally intimately associated with it.

Heated in the air the mineral becomes red; in fine splinters fusible with difficulty to a black, strongly magnetic, slag. With the fluxes gives the reaction for iron. Dissolved slowly by cold hydrochloric acid when in the state of a fine powder.

Occurs imbedded in a crystalline limestone, with irregularly situated beds of magnetite, at Morawitza in the Banat.

According to F. Berwerth (Tsch. Min. Mitth., 1874, 247) ludwigite occurs altered to limonite. An analysis of material, having a brownish-red color, and graduating insensibly into pure ludwigite, afforded him: $\dddot{\mathrm{Fe}}$ 75·34, $\dot{\mathrm{Mn}}$ tr., $\dot{\mathrm{Ca}}$ 0·09, $\dot{\mathrm{Mg}}$ 5·80, $\ddot{\mathrm{C}}$ 1·65, $\ddot{\mathrm{Si}}$ 2·83, $\dot{\mathrm{H}}$ 14·51, $\dddot{B}$ 0·08 = 101·02. G. = 3·41. Besides the limonite [illegible]8·17 p. c.), Berwerth considers that some talc, brucite, magnesite, and calcite are also here present as mechanically mixed impurities.

LÜNEBURGITE, Nöllner, Ber. Ak. München, 1870, 291.—Appendix I., p. 10.

132. Luzonite, *Weisbach*, Tsch. Min. Mitth., 1874, p. 257.

Massive, with uneven fracture, with but little tendency to cleavage. In cavities there were also observed some minute crystals, whose form could not to be distinguished. H. = 3·5 G. = 4·42. Color dark reddish-steel gray, turning violet with time. Lustre black and metallic. Streak black. Brittle.

Analysis, Winkler, l. c.

S	Sb	As	Cu	Fe
33·14	2·15	16·52	47·51	0.93 = 100·55

This gives substantially $Cu_3AsS_4 = 3\ \text{Є}uS + As_2S_5$, or similar to enargite

It is closely related to famatinite (q. v.) and Weisbach says, though without sufficient reason, that the two are probably isomorphous, while it forms a dimorphous group with enargite. The sole reason for separating the mineral from enargite seems to be its structureless character, nearly destitute of cleavage, but, unsupported by observations on the crystalline form, this cannot be regarded as conclusive.

Occurs in the copper veins of Mancayan, district of Lepanto, Island Luzon (Manila). Associated with the following minerals, named in the order of their deposition: Quartz, pyrite, (luzonite), enargite, quartz, tetrahedrite, barite.

447 B. Maconite, *Genth*, Amer. Phil. Soc., Philad., xiii., 396, 1873.

In irregular scales, resembling a variety of jefferisite. Soft, but slightly harder than kerrite. G. = 2·827 (Chatard). Color dark brown; lustre pearly, inclining to sub-metallic. Analysis, l. c., Chatard and Genth.

	S̈i	Ä̶l	F̶̈e	Ḟe	Ṅi,Ċo	Ṁg	L̇i	Ṅa	K̇	ign.
$\frac{3}{2}$	34·22	21·53	12·41	0·32	0·12	14·46	tr	0·51	5·70	11·85 = 101·1?

Oxygen ratio, Ṙ : R̶̈ : S̈i : Ḣ = 3 : 6 : 8 : 5 nearly, or 3Ṙ, 2S̈i + 2 (R̶̈, S̈i) + 5Ḣ.

Exfoliates largely on heating, and fuses with difficulty to a brown glass; easily decomposed by hydrochloric acid, with separation of silica in scales.

Contains numerous fragments of corundum, and some microscopic reddish-brown crystals which may be sphene. Found, as an apparent result of the alteration of chlorite, at the corundum locality, Culsagee Mine, near Franklin, Macon Co., No. Carolina.

MAGNESITE, Min. p. 685.—Traversella, cryst., *Strüver*, Atti Accad. Sci. Torino, vi., 374, 1871.

Greiner, Tyrol, note, *Zepharovich*, Ber. Ak. Wien, lxvii., 750, 1868.

From the Alps, crystals with *O*, *I*, *i*-2, also anal., *Rumpf*, Tsch. Min. Mitth., 1873 263.

Var. breunnerite, anal., *Leeds*, J. Frank. Inst., III., lx., 63, 1870.

MAGNETITE, Min. p. 149.—Crystals from Achmatowsk, with planes, *O*, 1, *i*, 3-3, $^{2}{}_{5}{}^{1}$-3, 5-$\frac{5}{3}$, $\frac{1}{2}$-$\frac{1}{2}$, ZS. G. Ges., xxi., 489, 1869.

Auerbach, anal., containing nickel, *Petersen*, J. pr. Ch., cvi., 441, 1869.

Wolfach, anal., *Petersen*, Pogg., cxxxvi., 506, 1869.

Traversella, cryst., *Strüver*, Atti Accad. Sci. Torino, vi., 374, 1871.

Brewster, N. Y., pseudomorph after dolomite and chondrodite, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.

In mica from Pennsbury, reply of *J. D. Dana* and *G. J. Brush* to a note by Rose (see hematite), Am. J. Sci., II., xlviii., 360, 1869 (Jahrb. Min., 1874, 611).

Both Zirkel (Microscop. Beschaff. der Min., 1873, p. 247) and Rosenbusch (Phys. d. Min., 1873, p. 213) speak of the mineral in the mica of Pennsbury as being hematite. It is difficult, however, to see how this view can be reconciled with the investigations of Brush (l. c.). He found that the mineral was blackish to smoky-brown in color, and strongly magnetic. It had moreover a black streak. Upon being heated to redness out of contact of the air it retained its color, but heated with access to the air it became red. It was sometimes, in consequence of alteration, changed to a bright red or yellow mineral. The red substance had a red streak, the yellow substance an ochre-yellow streak; the last became red when heated. Prof. Brush concludes that the black mineral is in all probability magnetite, the red mineral is hematite (arising from the oxidation of the original magnetite), and the yellow-ochre mineral is hydrated sesquioxyd of iron, due to hydration as well as oxidation.

189. Magnochromite, *Bock*, Inaug. Dissert. Breslau, 1869. *Websky*, ZS. G. Ges., xxv., 394, 1873.

A variety of chromite from Grochau, Silesia, containing a large amount of magnesia. It has been previously described by Breithaupt (1832, III., p. 234; 1847, III., 777), and also by other authors. In physical characters it agrees with chromite, except in its want of metallic lustre and low specific gravity. According to Breithaupt G. = 4·031–4·110 (this, Websky suggests, is in part accounted for by the presence of impurities). It occurs in rounded grains embedded in a green gangue from which it cannot be entirely separated. This gangue mineral is considered by Websky as a new species, and using an analysis of it (v. grochauite) he deducts it from an analysis of a mixture of the two, made by Bock, and obtains the following as the composition of the magnochromite: Ä̶l = 29·92, C̶̈r = 40·78, Ḟe = 15·30, Ṁg = 14·00 = 100·00. This result agrees with the general formula Ṙ,R̶̈ of the spinel group giving in this case 4 (Ä̶l,C̶̈r), (3Ḟe, 5Ṁg).

Malachite, Min. p. 715.—Pseudomorph after atacamite, *Kokscharow*, Bull. Soc. Imp. St Pet., xviii., 186, 1872; *Tschermak*, Min. Mitth., 1873, 39.

Maldonite, *Ulrich*.—Appendix I., p. 10.

Mangandisthen. See **Ardennite.**

290 A. Manganophyllite, *Igelström*, Jahrb. Min., 1872, 296, (Kenngott, 1873, 56).
Hexagonal? In thin plates, like other micas.
Color bronze to copper-red. Streak pale red. In thin scales translucent with a rose-red color.
Analysis, Igelström (l. c.)

S̈i	Ä̶l	Ḟe	Ṁn	Ċa	Ṁg	K̇,Ṅa	ign.		
38·50	11·00	3·78	21·40	3·20	15·01	5·51	1·60	=	100

Kenngott observes (l. c.) that, if we call the loss Ḣ and reckon it with the bases, the oxygen ratio for bases to silica becomes 11·72 : 12 or Ṙ : R̶̈ : S̈i = 1 : 3 : 4 nearly (the ratio of lepidomelane). The alkalies appear to be for the most part potash.
B. B. gives no coating on charcoal; with borax or soda affords a strong manganese reaction. Soluble in HCl with the separation of silica in the form of the original scales.
Occurs with tephroite, hydrotephroite, hamartite, magnetite, calcite, garnet, etc., at the manganese mine Pajsberg, near Filipstadt, Sweden.
Igelström calls attention to the fact that his manganophyll is in many respects similar to the imperfectly described (no analysis) alurgite of Breithaupt (Dana's Min. p. 764).

Marcasite, Min. p. 75.—Pseudomorph after bournonite, chalcopyrite, magnetite, *Döll*, Tsch. Min. Mitth., 1874, 87, 88.
(Weisskupfererz) Halsbrüche, near Freiberg, an analysis by *Frenzel* gave results agreeing with the formula R_2S_3 (Cu = 10·75 p. c., Fe = 40·47), it is a compound between marcasite and chalcopyrite, and, if constant in composition, Frenzel suggests that it should have a distinctive name, Jahrb. Min., 1873, 785.

Marceline, Min. p. 163.—Examined by *v. Kobell*, J. pr. Ch., II., iii., 467.

Margarite, Min. p. 506.—No. Carolina, anal., *J. L. Smith*, Am. J. Sci., III., vi., 184; analyses, *Genth*, Am. Phil. Soc., Philad., xiii., 399, 1873.
Optical character investigated, *Bauer*, ZS. G. Ges., xxvi., 186, 1874.

Mariposite, a name proposed provisionally by Prof. Silliman for an anhydrous silicate containing as bases, according to the blowpipe, iron (protoxide), alumina, chromium, lime, magnesia and potash, with traces of manganese and sulphuric acid. It had a light apple-green color, occurs in scales and associated with pyrite in a gangue of dolomite (ankerite) mingled with quartz; from the Mariposa estate, California. (Cal. Acad. Sci., III., 380, 1868). It has since been referred provisionally to fuchsite (Min p. 311, anal., 16), though its identity with that species has not been finally determined. It is the constant associate of the ore through the Mariposa region, and in consequence of its paragenetical relations deserves further investigation.

Marmolite, Min. p. 465. See **Serpentine.**

Martite, Min. p. 142.—Brazil, *Rosenbusch*, Jahrb. Min., 1871, 78.

309 A. Maskelynite, Tschermak, Ber. Ak. Wien, lxv., p. 122, 1872.
Isometric; form a distorted cube. In grains transparent, colorless, with milky portions arising from alteration. In the microscopic section seen to have a rectangular outline, and shown by optical properties to be isometric. H. = about 6·5. B. B., fusible with difficulty to a transparent glass. Analysis, mean of two closely agreeing analyses made by different methods:

S̈i	Ä̶l	F̶̈eḞe	Ċa	Ṁg	Ṅa	K̇		
54·3	24·8	4·7	11·1	tr	4·9	1·2	=	101·0

The iron comes from a little magnetite present, and deducting this we obtain: S̈i 56·8, Ä̶l 25·7, Ċa 11·6, Ṅa 5·1, K̇ 1·3 = 100·00.
The oxygen ratio is nearly Ṙ : R̶̈ : S̈i = 1 : 3 : 6, or that of labradorite.
Occurs in the meteorite from Shergotty, near Behar, India.

635 A. Maxite, ***Laspeyres*****, Jahrb. Min., 1872, 407, 508 ; 1873, 292.**
Orthorhombic. Massive, crystalline. Cleavage tabular, perfect.

Optical characters—acute bisectrix normal to the cleavage surface. Double-refraction strong, character negative. Axial angle small. Apparent angle in air for red rays 19° 38′ ; for blue 22° 45′ ; for white 20° 51′. H. = 2·5–3. G. = 6·87 (leadhillite 6·26–6·44 ; 6·60, Sardinia, *Bertrand*). Colorless. Transparent to translucent. Lustre adamantine to pearly. Fracture conchoidal to splintery. Slightly brittle.

Analysis, Laspeyres and Eichhorn (l. c.)

$\dot{Pb}$	$\dddot{S}$	$\ddot{C}$	$\dot{H}$
81·91	8·14	8·08	1·87 = 100·00

Laspeyres writes the formula $5\dot{Pb}\dddot{S} + 9\dot{Pb}\ddot{C} + 4\dot{Pb} + 5\dot{H}$, making it a hydro-sulpho-carbonate of lead.

Fuses easily in the flame of a spirit lamp, forming a yellow bead, crystalline on cooling. On charcoal gives a lead coating. In the matrass decrepitates, expands and becomes white and non-transparent, giving off water. Insoluble in water. Soluble in nitric acid.

Occurs with anglesite and cerussite in galenite at the Mala-Culzetta mine near Iglesias, Sardinia.

Maxite resembles leadhillite very closely in its physical characters, especially in its optical properties, and is not far off in composition. Bertrand, on this account, has urged that the maxite is probably nothing but an altered leadhillite (Bull. Soc. Chem., xix., 17, 1873), which seems not improbable.

MEGABASITE, Min. p. 604.—Morrochoco, Peru, anal., *Pflücker*, Domeyko 3d App. to Min Chili, 1871.

MEIONITE, Min. p. 318.—Vesuvius, cryst., *Brezina*, Tsch. Min. Mitth., 1872, 16.

MELACONITE, Min. p. 136.—Varieties from Chili containing $\dddot{\bar{F}}e$, and others with $\dot{C}o$ and $\dot{M}n$. Domeyko 2d App. Min. Chili, p. 14 et seq., 1867 ; 4th App., p. 11, 1874.

MELANGLANZ. See Stephanite.

Meerschaluminite, *Ross*, = pholerite, which see.

MELIPHANITE, Min. p. 263.—(Melinophane)—Cryst., *Nordenskiöld*, Œfv. Ak. Stockholm, 1870, xxvii., 556.

MELOPSITE, Min. p. 478.—Shown by *Goppelsröder* to be a magnesia-silicate, J. pr. Ch., cv., 126.

MENACCANITE, Min. p. 143.—Titaniferous sands from Chili, *Domeyko*, Ann. d. Mines, VI., xvi., 540. See also Min. Chili, 2d and 3d App. ; Silva, C. R., lxv., 207.
From doleryte, anal., *Sandberger*, Ber. Ak. München, 1873, 146.
Norway, analysis, *v. Gerichten*, Ann. Ch. Pharm., clxxi., 205, 1874.
Canada, analyses, *Harrington*, Canada Geol. Surv.. 1874, 227.

MENEGHINITE, Min. p. 105.—Occurs in the emery near Schwarzenberg, Saxony, analysis and description, *Frenzel*, Pogg., cxli., 443.

MESOLITE, Min. p. 430.—Iceland and Stromoë, analyses, *Schmid*, Pogg., cxlii., 118.
In dolerytes of Bergonne, analyses, *Pisani*, C. R., lxxiii., 1447, 1871.
In basalts, *Streng*, Jahrb. Min., 1874, 575.

METACINNABARITE, *Moore*, Am. J. Sci., III., iii., 36. Appendix I., p. 10.

Durand thinks, after an examination of some good crystals, though without the opportunity of making measurements, that there is a strong presumption in favor of the mineral being orthorhombic. He gives two figures, which, however, look much like a combination of the cube and octahedron, *i.e.*, isometric, as before suggested. Proc. Cal. Acad., iv., 219, 1872.

225 A. Meymacite, *Carnot*, C. R., lxxix., p. 639, 1874.
A hydrated tungstic acid, formed from the alteration of scheelite, which Carnot suggests, may have been accomplished by means of acid waters arising from the decomposition of pyrite.

Sometimes yellow or greenish-yellow, preserving the crystalline structure and cleavage of scheelite; sometimes when the alteration has been more complete, the mineral is friable between the fingers, and has a yellow or brownish color. Lustre resinous.

Analyses (l. c.) 1. and 2. on friable material, color yellow to brownish, streak sulphur yellow. G. = 3·80. 3. firm, with lamellar structure and yellowish streak. G. = 4·54.

$\dddot{\mathrm{W}}$	$\ddot{\mathrm{Ta}}$	$\dddot{\mathrm{Fe}}$	$\dddot{\mathrm{Mn}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{H}}$	gangue	
71·85	1·00	6 00	0·75	2·50	12·93	4·50	= 99·53
74·25	1·05	6·10	0·65	4·65	11·75	1·85	= 100 30
75·12	0·70	6·25	0·32	7·00	6·85	2·55	= 98·79

Deducting the tungstate of lime and hydrated oxyd of iron, which he regards as impurities, Carnot deduces the formula $\dddot{\mathrm{W}}$, 2$\dot{\mathrm{H}}$. In the tube gives off water. On charcoal turns black. With salt of phosphorus, gives in the O. F. a yellow bead, nearly colorless on cooling. In R. F. a bead colored violet to red (iron and tungstic acid together). With acids gives the reaction of tungstic acid when treated in the usual way.

Found with wolfram and scheelite at Meymac (Corrèze), France.

MICA, Min. p. 301 et seq.—Milben, near Petersthal, anal., *Nessler*, Jahrb. Min., 1869, 249.
In Scotch granites, analyses, *Haughton*, Phil. Mag., IV., xl., 62, 1870.
In granite from India, anal., *Ormsby*, Journ. R. Geol. Soc. Dublin, II., iii., 26, 1871.
With penninite, lepidolite, etc. (Verwachsungen), *Rose*, Pogg., cxxxviii., 177, 1869.
Brewster, N. Y., anal., *Breidenbaugh*, Am. J. Sci., III., vi., 207, 1873.
Manhattan Is., New York, analyses, *Schweitzer*, Amer. Ch., iv., 443, Jan., 1874.
Physical and optical investigations, *Reusch* (Körnerprobe), Pogg., cxxxvi., 130, 632; Ber. Ak. Berlin, July, 1869, 530; *Max Bauer*, Pogg., cxxxviii., 337, 1869; ZS. G. Ges., xxvi., 137, 1874; *Cooke*, relation to the vermiculites, Mem. Am. Ac. Boston, 1874, 35.

MICHAELSONITE, Min. p. 289.—(Erdmannite, *Blomstrand*), composition and description. *Nordenskiöld*, Œfv. Ak. Stockholm, 1870, xxvii., 365.

MICROLITE, Min. p. 513.—Shepard Am. J. Sci., II., l., 95, 1870.

MICROLITES, a name proposed by Vogelsang (Philosoph. d. Geol., 1867, p. 139) and since used by Zirkel (Mikroscop. Beschaff. d. Min., 1873, pp. 33, 88) for microscopic crystals, sometimes belonging to known species, sometimes of indeterminate nature, but often observed in igneous rocks. The method of aggregation of these microlites is sometimes very remarkable. Trichite and belonite are names given by Zirkel (l. c.) to analogous forms.

Mikroplakite, Mikrophyllite. See LABRADORITE.

305 A. Microsommite.—Scacchi, Rend. R. Accad. Napoli, Oct., 1872, ZS. G. Ges., xxiv., 506. Further investigated by v. Rath, Pogg., Ann. Erg. Bd, vi., p. 372, 1873.

Occurs in extremely minute hexagonal crystals; often grouped together. Crystals striated vertically, occasionally with edges truncated. *O* dull. *a* (vert.) = ·347. 1 ∧ *I*=111° 50′; 1 : 1 (over *I*)=43° 40′; 1 : 1 (adj.) 158° 34′ (angles only approximate).

H. 6. G. 2·60. Transparent. Colorless. Analysis (on 0·1 gr. consisting of 1500 crystals).

$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{K}}$	$\dot{\mathrm{Na}}$	Cl	$\dddot{\mathrm{S}}$		
33·0	29·0	11·2	11·5	8·7	9·1	1·7	=	104·2

If the Na belongs to the Cl the excess is diminished 2 p. c. Oxygen ratio for $\dddot{\mathrm{R}}$: $\ddot{\mathrm{Si}}$=3 : 4.

B. B. fusible with difficulty. No loss by violent ignition; in hydrochloric acid decomposed with separation of gelatinous silica. Occurs at Vesuvius in ejected masses, and formed by sublimation in the leucitic lava. It is closely related to sodalite.

Milanite. See HALLOYSITE.

MILARITE, Kenngott, Jahrb. Min. 1870, 81.—Appendix I., p. 10.

Kenngott suggests that milarite may be identical with levynite (but see below), Jahr. Nat. Ges. Zürich, xvi., 132, 1871.

According to Frenzel the locality is Val Giuf, Graubünden, *not* Val Milar. He has made an analysis with the following results: 1. G.=2·59. Analysis 2. is by Finkener (Eck, Jahrb Min., 1874, 62). G.=2·5.

	$\ddot{\mathrm{Si}}$	$\dddot{\mathrm{Al}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{Ka}}$	$\dot{\mathrm{H}}$		
1.	71·12	8·45	11·27	——	(7·61)	——	1·55	= 100·00	Frenzel.
2.	70·04	1[illegible] 62	10·05	0·20	0·65	5·74	1·69	= 99·99	Finkener.

The water is driven off only at a high temperature; Frenzel regards it as basic, and suggests that the mineral belongs near petalite (Jahrb. Min., 1873, 797).

Can the excess of silica be due to impurity?.

MILLERITE, Min. p. 56.—Anal., *Liebe*, Jahrb. Min., 1871, 843.

MILOSCHITE, Min. p. 510.—May be a mixture, *Kenngott*, Jahr. Nat. Ges. Zürich, xvii., 66

MIMETITE, Min. p. 537.—Nador, province Constatine, anal., *Flajolot*, ZS. G. Ges., **xxiv**. 49, 1872.

Miriquidite, Frenzel, Jahrb. Min., 1874, p. 673 (1873, 939).

Rhombohedral, *a* (vert)=3·363. Planes *R* and $-\frac{1}{2}R$, $R \wedge -\frac{1}{2}R = 123°$, $R \wedge R = 66°$ and 114°. Crystals very minute and hence measurements only approximate. Plane *R* often horizontally striated, and somewhat curved (cryst. descript. by vom Rath). Also massive in imbedded portions having a yellowish to reddish brown color. Color of crystals blackish-brown, on edges red by transmitted light. Streak ochre-yellow. Lustre glassy. Translucent to opaque. Brittle.

H.=4. Contains $\dot{\mathrm{P}}\mathrm{b}$, $\overset{\cdot\cdot\cdot}{\overline{\mathrm{F}}}\mathrm{e}$, $\overset{\cdot\cdot\cdot\cdot\cdot}{\overline{\mathrm{A}}}\mathrm{s}$, $\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{P}}$, $\dot{\mathrm{H}}$, but the want of sufficient quantity of pure material prevented an analysis.

B. B., fusible to a globule, coloring the charcoal yellow. In matrass gives water, and with the fluxes reacts for iron. The presence of the acids is less easily proved, and Frenzel concludes that it is probably a very basic compound.

Found at Schneeberg with chalcocite, pyromorphite, cuprite, torbernite, etc.

MISPICKEL, Min. p. 78.—See ARSENOPYRITE.

MONAZITE, Min. p. 539.—(Turnerite), Laacher See, cryst. description, *v. Rath*, Pogg Erg. Bd., v., 413, 1871.

Cryst., *Hessenberg*, Jahrb. Min., 1874, 876.

Produced artificially, *Radominski*, C. R., lxxx., 304, 1875.

See also *korarfveite.*

MONIMOLITE, Min. p. 546.—Cryst. note (Scandinavia), *Nordenskiöld*, Œfv. Ak. Stockholm, xxvii., 550, 1870.

MONTEBRASITE, Appendix I., p. 10.—See HEBRONITE.

MONTICELLITE, Min. p. 255.—Cryst. relation to chrysolite, *v. Rath*, Pogg. Erg. Bd., v., 434. Altered to serpentine and fassaite, Pesmeda Alp, Ber. Ak. Berlin, 1874, 737, 747

MONZONITE, *v. Kobell*, Ber. Ak. München, May 6, 1871.—Appendix I., p. 11.

MYARGYRITE, Min. p. 88.—Tres Puntas, analyses, Domeyko 2d App. Min. Chili, p. 40, 1867.

MYELIN, Min. p. 373.—Anal., identical with Carnat (Breithaupt), Min p. 474; *Frenzel*, J. pr. Ch., II., v., 401, 1872.

NÆSUMITE, *Blomstrand*, Œfv. Ak. Stockholm, 1868, 197.—Appendix I., p. 11.

NADORITE, *Flajolot*, C. R., lxxi., 237, 406.—Appendix I., p. 11.

NAMAQUALITE, *Church*, J. Ch. Soc., II., viii., 1.—Appendix I., p. 11.

NANTOQUITE. Breithaupt gives the following description of this mineral (Nantokite) previously announced by him, B. and H. Ztg., xxvii., 3, see Dana's Min. Appendix I., p. 11. Isometric, as proved by the cubic cleavage, though no crystals were observed. Granular, massive. H. = 2–2·5. G. = 3·930. Color white to colorless. Lustre adamantine.

Analyses give the formula Cu Cl or Cu_2 = 64·11, Cl = 35·89.

On charcoal fuses, coloring the flame intense azure blue, leaving a coating of oxyd of silver, and a white coating farther from the assay; a ductile globule of copper remains on the coal. Easily soluble in nitric or hydrochloric acid, as also in ammonia. Rapidly decomposed on exposure to the air. Jahrb. Min., 1872, 814.

This mineral was first described by Dr. Sieveking, see Domeyko 2d Append. Min. Chili, p. 51, Feb., 1873. A more recent analysis (3d Append., 1871) gave $\mathrm{Cu}_2\mathrm{Cl}$ 79·32, $\dot{\mathrm{C}}\mathrm{u}_2$ 12·56, insol. 3·30, $\bar{\mathrm{F}}\mathrm{e}$ 0·05 = 95·23. Domeyko mentions that the mineral is remarkable for evolving in the mine an odor of chlorine which incommodes the miners. This, he says, is due to the production of ozone, which accompanies the oxidation of the Cu_2Cl.

NATROLITE, Min. p. 426.—Composition discussed, *Rammelsberg*, ZS. G. Ges., xxi., 96, 1868.

Loch Thorn, Greenock, anal., *Young*, Chem. News, xxvii., 55, 1872.

Stempel, anal. (*Klippert*), *v. Koenen*, Jahrb. Min., 1875, 87.

404 E. Nefedieffite, *P. Pusirewsky* (Verh. Min. Ges. St. Petersburg, II., vii., 1872), in Jahrb Min., 1873, 420.

Amorphous, very similar to lithomarge (Steinmark). H. = 1·15. G. = 2·335. Fracture conchoidal. Color white to rose-red. Opaque, on the edges translucent. Feel greasy. Several analyses (not quoted in Jahrb. Min.) gave very discordant results, but their mean agrees most closely with the formula $H_6MgAl_2Si_5O_{17}$, although Pusirewsky prefers, on account of its simplicity, the formula $H_4MgAl_2Si_5O_{16}$, though it agrees even less well with the analyses. Scarcely soluble in acids. In water 0·2 p. c. dissolves, the solution giving an alkaline reaction; over sulphuric acid 11·30 p. c. H_2O is given off (in 22 days), which it again absorbs on exposure to the air. At 250° C. it loses 19·13 p. c. H_2O, and 4·73 p. c. more when heated to the melting point.

NEOLITE, Min. p. 406.—Freiberg, a mineral of similar character, Frenzel, Jahrb. Min., 1874, 676.

NEPHELITE, Min. p. 327.—As a microscopic constituent of rocks, *Zirkel*, Jahrb. Min., 1868, 697.

Monte Somma, cryst., *Strüver*, Atti Accad. Sci. Torino, iii., 123, 1867; altered to sodalite, same, ibid., vii., 329.

NEPHRITE, Min. p. 233 et al.—So called, from Turkistan, analyses, *v. Fellenberg*, Jahrb. Min., 1869, 231; 1870, 484; 1871, 173.

New Zealand, descriptions and anal., *Kenngott*, Jahrb. Min., 1871, 293.

Occurrence described in the Karakash valley, Turkestan, *Stoliczka*, Q. J. G. Soc., xxx., 568, 1874.

NICCOLITE, Min. p. 60 (rothnickelkies), Hembach (Wittichen), Baden, anal., *Petersen*, Pogg., cxxxiv., 82.

Description, *Kokscharow*, Min. Russl., v., 155.

Wolfach, Baden, anal. (Sb_2 = 28·22 p. c.) *Petersen*, Pogg., cxxxvii., 396, 1869.

Telhadella mine, Portugal, anal. (*Winkler*), *Breithaupt*, Jahrb. Min., 1872, 818.

NICKEL, nickeliferous sand from Frazer River, *Blake*, Am. J. Sci., III, vii., 238.

NIGRESCITE, *Hornstein*, ZS. G. Ges., 1867, 342.—Appendix I., p. 12.

NIOBITE. Synonym of columbite used by Rammelsberg.

Nitroglauberite. From Atacama (Dr. Schwartzemberg). Composition, $4\dot{\mathrm{N}}\mathrm{a}\dddot{\mathrm{S}} + 6\dot{\mathrm{N}}\mathrm{a}\ddot{\bar{\mathrm{N}}} + 5\dot{\bar{\mathrm{H}}}$. An analysis gave $\dot{\mathrm{N}}\mathrm{a}\dddot{\mathrm{S}}$ 33·90, $\dot{\mathrm{N}}\mathrm{a}\dddot{\mathrm{S}}$ 60·35, $\dot{\bar{\mathrm{H}}}$ 5·75. Occurs in a fibrous, translucent mass, or consisting of imperfect crystals; permanent in the air. When dissolved with just sufficient water at 40° to 50° C., the double salt separates out unchanged on cooling; but treated with cold water in quantity insufficient to dissolve the whole, the salt is decomposed into crystals of mirabilite, and soda-nitre which remains in solution. Also found by Domeyko at Paposo, 3d Append. Min. Chili, 1871.

478 A. Nohlite, *Nordenskiöld* (Geol. För. Stockholm, Förhandl. I., p. 7), Jahrb. Min., 1872, 534.

Massive. H. = 4·5-5·0. G. = 5·04. Color black-brown. Streak brown. Fracture uneven, splintery. Opaque. Brittle. Vitreous lustre.

Analysis.

$\ddot{\bar{\mathrm{C}}}\mathrm{b}$	$\dot{\mathrm{U}}$	$\dot{\bar{\mathrm{Z}}}\mathrm{r}$	$\dot{\mathrm{F}}\mathrm{e}$	$\dot{\mathrm{C}}\mathrm{u}$	$\dot{\mathrm{C}}\mathrm{e}$	$\dot{\mathrm{Y}}$	$\dot{\mathrm{M}}\mathrm{g}(\dot{\mathrm{M}}\mathrm{n})$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\bar{\mathrm{H}}}$
50·43	14·43	2·96	8·09	0·11	0·25	14·36	0·28	4·67	4·62 = 100·20

Corresponding approximately to the formula $\mathrm{R}^3\ddot{\bar{\mathrm{C}}}\mathrm{b} + 1\frac{1}{2}\dot{\bar{\mathrm{H}}}$.

B.B., fuses quietly on the edges to a dull glass. Decrepitates slightly in giving off its water. With borax easily dissolved, giving a bead colored by uranium. Easily decomposed by warm sulphuric acid.

Found in a feldspar quarry at Nohl, near Kongelf, Sweden. One fragment weighing 297 grs. seemed to be a portion of a mass at least 20 times as great.

Nohlite stands near samarskite, but differs from it in its percentage of water.

NONTRONITE, Min. p. 461.—(Chloropal, Dana), anal., *Thorpe*, J. Ch. Soc., II., viii., 29, 1870.

NOSITE (nosean), Min. p. 333.—A variety of hauynite = a soda-hauynite; discussion of relation to hauynite and lapis lazuli, *Vogelsang*, Vers. Med. Ak. Amsterdam, II., vii. 161, 1873.

OCTAHEDRITE, Min. p. 161.—Binnenthal, cryst., *Klein*, Jahrb. Min., 1872, 900; 1874, 961. Found at Pfitsch Joch, Tyrol, Tsch. Min. Mitth., 1873, 49.

OKENITE, Min. p. 398.—(Dysclasite), Poonah, India, anal., *Haughton*, R. Geol. Soc. Dublin, II., 414, 1866.

OKTIBBEHITE, Min. p. 16.—In meteoric irons, *Meunier*, Ann. Ch. Phys., IV., xvii., 35.

56 A. **Oldhamite**, *Maskelyne*, 1862; Phil. Trans. London, 1870, I., p. 195. In small, nearly round spherules (generally coated by sulphate of lime as result of alteration). They have three equal cleavages, at right angles to each other; shown by this fact to be isometric, as also because it gives no evidence of double refraction in polarized light. H. = 4. G. = 2.58. Color pale chestnut-brown, transparent when pure.

Analysis (l. c.) after deducting foreign matter (enstatite, etc.).

	Oldhamite		Incrustation				
	CaS	MgS	$\dot{\text{Ca}}\bar{\text{S}}$	$\dot{\text{Ca}}\ddot{\text{C}}$	troilite		
1.	89·37	3·25	3·95	3·43	——	=	100·00
2.	90·25	3·26	4·19	——	2·30	=	100·00

Maskelyne suggests that the MgS may be considered either as a mechanically mixed ingredient, or as a constituent of the mineral. Readily dissolved in acid with the evolution of sulphuretted hydrogen and deposition of sulphur. Found imbedded in enstatite or augite in the Busti meteorite, and apparently also in that of Bishopville.

OLIGOCLASE, Min. p. 346.—Vesuvius, cryst., and anal., *v. Rath*, Pogg., cxxxviii., 464, 1869.
Ytterby, several analyses, *Ludwig*, Pogg., cxli., 149.
Wilmington, Del., anal., *Tedu*, Tsch. Min. Mitth., 1871, 55.
Media, Penn., *T. D. Rand*, Proc. Ac. Philad., 1872, 299.
Bamle, Norway, anal., *Hawes*, Am. J. Sci., III., vii., 579, 1874. See *Tschermakite*.
See also *Feldspar*.

OLIVINE. See CHRYSOLITE.

Opacite, a name proposed by Vogelsang for the black opaque scales or grains occurring in many rocks, which cannot be identified with magnetite, menaccanite, or any other mineral, ZS. G. Ges., xxiv., p. 530, 1872.

OPAL, Min. p. 198.—Optical examination, *Crookes*, Ch. News, xix., 205, 1869.
Minute and careful microscopic investigation, *Behrens*, Ber. Ak. Wien, lxiv., 519, 1871.
Spectra of precious opals, *Behrens*, Jahrb. Min., 1873, 920.
Pseudomorph after chlorite (?), *Rœpper*, Am. J. Sci., II., l., 37.
Precious opals from Esperanza, State of Queretaro, Mexico, occurrence described, M Barcena, La Naturaleza, ii., 297, 1873, in Am. J. Sci., III., vi., 466, 1873.

ORILEYITE, Appendix I., p. 12.

ORTHITE, Min. p. 285.—Vesuvius, cryst. description, *v. Rath*, Pogg., cxxxviii., 492.
See ALLANITE.

ORTHOCLASE, Min. p. 352.—Cryst. monograph, *Kokscharow*, Min. Russl., v., 154, 329.
Striegau, cryst. and anal., *Becker*, Jahrb. Min., 1869, 236.

Elba, cryst., *Achiardi*, Nuovo Cimento II., iii., Feb., 1870.
Fibia, St. Gotthard, cryst., *Kenngott*, Jahrb. Min., 1869, 753; 1870, 781.
Monte Somma, cryst., *Scacchi*, Atti Accad. Sci. Napoli, March 12, 1870.
Finland, *Wiik*, Œfv. Finsk. Vet. Ac. Helsingfors, xiii., 76, 1870–71.
Sussex Co., N. J., anal, *Leeds*, Am. J. Sci., III., iv., 433, 1872; Delaware Co., Penn., anal., *same*, J. Frank. Inst., III., lx., 63.
Schiltach, cryst., *Klocke*, Ber. Nat. Ges. Freiburg, vi., 4, (Jahrb. Min., 1874, 868).
Is. Rachgoün, (Algeria), anal., *Velain*, C. R., lxxix., 250, 1874.
(Adular), cryst. note, *Zerrenner*, Tsch. Min. Mitth., 1874, 95.

OSBORNITE, *Maskelyne*, Phil. Trans., 1870, p. 198. Appendix I., p. 12.

OSTEOLITE, Min. p. 530.—Waltsch, Bohemia, in basalt, anal. (Preis), K. Böhm. Ges., 1873, 68.

OTTRELITE, Min. p. 506.—Composition, *Laspeyres*, Jahrb. Min., 1869, 339.

OZOCERITE. Min. p. 732.—Boryslaw, Galicia, *Andrar*, Jahrb. Min., 1868, 608.
In Silurian formation, Bohemia, *Boricky*, Ber. Ges. Böhm., Jan. 10, 1873.

PALAGONITE, Min. p. 483.—A related mineral analyzed, *Streng* and *Zoppritz*, Jahresb. Oberhess. Ges., Nat., xiv., 30 (Jahrb. Min., 1873, 427).

PARAGONITE, Min. p. 487.—Virgenthal, anal., *v. Kobell*, Ber. Ak. München, 1869, 366.
Schwarzenberg (Ochsenkopf) Saxony, anal. (essentially a soda-damourite), *Genth*, Am. Phil. Soc., Philad., xiii., 390, 1873.
See also Cossaite, p. 63.

PATTERSONITE, Min. p. 801. Appendix I, p. 18.—*Genth* has analyzed the pattersonite from Unionville with the following results:
$\ddot{\text{Si}}$ 29·90, $\dddot{\text{Al}}$ 27·59, $\dddot{\text{Fe}}$ 3·12, $\dot{\text{Fe}}$ 9·17, $\dot{\text{Mg}}$ 17·10, $\dot{\text{L}}$ tr., $\dot{\text{Na}}$ 0·58, $\dot{\text{K}}$ 2·33, ign 11·51 = 101·30; the oxygen ration for $\dot{\text{R}}$: $\dddot{\text{R}}$: $\ddot{\text{Si}}$: $\dot{\text{H}}$ is nearly 6 : 9 : 10 : 6, or near that of thuringite.

PEALITE, see Geyserite.

PECTOLITE, Min. p. 396.—Fassathal, anal., *Lemberg*, ZS. G. Ges., xxiv., 252, 1872.

PEGANITE, Min., 582.—Nobrya, Portugal, analyses, *Breithaupt*, Jahrb. Min., 1872, 819.

PENCATITE, Min. p. 708.—See predazzite.

PENNINITE, Min. p. 495.—Pseudomorph after feldspar, anal., *Zepharovich*, Tsch. Min. Mitth., 1874, 7.
Zermatt, anal., *v. Fellenberg*, Jahrb. Min., 1868, 746.
Relation to kotschubeite, *v. Leuchtenberg*, Bull. Soc. Imp. St. Pet., xiii., 34, 1869.
Anal., *v. Hamm*, Tsch. Min. Mitth., 1872, 260.
Luppikko, anal., *Jernström*, Œfv. Finsk. Vet. Soc., xvi., 38, 1873.

PERCYLITE, Min. p. 122.—So. Africa, anal., *Maskelyne* and *Flight*, J. Ch. Soc., II., x., 1051.

PETALITE, Min. p. 229.—Elba, cryst., *v. Rath*, ZS. G. Ges., xxii., 668, 1870.

PEROFSKITE, Min. p. 146.—Wildkreuzjoch, cryst., *Hessenberg*, Min. Not., x., 38, 1871; xi., 1, 1873 (Pogg., cxliv., 595).

PETZITE, Min. p. 51.—California, anal., *Genth*, Am. J. Sci., II., xlv., 309; Colorado, anal., *Genth*, Am. Phil. Soc. Philad., xiv., 226, 1874.

PHARMACOLITE, Min. p. 554.—Wittichen, Baden, anal., *Petersen*, Pogg., cxxxiv., 86.
Joachimsthal, cryst., and anal., *Tschermak*, Ber. Ak. Wien, lvi., 829, 1867.
Cryst., *Schrauf*, Tsch. Min. Mitth., 1873, 138.

PHENACITE, Min. p. 630.—Color investigated, *Kokscharow*, Verh. Min. Ges. St. Pet., II. iv., 322.

PHILLIPSITE, Min. p. 438.—From basalt, cryst. memoir, *Streng*, Jahrb. Min., 1874, 561.
Richmond, Victoria, cryst. description, analyses, *Ulrich*, Contrib. Min. Vict., p. 30.

Pholerite. Min. p. 472.—Analysis, *Maskelyne* and *Flight*, Ch. News, xxii, 260, J Ch. Soc., II., ix., 12, 1871.
It is shown by M. and F. that the *meerschaluminite* of Ross, since called *simlaite* by Schrauf (Verh. G. Reichs. 1870, 43) is identical with pholerite. An analysis gave them $\ddot{S}i$ 43·14, $\dddot{A}l$ 41·07, $\dot{H}$ 15·78 = 100.

Phosphorchromite.—Appendix I., p. 12.

Phosphorite. Min. p. 530.—Deposits in Nassau, *Wicke*, Jahrb. Min., 1869, 88.
Deposits on banks of Dniester, analyses, *Schwackhöfer*, Jahrb. k. Reichs, xxi., 211.
From Belmez, *de Reydellet*, Bull. Soc. G., III., i., 350, 1873.

Picotite, Min. p. 147.—Bohemia, in basalt, anal., *Farsky*, Ber. Chem. Böhm. Ges., (Zprávy, etc.), i., 31, 1872.

Picrolite, Min. p. 465.—In diabase, *Liebe*, Jahrb Min., 1870, 18; Zermatt, anal., v. Fellenberg, anal., Jahrb. Min., 1868, 747.

Picromerite, Min. p. 642.—Stassfurt, crystals examined, *Groth*, Pogg., cxxxvii., 442, 1869.
Kalusz, Galicia, chem. exam., *v. Hauer*, Jahrb. G. Reichs, xx., 141.

Picropharmacolite, Min. p. 555,—Freiberg, *Frenzel* obtained, $\dddot{A}s = 46·93$, $\dot{C}a = 25·77$, $\dot{M}g$ 3·73, $\dot{H} = 24·01$, agreeing with the results of Stromeyer, and he regards it as deserving of a place as a good species, Jahrb. Min., 1873, 786.

Pihlite, Min. p. 455—A supposed new mineral from Chesterfield, Mass., in large crystals, pseudomorphous after spodumene, afforded *Julien* (as approximate results) $\ddot{S}i$ 55·9, $\dddot{A}l$ ($\dddot{F}e$) 27·7, $\dot{N}a$ 10·5, $\dot{K}$ 4·5. $\dot{H} = 2$. G. = 2·696. Am. Chemist, II., i., 300, Feb., 1871. Very probably identical with the cymatolite of Shepard (Min. p. 456).

Pinite, Min. p. 479.—Iglau, enclosing a kernel of iolite, *Makowsky*, Verh. Nat. Ver. Brünn, ix., 3, 1871.

Pitticite, Min.. 589—Redruth, Cornwall, anal., *Church*, Chem. News, xxiv., 135, 1871.
Freiberg (arseneisensinter), anal, *Frenzel*, Jahrb. Min., 1873, 787.

Platinum. Min. p 10.—In northern Lapland, Pogg., cxl., 336.
Russian localities, analyses and description, Kokscharow, Min. Russl. v., 177, 371.
In sand from gold washings, California, Am. J. Sci., III., vi., 132.
(Eisenplatin), anal., *Frenzel*, Jahrb. Min., 1874, 684.

Plagionite, Min. p. 89.—Wolfach, Baden, *Sandberger*, Jahrb. Min., 1869, 312.

Pleonaste, Min. p. 147.—Vesuvius, crystals with the cubic planes, *Hessenberg*, Min. Not., viii., 45, 1868.

Plessite, Min. p. 73.—*Meunier*, Ann. Ch. Phys., IV., xvii., 34, 1869.

Plumballophane, *Bombicci*.—Appendix I., p. 12.

Plumbocalcite, Min. p. 678.—Bleiberg, Carinthia, anal., *Höfer*, Jahrb. Min., 1871, 80.

Plumbocuprite, Adam, Tableau Min., 1869, 52. Syn. of cuproplumbite, Dana, Min., p. 48.

Plumbiodite, Adam, Tableau Min., 1869, p. 67.. Syn. of schwartzembergite, Dana, Min. p. 120.

Polyargyrite, *Sandberger* and *Petersen*, Appendix I., p. 12.

Polycrase, Min. p. 523.—Anal., *Rammelsberg*, Pogg., cl., 207, 1873.

Polyhalite, Min. p. 641.—Stassfurt, in halite, *Reichardt*, Jahrb. Min., 1869, 325.
Berchtesgaden, Bavaria, anal., *Schober*, Jahrb. Min., 1869, 578.
Hallstatt, cryst. (probably monoclinic), *Tschermak*, Ber. Ak. Wien, lxiii., 332, 1871.
Stebnik, Galicia, analyses, *v. Lill*, Tsch. Min. Mitth., 1874, 89.

PREDAZZITE, Min. p. 708.—According to *Hauenschild* (Ber. Ak. Wien, lx., 795, 1869) *predazzite* and *pencatite* are both mixtures of calcite and brucite. The same conclusion was reached by *Damour*, Bull. Soc. G., France, II., iv., 1050. The subject has been further investigated by *Lemberg* (ZS. G. Ges., xxiv., 229, 1872) with conclusive results. According to the latter the black color is due to the presence of finely divided pyrite (not organic matter, as urged by Hauenschild).

PREHNITE, Min. p. 410.—Composition, analyses, *Rammelsberg*, ZS. G. Ges., xx., 79.
Slate river, L. Superior, anal., *Chapman*, Can. Journal, II., xii., 267, Nov., 1869.
Harzburg, cryst. description, composition, *Streng*, Jahrb. Min., 1870, 314.
Tortola, anal., Ak. H. Stockholm, ix., No. 12, 1870 (Cleve's Geol. W. India I., p. 30).
Dumbartonshire, anal., *Young*, Ch. News, xxvii., 55.

600 A. Priceite. Cryptomorphite (?), *Chase*, Am. J. Sci., III., v., 287; Priceite, *Silliman*, Am. J. Sci., III., vi., 128.

Compact, chalky, the powder consisting of minute rhombic crystals. Soft. G. = 2·262-2·298. Color milk-white, without lustre. Feel greasy and unctuous.

Analyses, 1. Silliman, l. c. 2. Chase, variety found in bowlders. 3. Chase, from veins.

		$\dddot{B}$	$\dot{C}a$	$\dot{H}$	NaCl, $\bar{F}e$, $\ddot{\bar{A}}l$		
1.	⅓	(48·82)	31·83	18·29	·96	=	100·00
2.		(47·04)	29·96	22·75	alkalies ·25	=	*100·00
3.		(45·20)	29·80	25·00	" tr.	=	100·00

* Trace Cl.

Silliman gives as the probable formula $\dot{C}a^3\dddot{B}^4 + 6\dot{H}$.

B.B. gives a green flame, and fuses at a red-heat. In the matrass gives off neutral water. Insoluble in water, but perfectly so in hydrochloric acid.

Found in a hard, compact form in layers, between a bed of slate above, the cavities and fissures of which it filled, and a tough blue steatite below; also occurring in bowlders or rounded masses completely imbedded in the steatite. These masses in the main flow formed a continuous line touching each other, and of uniform size, weighing about 200 lbs. each. Branching off from the main deposit were side flows where the bowlders were smaller, from a weight of 20 lbs. down to small pellets the size of a pea, or even smaller.

Locality, Curry Co., Oregon, five miles north of Chetko.

PROCHLORITE, Min. p. 501.—No. Carolina, with corundum, analyses, *Genth*, Am. Phil. Soc. Philad., xiii., 393, 1873.

PROUSTITE, Min. p. 96.—Wittichen, Baden, anal., *Petersen*, J. pr. Ch., cvi., 144, 1869.
Pseudomorph after stefanite and argentite, *Döll*, Tsch. Min. Mitth., 1874, 87.

PSEUDOMALACHITE, Min. p. 568—(prasine), anal., J. Ch. Soc., II., x., p. 1057.
(Ehlite), anal., *Church*, J. Ch. Soc., II., xi., p. 107.
Cryst., *Schrauf* (triclinic), Tsch. Min. Mitth., 1873, 139.

PSEUDOPHITE, Min. p. 496.—Note, *Kenngott*, Jahrb. Min., 1869, 343.

PUCHERITE, *Frenzel*, J. pr. Ch., II., iv., 227, 361.—Appendix I., p. 12.
Further investigations on crystalline form, showing relation to brookite, *Websky*, Tsch. Min. Mitth., 1872, 245. Analysis, *Frenzel*, Jahrb. Min., 1872, 514, 939.

PYRARGYRITE, Min. p. 94.—Wolfach, Baden, anal., *Senfter*, J. pr. Ch., cvi., 143, 1869.
Altered to sulphid of silver from Guanajuato, *Don Severo Navia*, Naturaleza, 1874, 154.
Pseudomorph after silver, *Döll*, Tsch. Min. Mitth., 1874, 86.

PYRICHROLITE, Adam, Tableau Min., 1869, p. 93. Synonym for pyrostilpnite, Dana, Min., 1868, p. 93.

PYRITE, Min. p. 62.—Altenhunden (½ p. c. thallium), *Marquart*, Jahrb. Min., 1868, 608.
Bösingsfelde, *Hessel*, Pogg., cxxxvii., 536, 1869.
Traversella, *Hessenberg*, Min. Not., ix., 60, 1870.
Strüver, complete cryst. memoir, with many figures, and a large number of new forms, Mem. R. Accad. Sci. Torino, II., xxvi., 1869; again *Strüver*, Atti Accad. Sci. Torino, 1871 374 et. seq.

From the Lölling, *Zepharovich*, cryst., Ber. Ak. Wien, lx., 814, 1869; Lotos, 1870, p. 4.
Chilchiliane (Isère), cryst., *v. Rath*, Pogg., cxliv., 582, 1871.
Containing arsenic, Smith, Chem. News, xxiii., 221, 1871.
Thermo-electrical character, *Friedel*, Ann. Ch. Phys., IV., xvii., 79, 1868. *Rose*, Pogg. cxlii., 1, 1871; *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 145, 157, 1874. *Brezina*, Tsch. Min. Mitth., 1872, 23.

PYRITOLAMPRITE, Adam, Tableau Min., 1869, p. 39. A name given to the Arseniksilber from Andreasberg, (Dana, Min. p. 35), shown by Rammelsberg to be a mixture.

PYROCHLORE, Min. p. 512.—Scheelingen, Kaiserstuhlgebirge, anal., *Knop*, ZS. G. Ges., xxiii., 656, 1871; see *koppite.*
Miask, Brevig, Fredriksvärn, analyses, *Rammelsberg*, Pogg., cxliv., 191 et. seq., 1871; cl., 198.

PYROLUSITE, Min. p. 165.—Atacama, anal., Domeyko, 2d Append. Min. Chili, p. 8, 1867.

PYROMORPHITE, Min. p. 535.—Schapbach, anal., *Petersen*, Jahrb. Min., 1871, 393.
Containing didymium, *Horner*, Ch. News, xxvi., 109, 1872.

PYROSCLERITE, Min., p. 493.—Related mineral, anal., *Leeds*, Am. J. Sci., III., vi., 22.
St. Philipp, Alsace, anal., *Ebert*, Jahrb. Min., 1875, 70.

PYROSMALITE, Min. p. 414.—Cryst., *Nordenskiöld*, Œfv. Ak. Stockholm, xxvii., 562, 1870.
Nordmarken, Sweden, anal., *Wöhler*, Ann. Ch. Pharm., clvi., 85, 1870.

PYROPHYLLITE, Min. p. 454.—Wermland, anal., *Igelström*, Œfv. Ak. Stockh., 1868, xxv., 38.
Anal. in fossils, *Nägeli*, Ber. Ak. München, 1868, 503.
Ottré, anal., *Koninck*, Bull. Ac. R. Belg., II., xxvi., 469, 1868.
Pagodite, anal., *Church*, Chem. News, xxii, 220, 1870.

PYROXENE, Min. p. 212.—Degerö, anal., *Wiik*, Jahrb. Min., 1868, 185.
Meteorite of Shergotty, *Tschermak*, Ber. Ak. Wien, lxv., 123, 1872, "Ein augitähnliches Mineral" gave him, $\ddot{S}i$ 52·34, $\ddot{A}l$ 0·25, $\dot{F}e$ 23·19, $\dot{M}g$ 14·29, $\dot{C}a$ 10·49=100·56 ($\dot{C}a\dot{M}g$,2$\dot{F}e_3\ddot{S}i$). in physical and optical characters near diopside.
Distinguished from related minerals by the microscope, *Tschermak*, Ber. Ak. Wien, lx., 5, 1869.
Formed by sublimation at Vesuvius, *Scacchi* Atti Accad. Sci , Napoli, v., Sept. 14, 1872
Associated with hornblende at Vesuvius, *v. Rath*, Pogg. Erg. Bd., vi., 229, 1873.
Anal., *E. Reyer*, Tsch. Min. Mitth., 1872, 258.
Pyroxene group of minerals, *Tschermak*, Min. Mitth., 1871, 28.
Made artificially, *Lechartier*, C. R., lxxv., 487, 1872.
See also *augite.*

PYRRHITE, Min. p. 763.—St. Miguel, cryst., *Schrauf*, Ber. Ak. Wien, lxiii, 187, 1871.
Elba, *v. Rath*, ZS. G. Ges., xxii., 672, 1870.

PYRRHOTITE, Min. p. 58.—Composition discussed, etc. (see chalcopyrrhotite), *Blomstrand*, Œfv. Ak. Stockholm, xxvii, 24, 1870.
Showing polarity, *Kenngott*, Jahrb. Min., 1870, 354.
Brewster, N. Y., pseudomorph after serpentine, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.
Composition discussed, *Knop*, Jahrb. Min., 1873, 524.

QUARTZ, Min. p. 189.—"Die Gesetze regelmässiger Verwachsung mit gekreuzten Hauptaxen, etc,"—*Jenzsch*, Pogg., cxxxiv, 540.
Baveno, cryst., new form, *Becker*, Pogg., cxxxvi., 626.
Enormous crystals from the Tiefen glacier, Pogg., cxxxvi., 637.
Carrara, cryst., *Scharff*, Jahrb. Min., 1868, 822.
Etchings on crystalline faces, *J. Hirschwald*, Pogg., cxxxvii., 548, 1869.
Description of remarkable crystals from Elba, *v. Rath*, ZS. G. Ges., xxii., 619, 658, 727 1870; *Achiardi*, Nuovo Cimento, II., iii., Feb., 1870; *Bombicci*, Mem. Ac. Sci. Bologna, II., ix.
Color of smoky quartz due to presence of an organic substance containing carbon and nitrogen, *Forster*, Pogg., cxliii., 173.

Wallithal, near Biel, Ober Wallis, cryst , new forms, *Weiss*, Verh. Nat. Ges. Bonn., xxviii., 149, 1871.

Paragenetical investigations; the trapezohedral planes are conditioned by the presence of fluorine or chlorine compounds, being formed simultaneously with the evolution of fluorine or chlorine, in part in consequence of their indirect influence, in part though subsequent etching, *Stelzner*, Jahrb. Min., 1871, 33.

Striegau, Silesia, cryst. memoir, *Websky*, Jahrb. Min., 1871, 732, 785, 897.

(Faserquarz) pseudomorph after crocidolite, *Fischer*, Tsch. Min. Mitth.. 1873, 117; *Wibel*, Jahrb. Min., 1873, 367; *Lasaulx*, ibid., 1874, 165.

Poohnah, cryst., *Scharff*, Jahrb. Min., 1873, 944.

Oberstein, Baveno, etc., cryst., *Websky*, Jahrb. Min., 1874, 113.

Cryst., *Laspeyres*, Jahrb. Min., 1873, 941; 1874, 49, 261.

Pseudomorph after garnet, calcite, anhydrite, barite, pyromorphite, scheelite, etc., *Frenzel*, Min. Lex. Sachsen, 261.

Galenstock, Wallis, crystals with the basal plane, *Bauer*, ZS. G. Ges., xxvi., 194, 1874.

Containing water, the so-called *enhydros*, occurrence and character described, Beechworth, Victoria, *Dunn*, p. 32; *Foord*, p. 71, Trans. Roy. Soc. Victoria, x., 1874.

Remarkable association with calcite, *v. Rath*, Ber. Ak. Berlin, 1874, 683.

Crystalline form discussed, *Kenngott*, Jahrb. Min., 1875, 27.

RABDIONITE, *v. Kobell*, Ber. Ak. München, Jan., 1870.—Appendix I., p. 13.

RALSTONITE, *Brush*, Am. J. Sci., III., ii., 30.—Appendix I., p. 13.

Nordenskiöld has further investigated the ralstonite from Ivituk, Greenland, and obtained the following results, agreeing essentially with the description given by Brush (l. c.). H. = 4·5. G. = 2·62 (on 0·13 gr.). Characters as described by Brush.

Analysis (on 0·221 gr.).

Al	Ca	Mg	Na	Ka	$\ddot{\cancel{\mathrm{P}}}$	$\underbrace{\mathrm{O\ Fl}}$	$\dot{\mathrm{H}}$
22·94	1·99	5·52	4·66	tr	tr	(50·05)	14·84 = 100

Nordenskiöld finds that if the loss be considered as being fluorine alone, it is insufficient to combines with the bases, so that he concludes there must also be oxygen present.

He writes the formula

$$\left.\begin{matrix}\mathrm{Mg}\\ 3\mathrm{Ca}\\ \mathrm{Na}\end{matrix}\right\}\mathrm{Fl}\ \cancel{\mathrm{A}}\mathrm{l}\ \mathrm{Fl}_3 + \left.\begin{matrix}\dot{\mathrm{M}}\mathrm{g}\\ 2\dot{\mathrm{C}}\mathrm{a}\\ \dot{\mathrm{N}}\mathrm{a}\end{matrix}\right\}\ddot{\cancel{\mathrm{A}}}\mathrm{l} + 10\dot{\mathrm{H}}$$

He also suggests the following formula, after the type of the spinel group, which it resembles in crystalline form: $\mathrm{R}\ \cancel{\mathrm{A}}\mathrm{l}\ (\mathrm{O,Fl})_4 + 2\dot{\mathrm{H}}$.

RAMMELSBERGITE, Min. p. 77.—Anal., *Sandberger*, Ber. Ak. München, 1871, 202.

377 A. Rauite, *Paykull*, Ber. Chem. Ges. Berlin, 1874, p. 1334.

Not crystalline. Structure finely granular. Color grayish-black Without lustre. H. = 5. G. = 2·48. An analysis gave, $\ddot{\mathrm{S}}\mathrm{i}$ 39·21, $\ddot{\cancel{\mathrm{A}}}\mathrm{l}$ 31·79, $\cancel{\mathrm{F}}\mathrm{e}$ 0·57, $\dot{\mathrm{C}}\mathrm{a}$ 5·07, $\dot{\mathrm{N}}\mathrm{a}$ 11·15, $\dot{\mathrm{H}}$ 11·71 = 99·90. The oxygen ratio for $\dot{\mathrm{R}} : \cancel{\mathrm{R}} : \ddot{\mathrm{S}}\mathrm{i} : \dot{\mathrm{H}} = 1 : 3 : 3\tfrac{1}{3} : 2$, or near that of thomsonite. B.B. fuses with difficulty on thin edges.

Occurs on the Island of Lamö, near Brevig, Norway. Formed from the alteration of elæolite. It may be identical with the ozarkite of Shepard (Dana Min., p. 426).

REDONDITE, Shepard, Am. J. Sci., II., xlvii., 428, l., 96.—Appendix I., p. 13.

RESIN, Min. p. 739 et seq.—Samland, Brüsterort, *Spirgatis*, Ber. Ak. München, 1871, 172.

Valley of the Arno, *Guareschi*, Boll. Com. Geol. d'Italia, 1871, 70. See BOMBICCITE.

Alaska, p. 88; Mesen, p. 90, *Chydenius*, Œfv. Finsk. Vet. Soc., xiii., 71, 1870.

Helbing has described a new resin from a quarry at Enzenau, near Heilbrunn. An analysis gave C 75·01, H 9·51, O 1·37, FeS_2 14·11 = 100·00. The part soluble in ether (19 p. c.) has the composition, $C_{40}\,H_{62}\,O_2$; 9 p. c., soluble in ether and hot alcohol, has the composition $C_{40}\,H_{60}\,O$; and 72 p. c., insoluble, gives $C_{40}\,H_{62}$.—Ann. Ch. Pharm., clxxii., 297, 1874.

REISSITE, *Hessenberg*, Min. Not., ix., 22.—Appendix I., 14.

RESTORMELITE, *Church*, J. Ch. Soc., II., viii., 166.—Appendix I., p. 13.

346 A. Resanite, *Cleve*, Ak. H. Stockh., ix., No. 12 (Nov., 1870). Geol. West India Islands, p. 28. A hydrous silicate of copper and iron, of an olive-green color, uncrystalline. G. = 2·06. Analysis, Fiebelkorn, l. c.,

$\ddot{\mathrm{Si}}$	$\dot{\mathrm{Cu}}$	$\bar{\mathrm{F}}\mathrm{e}$	$\dot{\mathrm{H}}$ (loss at 100°)	$\dot{\mathrm{H}}$ (ignition)
35·08	23·18	9·91	23·15	8·53 = 99·85

If the iron is protoxide it gives the formula $\dot{\mathrm{R}}^2\ \ddot{\mathrm{Si}}^3 + 9$ aq. It is easily decomposed by HCl. Found with malachite and chrysocolla, at Puerto Rico (Luquillo), West Indies, and named from Don Pedro Resano.

RETINITE, Min. p. 739.—Chydenius, Œfv. Finsk. Vet. Soc., xiii., 92, 1870–71.

RETZBANYITE, Min. p. 100.—Equivalent with cosalite, Frenzel, Jahrb. Min., 1874, 681.

577. Rhagite, Weisbach (Abh. Berg. u. Hüttenwesens), Jahrb Min., 1874, 302. Winkler, J. pr. Ch., II., x., p. 190. 1874.

In crystalline aggregates, spherical or mammillary (isometric), smooth on the surface. H. = 5. G. = 6·82. Color yellowish-green, sometimes wax-yellow. Lustre wax-like. On the edges translucent; brittle; fracture dense and incompletely conchoidal.

Analysis, Winkler (l. c.)

$\ddot{\bar{\mathrm{B}}}\mathrm{i}$	$\overset{\cdot\cdot\cdot}{\ddot{\mathrm{A}}}\mathrm{s}$	$\bar{\mathrm{F}}\mathrm{e}, \ddot{\bar{\mathrm{A}}}\mathrm{l}$	$\dot{\mathrm{C}}\mathrm{o}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{H}}$	gangue
72·76	14·20	1·62	1·47	0·50	4·62	3·26 = 98·43

giving the formula, $\ddot{\bar{\mathrm{B}}}\mathrm{i}^5\ \overset{\cdot\cdot\cdot}{\ddot{\mathrm{A}}}^2\ \dot{\mathrm{H}}^8$. It is related to atelestite.

Easily soluble in hydrochloric acid, with difficulty in nitric acid. In the matrass decrepitates, and crumbles to a yellow powder, giving off its water; on charcoal fusible.

Occurs on bismutite and quarz, accompanied by walpurgite, at the "Weisser Hirsch" mine, near Schneeberg, Saxony.

RHODITE, Adam, Tableau Min., 1869, p. 83.—Rhodium-gold described by del Rio. Dana Min. p. 4.

RHODOCHROSITE, Min. p. 691.—Franklin, N. J., anal., *Roepper*, Am. J. Sci., II., l., 37, 1870; see also Am. J. Sci., III., iv., 146, 1872. See stirlingite.

RIONITE, Jahrb. Min., 1870, 590.—Appendix I., p. 14.

RIPIDOLITE, Min. p. 497.—Kotschubeite, analyses, *Kokscharow*, Min. Russl., v. 369; vi., 92.

Massaschlucht, anal., *v. Fellenberg*, Jahrb. Min., 1868, 746.

Monte Pisani, etc., anal. (Gherardi), *Achiardi*, Boll. Com. Geol. Ital., 1871, 156.

Brewster, N. Y., anal., *Breidenbaugh*, Am. J. Sci., III., vi., 208, 1873.

Zillerthal, anal., Tsch. Min. Mitth., 1874, 244.

RITTINGERITE, Min. p. 94.—Joachimsthal, consists essentially of arsenic, selenium, and silver, monoclinic ($C = 90°\ 34'$), *Schrauf*, Ber. Ak. Wien, lxv., 227, 1872.

507. A. Rivotite, *Ducloux*, C. R., lxxviii., p. 1471, 1874.

Amorphous, compact, with a stony look. Fracture uneven. Opaque. Color yellowish green to grayish-green. Streak grayish-green.

H. = 3·5–4. G. = 3·55–3·62. Fragile, breaking into pieces at the blow of a hammer.

Analysis, Ducloux (l. c.).

$\overset{\cdot\cdot}{\ddot{\mathrm{S}}}\mathrm{b}$	$\dot{\mathrm{A}}\mathrm{g}$	$\dot{\mathrm{C}}\mathrm{u}$	$\ddot{\mathrm{C}}$	$\dot{\mathrm{C}}\mathrm{a}$		
42·00	1·18	39·50	21·00	tr	=	103·68

Ducloux gives the formula $\overset{\cdot\cdot}{\ddot{\mathrm{S}}}\mathrm{b}_2 + 4 \left.\begin{matrix}\dot{\mathrm{C}}\mathrm{u}\\ \dot{\mathrm{A}}\mathrm{g}\end{matrix}\right\} \ddot{\mathrm{C}}$, urging that the antimony is present in the condition of antimonic acid.

Decrepitates on heating, colors the flame green. On charcoal alone, in reducing flame, leaves a metallic globule with no odor of arsenic nor fumes of antimony. In the closed tube gives off carbonic acid and becomes black. Gives no reaction for sulphur. With the fluxes gives a copper reaction. Treated with hydrochloric acid in the cold gives off carbonic acid, but dissolves only in part.

Occurs in small irregular masses disseminated through a yellowish-white limestone, on the west side of the Sierra del Cadi, province of Lerida.

Named in honor of M. Prof. Rivot of the School of Mines, Paris.

RŒPPERITE. *Rœpper*, Am. J. Sci., II., l., 35.—*Brush*, Appendix I., p. 13.

Kenngott (Jahrb. Min., 1872, 188) has proposed to give the name *rœpperite* to the manganese dolomite, analyzed by Rœpper (l. c.), and the name *stirlingite* to the iron-manganese-zinc-chrysolite. The latter name cannot stand as it has already been given to the mineral most characteristic of the locality (Franklin, N. Y.), that is, the red oxyd of zinc (zincite, *Dana*, but see Min. 5th ed., 5th sub. ed., p. 135), Alger. Min., p. 565, 1844, by him incorrectly written sterlingite. Moreover the other mineral being only a sub-variety does not deserve a name. Almost simultaneously with the note of Kenngott, Brush gave the name rœpperite to the new chrysolite of Rœpper, and there is no question but that this name should be received; it may be added that it is already accepted by *Groth*, Tabellarische Uebersicht der Mineralien, etc., p. 52, 1874.

RŒSSLERITE, Min. p. 556.—Joachimsthal, *Tschermak*, Ber. Ak. Wien, lvi., 828, 1867.

ROMEITE, Min. 547.—Composition, *Kenngott*, Jahrb. Min., 1870, 999.

ROSELITE, Min. p. 560.—This very rare mineral has been recently rediscovered at the Daniel Mine near Schneeberg. Schrauf (Tsch. Min. Mitth., 1874, 137) has investigated it thoroughly, and proved that it is beyond doubt an independent species. According to him its crystalline form is triclinic, a (vert.) : b : c=1·4463 : 1 : 2·2046. The fundamental angles are: ξ=91° 0′, η=89° 26′. ζ=90° 40′. The habit of the crystals is quite varied, but they are especially characterized by their tendency to the formation of twins. All the crystals investigated by Schrauf proved to be twins, in many cases of the most complex nature. But without figures any description of them would be unintelligible. H.=3·5. G.=3·585, Rappold (on crystals, 0·03 gr.); 3·506 Daniel (crystals, 0·04 gr.); 3·738 Rappold (massive and perhaps not perfectly pure), Schrauf. G.=3·46. Weisbach (Jahrb. Min., 1874, 871).

Analyses, 1. and 2. Schrauf (l. c.); 3. Winkler, J. pr. Ch., II., x., 191, 1874.

		$\ddot{A}s_2$	$\dot{C}o$	$\dot{C}a$	$\dot{M}g$	$\dot{H}$.		
1.	Daniel Mine.	50·9	(12·1)	21·9	4·3	10·8	=100·00	Schrauf.
2.	Rappold Mine.	49·6	(15·9)	19·2	4·8	10·5	=100·00	Schrauf.
3.	Daniel Mine.	49·96	12·45	23·72	4·67	9·69	=100·49	Winkler.

Schrauf writes the formula $\dot{R}^3\ddot{A}s_2+3\dot{H}$ or more exactly $7\dot{C}a,2\dot{M}g3\dot{C}o,8\ddot{A}s_2,10\dot{H}$, (for crystals from the Daniel Mine), and $6\dot{C}a,2\dot{M}g,4\dot{C}o,8\ddot{A}s,10\dot{H}$ for those from the Rappold mine. The Daniel crystals have a lighter color, corresponding to the smaller percentage of cobalt, and greater amount of lime.

When heated at 100° C., the crystals break into fragments, and take a dark-blue color, but resume their red color on cooling.

ROSTHORNITE, Höfer, Jahrb. Min., 1871, 561.—Appendix I., p. 14.

RUTILE, Min. p. 159.—(Ilmenorutile), *Kokscharow*, Min. Russl., v., 193.
Co. Mayo, Ireland, anal., *Reynolds*, J. R. Geol. Soc. Dublin, II., ii., 164
Associated with hematite, *v. Rath*, Pogg., clii., 21, 1874.

SAHLITE, Min. p. 215.—Valpellina, anal., *v. Rath*, Pogg., cxliv., 387.

SAL AMMONIAC was found abundantly at Vesuvius after the eruptions of 1868 and 1872. The crystals showed the following forms: O, 1, i, 2-2, 3-$\frac{3}{2}$, they have often a yellow color due to a chlorid or a basic chlorid of iron. *Scacchi*, Rend. R. Accad. Sci. Napoli, Oct., 1872.

SAMARSKITE, Min. p. 520.—And related minerals, composition discussed, *Hermann*, J. pr. Ch., cvii., 139, 1869; II., ii., 123; *Rammelsberg*, Pogg., cl., 213, 1873; cryst. note, *Zerrenner*, ZS. G. Ges., xxv., p. 461, 1873. See nohlite.

SANDBERGERITE, Min. p. 104.—A mineral of similar form and composition has been described and analyzed by Achiardi, Lettera a Carlo Regnoli, sopra alcuni Min. del Peru, p. 15, Pisa, 1870. See also Domeyko, 3d App. Min. Chili, 1871.

SANIDINE, Min. p. 352.—Cryst., p. 454, anal., 561, *v. Rath*, Pogg., cxxxv.

SAPONITE, Min. p. 472.—Filling cavities in trap, George Is., north coast of Prince Edward's Is., anal., *Harrington*, Can. Nat., II., vii., 179

SARCOPSIDE, *Websky*, ZS. G. Ges., xx., 245, 1868.—Appendix I., p. 14.

SCAPOLITE, Min. p. 317.—Buck's Co., Penn., anal., *Leeds*, J. Frank. Instit., III., lx., 62 1870.

SCHEELITE, Min. p. 605.—Coquimbo, anal., containing 6·2 p. c. V^2O^5, Domeyko 2d Append. Min. Chili, p. 2, 1867.
Riesengebirge, cryst., *Rammelsberg*, ZS. G. Ges., xix., 493, 1867.
Domodossola, Piedmont, Rep. Brit. Assoc., 1869, p. 88.
Russian localities, *Beck* and *Teich*, Verh. Min. Ges. St. Pet., II., iv., 312, 1869.
Schwarzenberg, *Stelzner*, Jahrb. Min., 1869, 745.
Cryst. memoir (many figures), *Bauer*, Würtemberg Nat. Jahrb., 1871, 129 (Pogg., cxliii., 452).
Found at Graussen (Bohemia), Sulzbach, Salzkammergut, ZS. G. Ges., xxiv., 595, 1872.
Traversella, contains didymium, *Horner*, Chem. News, xxviii., 299; (*Sorby*, Proc. Roy. Soc., xviii., 197).
Meymac, Corrèze, anal., *Carnot*, C. R., lxxix, 638, 1874. See meymacite.

SCHEFFERITE, Min. p. 215.—Cryst., *Nordenskiöld*, Œfv. Ak. Stockholm, xxvii., 560 1870.

SCACCHITE, Adam, Tableau Min., 1869, p. 70.—A chlorid of manganese, supposed by Scacchi to occur at Vesuvius. See Dana, Min., p. 122.

112 B. Schirmerite, Genth, Am. Phil. Soc. Philad., xiv., 230, Aug. 21st, 1874.
Massive, finely granular, disseminated through quartz; no cleavage observed. Fracture uneven; soft; brittle. G. = 6·737. Color lead-gray, inclining to iron-black. Lustre metallic. B.B. fuses easily, and gives the reactions for bismuth, lead, silver and sulphur.
Analyses, 1. (1 p. c. quartz deducted). 2. (1·07 p. c. deducted).

	Pb	Ag	Bi	Zn	Fe	S
1.	12·69	22·82	46·91	0·08	0·03	14·41 = 96·94
2.	12·76	24·75	(47·27)	0·13	0·07	15·02 = 100·00

Atomic ratio for Pb : Ag : Bi : S = 1 : 4 : 4 : 9 nearly, corresponding to $PbS, 2Ag_2S, 2Bi_2S_3$. It is allied to and closely resembles cosalite.
Occurs with other tellurium minerals at the Red Cloud mine, Colorado.
Named from J. F. L. Schirmer, Esq.

Schirmerite, Endlich, Engineering and Mining J., Aug. 29th, 1874.
Color bright lead-gray with tinge of purple. H. = 2–2·5.
Composition (according to analyses not published), (AuFe)Te + 3AgTe.
B.B. magnetic before the oxydizing flame. Occurs massive, disseminated through the ore, giving it a dark-gray color; also in thin streaks. Red Cloud mine, Colorado.
Dr. Genth (l. c.) asserts that this so-called new species "is nothing else but a mixture of petzite either with pyrite, or perhaps with a tellurid of iron," and "is based upon a partial examination of a mixture," and therefore "is not entitled to a name."

SCHREIBERSITE, Min. p. 61.—In meteoric irons, *Meunier*, Ann. Ch. Phys., IV., xvii., 43, 1869.

755 A. Schröckeringite, *Schrauf*, Tsch. Min. Mitth., 1873, p. 137.
Occurs at Joachimsthal on uraninite, in small. six-sided tabular crystals; $i\text{-}\breve{i} \wedge I = 121\frac{1}{2}°$. Prismatic, one bisectrix being normal to $i\text{-}\breve{i}$. Color greenish to yellow. It is a hydrous oxy-carbonate of uranium, containing only traces of $\ddot{S}$. Loss by ignition ($\dot{H}$ and $\ddot{C}$) = 36·7 Contains also a little lime.

SCOLECITE, Min. p. 428.—Chili, anal., Domeyko, 2d App. Min. Chili, p. 47, 1867.
Composition, *Rammelsberg*, ZS. G. Ges., xxi., 96, 1868; *Kenngott*, Jahrb. Min., p. 1870, 998.
Lunddörrsfjäll, anal., *Igelström*, Jahrb. Min., 1871, 361.
(Poohnahlite), India, anal., *Haughton*, J. R. Geol. Soc. Dublin, II., 1868, 114; *Petersen*, Jahrb. Min., 1873, 852.

388 A. Seebachite, *Bauer*, ZS. G. Ges., xxiv., p. 391; xxv., p. 351, and *Rammelsberg*, xxv., p. 96.

Bauer makes the mineral described as herschelite by Ulrich (Geol. and Min. of Victoria, p. 61-66) a new species, under the name of seebachite, and in this he is supported by Rammelsberg.

Analyses (l. c.), 1. Kerl; 2. Lepsius.

	$\ddot{Si}$	$\overset{\cdots}{\bar{Al}}$	$\dot{Ca}$	$\dot{Na}_2$	$\dot{K}_2$	$\dot{H}_2$	
1.	43·7	21·8	8·5	3·5	tr	22·7	= 99·7
2.	44·77	22·10	7·51	3·18	—	22·07	= 99·63

It occurs with phillipsite in the basalt quarries of Richmond near Melbourne, and according to v. Lang (Phil. Mag., IV., xxviii, p. 506) is identical crystallographically with herschelite from Sicily. (See also Jahrb. Min., 1874, 522.)

SELENWISMUTHGLANZ. See FRENZELITE.

SELLAITE, *Strüver*, Atti Accad. Sci. Torino, iv., 35, 1868.—Appendix I., p. 14.

SELWYNITE, Min. p. 509—(belonging in the pinite group), Appendix I., p. 19.

SERICITE, Min. p. 487.—Doubtful character discussed, *Scharff*, Jahrb. Min., 1868, 309; 1871, 56; 1874, 271.

SERPENTINE, Min. p. 464.—Origin and method of formation, *Tschermak*, Ber. Ak. Wien, lvi., 283, 1867; *v. Drasche*, Tsch. Min. Mitth., 1871, 1.

Composition, *Rammelsberg*, ZS. G. Ges., xxi., 97, 1868.

Finland, anal., *Kullheim*, Œfv. Finsk. Vet. Soc., xiii., 43, 1870–71.

Origin of, varieties chautonnite, aumalite, *Meunier*, C. R., lxxi., 590, 1871.

Pseudomorph after staurolite, *Rand*, Proc. Ac. Nat. Sci. Philad., 1871, 303.

Snarum, anal., Pogg., cxlviii., 329.

Brewster, N. Y., analyses, *Breidenbaugh*, Am. J. Sci., III., vi., 211, 1873; *Hawes*, ibid., viii., 451, 1874.

Brewster, N. Y., pseudomorphs after calcite, dolomite, chlorite, chondrodite, enstatite, amphibole, biotite, brucite, and other unknown minerals, *J. D. Dana*, Am. J. Sci., III., viii., 375, 1874.

(Vorhauserite), anal., *v. Kobell*, Ber. Ak. München, June, 1874; chrysotile, antigorite, marmolite, analyses, same, ibid., 165, 1874.

Pseudomorph after monticellite, *v. Rath*, Ber. Ak. Berlin, 1874, 737.

SIDERITE, Min. p. 688.—Hüttenberg, Carinthia, analyses, *Wolff*, Ber. Ak. Wien, lvi., 299, 1867.

Altered to hematite, limonite, etc. (Bohemia), *Boricky*, Ber. Ak. Wien, lix., 605, 1869.

Tuscany, province of Lucca, anal., *Achiardi*, Boll. Com. Geol. Ital., 1871, 134.

Pseudomorph after calcite, *Strüver*, Atti Accad. Sci. Torino, vi., 377, 1871.

Nova Scotia, anal., *Harrington*, Geol. Surv. Canada, 1874, p. 239.

Siegburgite. A new fossil resin, containing 85 p. c. carbon, found at Siegburg near Bonn. Described by Lasaulx at the "Versammlung Deutscher Naturforscher in Breslau," Sept., 1874. (Chem. News, xxxi., 131.)

SILVER, Min. p. 9.—Andreasberg, in crystals, *Groddeck*, Jahrb. Min., 1869, 445.

Pseudomorph after stephanite, Przibram, *Zepharovich*, Ber. Ak. Wien, lxix., 33, 1874.

Simlaite, *Schrauf*, = PHOLERITE, which see.

SIMONYITE, *Tschermak*, Ber. Ak. Wien, Nov., 1869.—Appendix I., p. 14.

Reichardt, Jahrb. Min., 1871, 856. *Brezina*, Tsch. Min. Mitth., 1872, 20. See blœdite.

SKUTTERUDITE, Min. p. 71.—Possesses positive and negative thermo-electrical varieties, *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 153, 1874.

SMALTITE, Min. p. 70.—Bunta Brava, anal., corresponding to (Co Ni Fe)^2 As^3, Domeyko, 2d App. Min. Chili, p. 11, 1867; see also ibid., p. 22.

Wittichen, Baden, anal., *Petersen*, Pogg., cxxxiv., 70, 1868.

Andreasberg, cloanthite (chathamite), anal., *v. Kobell*, Ber. Ak. München, 1868, 402.

Bieber, Hessen, anal., *Hilger*, Ber. Ak. München, 1873, 136.

Groth shows that some crystals are thermo-electrically positive, others negative, and concludes (*Rose*, Pogg., cxlii., 1) that it is isomorphous with pyrite and cobaltite. He remarks that this variation in thermo-electrical character is true only of pyrite, cobaltite and smaltite (July, 1874), ignorant of the investigations of *Schrauf* and *Dana* (March, 1874, Ber. Ak. Wien, lxix.), Pogg., clii., 249.

SMARAGDITE, Min. p. 215.—From the diamond rock of Du Toit's Pan, So. Africa, analyses, *Maskelyne* and *Flight*, Q. J. G. Soc., xxx., 412, 1874.

SMITHSONITE, Min. p. 692.—Raibl, Carinthia, anal., Tsch. Min. Mitth., 1871, 55.
Tennessee, contains indium, *Tanner*, Ch. News, xxx, 141, 1874.
Missouri, analyses, Geol. Rep., 1874.

SNARUMITE, Min. p. 316.—Snarum, anal., *Breithaupt*, Jahrb. Min., 1872, 820.

SODALITE, Min. p. 330.—Pseudomorph after nephelite, Monte Somma, *Strüver*, Atti Accad Sci. Torino, vii., 329.

SPHALERITE, Min. p. 48.—Cryst., *Sadebeck*, ZS. G. Gs., xxi., 620, 1869; xxiv., 181, 1872.
Geroldseck, Breisgau, containing thallium, *v. Kobell*, Ber. Ak. München, 1871, 77.
Unkel, cryst., *Lasaulx*, Verh. Nat. Ges. Bonn., xxvii., 133, 1871.
Cryst., (4-4, $\frac{15}{2}$-$\frac{15}{2}$, new), *Klein*, Jahrb. Min., 1870, 311; Kapnik, cryst., ibid., 1871, 492, Binnenthal, cryst. memoir (new forms), Klein, ib., 1872, 897.
Roxbury, Ct., contains 0·0255 p. c. indium, *Cornwall*, Am. Chemist, Oct., 1873.
In sphærosiderite, *Schnorr*, Jahrb. Min., 1874, 631.

83 A. Spathiopyrite. Sandberger, Der rhombische Arsenkobalt, Jahrb. Min., 1868, 410; 1873, p. 59. Sitzsb. Ak. München, 1873, 135.

Orthorhombic, in rounded or complex crystals, combinations of *I* and *m*-ī; also, more rarely, in simple crystals, showing the same planes. Macrodome planes well polished, prismatic planes dull. Angles apparently very near those of leucopyrite, Dana.

H. = 4·5, G. = 6·7. Color tin-white on the fresh fracture, but changes rapidly to a dark steel-gray.

Analysis v. Gerichten (l. c.).

As	S	Co	Ca	Fe	
61·46	2·37	14·97	4·22	16·47	= 99·49

Atomic ratio for Co, Fe, Cu to As,S = 2 : 3. It contains no nickel.

Found on smaltite (Speiskobalt), or filling cavities in it, in the cobalt veins at Bieber in Hessen.

SPHENE. See TITANITE.

SPINEL, Min. p. 147.—Anal., *Kokscharow*, Min. Russl., v., 367.
Dornburg, variety in red octahedral crystals, anal., containing 5·68 p. c. TiO_2, *Kosmann*, Ber. Ges. Bonn., xxvi., 144.
No. Carolina, analyses, altered from corundum, *Genth*, Am. Phil. Soc. Philad., xiii., 370, 1873.

SPODUMENE, Min. p. 228.—See PIHLITE.

STAFFELITE, Min. p. 534.—Discussion as to doubtful character of the species, Jahresb Chem., 1869, 1233; 1871, 1317.
Anal., contains iodine, *Petersen*, Jahrb. Min., 1868, 482; 1872, 96.
Anal., *Haushofer*, J. pr. Ch., II., vii., 147.
Waltsch, Bohemia, anal., *Boricky*, Ber. Böhm. Ges. Prag. Feb. 21, 1873.

STANNITE, Min. p. 68.—Cornwall, anal., *Adger*, Ch. News, xxv., 259, 1872.

STAUROLITE, Min. p. 388.—*Rammelsberg* has confirmed the observations of *Lechartier* (Min. p. 389) that staurolite contains silica as an impurity (ZS. G. Ges., xxv., 53, 1873). *Lasaulx* has carried the matter further and proved that not only quartz, but even garnet, mica, magnetite, and brookite exist in it as impurities (Tsch. Min. Mitth., 1872, 173). The same subject, with similar results, has been investigated by Fischer.
St. Radegrund, cryst. and anal., *Peters* and *Maly*, Ber. Ak. Wien, lvii., 646, 1868.
In metamorphic rocks, *Lebour*, Geol. Mag., x., 102, 1873.
No. Carolina, analyses, *Genth*, Am. Phil. Soc. Philad., xiii., 383, 1873.

STEATITE, **Min. p. 451.—Anal., Tsch. Min. Mitth., 1872, 257.**

STEPHANITE, Min. p. 106.—(melanglanz), Freiberg, anal., *Frenzel*, Jahrb. Min., 1873, 788; 1874, 636.

Sterlingite. See DAMOURITE.

STETEFELDTITE, Min. p. 188.—An antimonite of copper, resembling stetefeldtite, has been described by Domeyko as occurring at the Potochi copper mine, near Huancavelica, Peru. It is amorphous, compact. Fracture smooth or uneven, in parts coarsely granular. Color black or greenish black. Streak yellowish-green. Lustre weakly resinous. An analysis on the purest material obtainable (though still mixed with some sub-sulphate of copper), gave SbO_4 32·93, CuO 32·27, Fe_2O_3 11·14, ZnO 0·50, SO_3 1·00, H_2O (loss at low redness), 18·53, insoluble, 1·57 = 96·94. B.B. infusible. Dissolves readily in hydrochloric acid. Domeyko regards the mineral as probably having come from the decomposition of chalcostibite, an analysis of which he adds. 3d Appendix Min. Chili, 1871.

587. Stibioferrite. E. Goldsmith, Proc. Ac. Philad., 1873, p. 366.

Generally amorphous. Crystals observed in a cavity and supposed to be the same substance (no reason given) were orthorhombic showing planes *i-ī*, *i-ĭ*, *I* and *O*, approximate measurement gave *I* (*i-ī*) *I*=100° 8′.

H.=4. G.=3·598. Lustre slightly resinous. Color (cryst.) faint yellow; yellow to brownish-yellow (amorphous). Streak dull yellow, brittle, fracture uneven chonchoidal.

Analysis (l. c.).

$\dddot{\mathrm{S}}\mathrm{b}$	$\bar{\mathrm{F}}\mathrm{e}$	$\dot{\mathrm{H}}$	$\ddot{\mathrm{S}}\mathrm{i}$	loss		
42·96	3·85	15 26	8·84	1·09	=	100·00

Deducting the iron we obtain as the oxygen ratio $\dddot{\mathrm{S}}\mathrm{b} : \bar{\mathrm{F}}\mathrm{e} : \dot{\mathrm{H}}$, 1·1 : 1 : 1·4 or 1 : 1 : $1\frac{1}{3}$ = $2(\dddot{\mathrm{S}}\mathrm{b} + \bar{\mathrm{F}}\mathrm{e}) + 3\dot{\mathrm{H}}$. B. B. gives reaction for antimony and iron. Soluble in hydrochloric acid.

Occurs as a coating, sometimes $\frac{1}{4}$ inch thick, on stibnite from Santa Clara Co., Cal.

STIBIOTRIARGENTITE, *Stibiohexargentite*, *Petersen*.—Appendix I., p. 15.

STIBNITE, Min. p. 29.—New Zealand, anal., *Muir*, Phil. Mag., IV., xlii., 236, 1871.
Santa Clara Co., Cal., anal., *Goldsmith*, Proc. Ac. Philad., 1873, 368.

STILBITE, Min. p. 442.—India, anal., *Haughton*, J. Roy. Geol. Soc. Dublin, ii., 113, 1868.
Composition, *Rammelsberg*, ZS. G. Ges., xxi., 25.
Anal., Ak. H. Stockh., ix., No. 12, Nov., 1870 (Cleve's Geol. West India Is., p. 30, 1873).
Stromoë, anal., *Schmid*, Pogg., cxlii, 115.
Dumbartonshire, anal., *Young*, Chem. News, xxvii., 55, 1872.
Seisser Alp. anal., *Petersen*, Ber. Offenbach. Ver., xiv., 102, 1873.

STIRLINGITE, see RŒPPERITE.

454. A. Strigovite, Becker and Websky, Jahrb. Min., 1869, p. 236. Websky, ZS. G. Ges., xxv., 388, 1873.

In minute crystals, showing hexagonal prisms under the microscope; sometimes in balls of aggregated crystals, and shown by the behavior in polarized light to belong to the hexagonal system. H.=1. G=3·144. Color dark-green (on alteration changing to brown). Streak green to grayish-green. Analyses: 1. Becker l. c. 2. Websky (G_1=2·788), Jahrb. Min., 1869, 236. 3. Websky, Jahrb. Min., 1873, 391.

	$\ddot{\mathrm{S}}\mathrm{i}$	$\bar{\mathrm{A}}\mathrm{l}$	$\dot{\mathrm{F}}\mathrm{e}$	$\bar{\mathrm{F}}\mathrm{e}$	$\dot{\mathrm{M}}\mathrm{n}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{H}}$	loss	
1.	32·62	16·66	16·74	16·04	——	3·16	2·02	12·37	——	= 99·61
2.	32·60	14·08	12·47	21·94	——	3·82	——	14·81	0·28	=100·00
3.	28·43	16·60	11·43	26·21	7·26	0·36	0.36	9·31	——	= 99·96

Analyses 1. and 2. were made on material which had suffered some alteration, so that 3. alone expresses the correct composition. Oxygen ratio $\dot{\mathrm{R}} : \bar{\mathrm{R}} : \ddot{\mathrm{S}}\mathrm{i} : \dot{\mathrm{H}}$=(approx.) 3 : 2 : 4 : 2. Easily decomposed by acid with the separation of silica in powder. In closed tube gives off water. B. B. fuses with difficulty to a black glass without coloring the flame.

Occurs as a fine coating over the minerals in druses or cavities in the granite west and north-west of Striegau in Silesia.

STROMEYERITE, Min. p. 54.—Chili, anal., Domeyko, 2d App. Min. Chili, p. 35, 1867. Argentine Republic, anal., Siewert, Tsch. Min. Mitth., 1873, 251.

STRONTIANITE, Min. p. 699.—Clausthal, cryst., *Hessenberg*. Min. Not., ix., 41, 1870.

STRUVITE, Min. p. 551.—Skipton caves, Ballarat, cryst. description, and anal., *Ulrich* Contrib. to Min. of Victoria, 1870, p. 12.

SULPHATITE, Min. p. 614.—In eastern Texas, *Mallet*, Chem. News, xxvi., 147, 1872.

SULPHUR, Min. p. 20.—Cryst., *v. Rath*, Pogg. Erg. Bd., vi., 349; *Brezina*, Ber. Ak Wien, lx., 539, 1869.

SUSANNITE, Min. p. 626.—*Kenngott* thinks that susannite is only a form of leadhillite in compound crystals (drillings), but gives no sufficient proof, Jahrb. Min., 1868, 319.

SUSSEXITE, *Brush*, Am. J. Sci., II., xlvi., 140, 240.—Appendix I., p. 15.

SYEPOORITE, see JEYPOORITE.

SYLVANITE, Min. p. 81.—Red Cloud Mine, Colorado, *Silliman*, Am. J. Sci., III., viii., 28; *Genth*, anal., Amer. Phil. Soc. Philad., xiv., 228, 1874.

SYLVITE, Min. p. 111.—Stassfurt, cryst. Huyssen, ZS. G. Ges., xx., 460, 1868.
Kalusz, cryst., Tschermak, Ber. Ak. Wien, lxiii., 308, 1871.

656. A. Syngenite, *v. Zepharovich*, Lotos, p. 137, p. 213, June, 1872; Ber. Ak. Wien, lxvii., p. 128, 1873. Kaluszite, *Rumpf*, Tsch. Min. Mitth., 1872, 117, 197; 1873, 147.

Monoclinic, *a* (vert.) : *b* (clinodiag.) : *c*=0·8738 : 1·3699 : 1 or ·63786 : 1 : 72998. *C*=76° 0′. Observed planes *O*, *i-i*, *i-ì* -1-*i*,-$\frac{2}{3}$-*i*, 1-*i*, 2-*i*, *I*, *i*-8, *i*-6, *i*-4, *i*-3, *i*-2, *i*-$\frac{3}{2}$, *i*-2̀, 1-ì, -1, -4·4, 1, 2, 2-2. *I* ∧ *I* = 73° 55′ (over *i-i*). *O* ∧ 1-ì=139° 42′. *O* ∧ -1-*i* = 151° 49′. *O* ∧ 1-*i* =143° 48′. *O* ∧ -1=137° 44′; *i-i* ∧ -1 = 124° 19′, *i-ì* ∧-1=122° 55′.

In generally small tabular crystals, elongated in the direction of the vertical axis, the plane *i-i* always predominates, and is striated vertically.

Cleavage *I* perfect, also *i-i*. In other directions fracture conchoidal. Plane of optic axes parallel to the orthodiagonal section, acute bisectrix makes an angle of 2° 46′ with *i-i*. Optic-axial angle apparent in air—red=41° 35′, blue=46° 22′; actual angle, red=26·31, blue, 29° 24′ (Vrba). Index of refraction 1·55 (Vrba). Double refraction negative. Dispersion of axes $\rho < \upsilon$.

H.=2·5. G.=2·603 (mean), 2·252 (Rumpf, l. c.). Colorless or milky-white.

Analyses, 1. Ullik (mean of four closely agreeing analyses, in one of which was also found 1·42 p. c. NaCl), Tsch. Min. Mitth., 1872, 120; 2. Völker, Ber. Ak. Wien, lxvi., 197, 1872.

	$\dot{C}a$	$\dot{K}$	$\dddot{S}$	$\dot{H}$		
1.	16·88	28·55	48·45	5·47		= 99.35
2.	16.97	28·03	49·04	5·85	(also 0·46 $\dot{M}g$.)	= 99·89

These give the formula $\dot{C}a\dddot{S}$, $\dot{K}\dddot{S}+\dot{H}$, or the same with the artificial salt, which Zepharovich shows to be also monoclinic (ib., p. 139). In form the syngenite is closely related to gypsum, particularly in the angles of the prismatic zone.

In the flame of a Bunsen gas-burner becomes milky, colors the flame violet, and melts easily to a colorless (on cooling white) bead, with a crystalline granular texture. In matrass gives off water, decrepitating violently. Easily attacked by water, dissolving in part with the separation of sulphate of lime. Vrba found that one part of syngenite dissolved in 400 pts. of water. Found in cavities in halite at Kalusz, East Galicia. Name derived from συγγενής (related), alluding to its close relation to polyhalite.

TABERGITE, Min. p. 493.—Composition, *Kenngott*, Jahrb. Min., 1869, 202.

TÆNITE, Min. p. 16.—In meteoric iron, *Meunier*, Ann. Ch. Phys., IV., xvii., 31 1869.

TALC, Min. p. 451.—Greiner (Zillerthal), Tyrol, anal., *Ullik*, Ber. Ak. Wien, lvii., 946, 1868.

Swayne Co., No. Carolina, anal., of a compact variety, *Adger*, Chem. News, xxv., 270. 1872.

Pseudomorph after pectolite, Bergen Hill, *Leeds*, Am. J. Sci., III., vi., 23, 1873.

TALCOSITE, *Ulrich*.—Appendix I., p. 15.

TAMMITE. Mr. Tamm has analyzed a dark steel-colored crystalline powder, locality unknown, very hard. G. = 12·5. He obtained W 88·05, Fe 5.60, Mn 0.15, undetermined 6·20 = 100·00. The loss he says is not due to oxygen. He calls his unknown substance ferrotungsten, and proposes, in case the character of the mineral is sustained, to give it the name *Crookesite*. Mr. Crookes justly says that the name *tammite* should be preferred. Chem. News, xxvi., July, 1872.

TANTALITE, Min. p. 514.—Composition, *Hermann*, Bull Soc. Mosc., 1867, iv., 464.
Finland and Sweden, analyses, *Rammelsberg*, Pogg., cxliv., 56, 1871.

Tapalpite, Don *Pedro L. Monroy*, Naturaleza, Aug., 1869, p. 76. Tellurwismuth, *Rammelsberg*, ZS. G. Ges., xxi., 81.—Appendix I., p. 15.

TAPIOLITE, Min. p. 518.—Sukkula, Finland, *Rammelsberg*, anal., Pogg., cxliv, 79, 1871.

TELLURATE OF COPPER AND LEAD, discovered by Mr. Knabe, at the Iron Rod Mine, Silver Star District, Montana, occurring in fissures in the rock. At the Green Campbell Mine it is found as a thin coating upon the selvage of the foot wall. Proved to contain copper, lead, and telluric acid. The sample sent to Dr. Genth consisted of an apparently uniform siskine-green powder. He speaks (priv. contrib.) of proposing to investigate the material further, and, if its supposed character is sustained, will give it a distinctive name. *Genth*, Am. Phil. Soc. Philad., xiv., 229, 1874.

TELLURWISMUTH. See TAPALPITE.

TELLURIUM, Min. p. 19.—*Genth*, Am. J. Sci., II., xlv., 313, 1868.
Colorado, *Silliman*, Am. J. Sci., III., viii., 27, 1874; Genth, Am. Phil. Soc., Philad., 1874, Aug. 21.
Sacramento, Chili, note, *Bertrand*, Jahrb. Min., 1870, 455.

TEPHROITE, Min. p. 259.—Franklin, N. J., anal., *Mixter*, Am. J Sci., II. xlvi., 231, 1868.

TETRADYMITE, Min. p. 30.—Orawitza, anal., *Frenzel*, Jahrb. Min., 1873, 799.
Thermo-electrical properties, *Schrauf* and *Dana*, Ber. Ak. Wien, lxix., 151, 1874.
Montana, anal., *Genth*, Am. Phil. Soc. Philad., xiv., 224, 1874.

TETRAHEDRITE, Min. p. 100.—Russia, cryst., *Jeremejew*, Koksch. Min. Russl., v., 369.
Neubulach, Würtemberg, anal. (Bi = 6·33 p. c.), *Petersen*, Jahrb. Min., 1870, 464
Cerro Blanco, anal., by *Sieveking*, Domeyko, 3d Appendix Min. Chili, 1871; Ghalgayic, anal. (freibergite), ibid. See also 2d Appendix, p. 19, 1867, and 4th Appendix, p. 15, 1874.
Horhausen, near Neuwied, cryst., *Klein*, Jahrb. Min., 1871, 493.
Brixlegg, Tyrol, anal., *Untchy*, Jahrb. Min., 1872, 874.
Cryst. memoir and relation to sphalerite and chalcopyrite, *Sadebeck*, ZS. G. Ges., xxiv., 427, 1872.

THOMSENOLITE, Min. p. 129.—Cryst., belonging to a so-called clino-quadratic system, a (vert.) : $b : c = 1·0444 : 1 : 1$. $C = 92° 30'$, anal., *Nordenskiöld*, Œfv. Ak. Stockh., 1873, 84. See *Schrauf*, Tsch. Min. Mitth., 1874, 161.

THOMSONITE, Min. p. 424.—Anguilla, W. I., anal., *Nordström*, Ak. H. Stockholm, ix., No. 12, Nov., 1870 (Cleve's Geol. W. India Is., p. 30, 1870).
Seisser Alp, anal., *Haushofer*, J. pr. Ch., ciii., 305.
Mugdock Water Tunnel, *Young*, Chem. News., xxvii., 55, 1872.

THORITE, Min. p. 413.—(Orangite), cryst., *Nordenskiöld*, Œfv. Ak. Stockh., xxvii., 554, 1870.

TIN. See CASSITERITE.

TITANITE, Min. p. 383.—Rothenkopf, Tyrol, cryst., *Zepharovich*, Ber. Ak. Wien, lx., 815, 1869.
Cryst. memoir, *Hessenberg*, Min. Not., viii., 1, 1868; ix., 45, 1870; xi., 19, 21, 1873; see also Jahrb. Min., 1874, 828.
Sulzbach, cryst., *Schrauf*, Ber. Ak. Wien, lxii., 704, 712, 1870.

Tocornalite, Domeyko, 2d Append. Min. Chili, p. 41, 1867.

Amorphous, structure granular. Color a pale-yellow, by the action of the air it grows darker, and passes to a grayish-green, and finally to a grayish-black and black. Soft, easily reduced to a powder. Streak yellow.

Composition Ag I + Hg^2I. An analysis gave Ag 33·80, Hg 3·90, I 41·77, siliceous residue 16·65 = 96·12. The loss is due to some water belonging with the residue, and probably some iodine.

In the closed tube gives off first water, then a yellow ring, followed by a mixed sublimate (mercurial), and finally a red ring. With carbonate of soda in the matrass gives only pure mercury. Decomposed by nitric acid. From the mines of Chañarcillo, Chili.

TOPAZ, Min. p. 376.—*Blum*, cryst. note, Jahrb. Min., 1869, 721.

Altenberg and Schlaggenwald, cryst. memoir, *Grcth*, ZS. G. Ges., xxii., 381, 1870.

Thermo (= pyro)-electrical character, *Hankel*, Jahrb. Min., 1871, 287.

Analyses, *Klemm*, Jahrb. Min., 1874, 189.

TORBERNITE, Min. p. 585.—Analyses, *Winkler*, J. pr. Ch., II., vii., 10, 11, 13; *Schrauf*, Tsch. Min. Mitth., 1872, 181.

TOURMALINE, Min. p. 365.—Switzerland, colorless, *Wiser*, Jahrb. Min., 1868, 465.

Isola del Giglio, anal., *Bechi*, Boll. Com. Geol. Ital., 1870, 84.

Elba, cryst. and anal., *v. Rath*, ZS. G. Ges., xxii., 663, 1870; *Achiardi*, Nuovo Cimento, II., iii., Feb., 1870.

Many analyses, and discussion of composition, *Rammelsberg*, Pogg., cxxxix., 379, 547, 1870.

No. Carolina, with corundum, *Genth*, Am. Phil. Soc. Philad., xiii., 378, 1873.

335 A. **Trautwinite**, E. Goldsmith, Proc. Ac. Philad., 1873, 9, 348, 365.

Microcrystalline; observed forms, hexagonal prism, pyramid, also triangular prism. H. = 1–2. Color green. Lustre dull (under microscope vitreous). Streak light-gray.

Analysis (l. c.):

$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{Cr}}}$	$\dddot{\bar{\mathrm{Fe}}}$	$\dddot{\bar{\mathrm{Al}}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{Mg}}$
21·78	38·39	13·29	0·81	18·58	0·11 = 100·84

Oxygen ratio for bases to silica = 11 : 6, perhaps 2 : 1. B.B. gives reaction for chromium, insoluble in acids. Occurs on chromite; from Monterey Co., Cal.

TREMOLITE, Min. p. 233.—Related minerals, *Tschermak*, Min. Mitth., 1871, 37.

TRIDYMITE, Min. p. 805.—Appendix I., p. 19.—From Alleret (Dep. Haute Loire), **Lasaulx**, Jahrb. Min., 1869, 66.

Formed artificially, *Rose*, Ber. Ak. Berlin, June, 1869, p. 469.

Double-refraction positive like quartz, *Schultze*, Ber. Ges. Bonn, xxvi., 119, 1869.

Observed with microscope in thin rock-sections, *Zirkel*, Pogg., cxl., 492 (Jahrb. Min., 1870, 823).

In porphyry at Waldböckelheim, *Streng*, Tsch. Min. Mitth., 1871, 49.

As inclosures in quartz crystals, Lotos, Dec., 1872; *Sandberger*, Jahrb. Min., 1868, 466, 723.

From various new localities, *Möhl*, Jahrb. Min., 1873, 608.

Cryst. memoir, with a complete description of the many and interesting twins, *v. Rath*, Pogg., clii., 1, 1874.

TRINKERITE, *Tschermak*, J. pr. Ch., II., ii., 250.—Appendix I., p. 16.

TRIPLITE, Min. p. 543.—Sierra von Cordoba, Argentine Republic, several analyses, *Siewert*, Tsch. Min. Mitth., 1873, 225 et seq.

TRÖGERITE, *Weisbach*, Jahrb. Min., 1871, 870; 1873, 315.—Appendix I., p. 16.

Winkler has analyzed the trögerite of Weisbach with the following results; Analyses 1 3 p. c. impurities deducted. 2. 4½ p. c. deducted. 3. on pure material.

	$\overset{.....}{\bar{\mathrm{As}}}$	$\ddot{\bar{\mathrm{U}}}$	$\dot{\mathrm{H}}$
1.	18·48	63·44	18·08 = 100·00
2.	18·83	62·42	18·75 = 100·00
3.	19·64	63·76	14·81 = 98·21

which correspond to the formula $3\ddot{\bar{\mathrm{U}}}\,\overset{.....}{\bar{\mathrm{As}}} + 12\dot{\mathrm{H}}$.

On heating it gives off water, and takes a golden-brown color, but resumes a yellow on cooling. J. pr. Ch., II., vii., 6, 1873.

TROILITE, Min. p. 57.—*Meunier* concludes that the composition of troilite is (FeNi)'Si· (not FeS), Ann. Ch. Phys., IV., xvii., 36, 1869; C. R., lxviii., 763, 1874. *Rammelsberg*, Abh. Ak. Berlin, 1870, 84).

TSCHEFFKINITE, Min. p. 387.—Composition, *Hermann*, J. pr. Ch., cvi., 332, 1868.

314 A. Tschermakite, *v. Kobell*, J. pr. Chem., II., viii., 411, 1873.
Massive, cleavage on two surfaces, making an angle of 94°. Striations on face of better cleavage. H. 6. G. 2·64. Phosphorescent. Color grayish to white. Translucent. Lustre vitreous. Analysis, l. c.;

$\ddot{\text{Si}}$	$\ddot{\bar{\text{Al}}}$	$\dot{\text{Mg}}$	$\dot{\text{Na}}$($\dot{\text{K}}$ tr)	$\dot{\bar{\text{H}}}$
66·57	15·80	8·00	6·80	2·70 = 99·87

This would give the formula 3$\dot{\text{R}}$ $\ddot{\text{Si}}$ + $\ddot{\bar{\text{Al}}}$ $\ddot{\text{Si}}_2$, or that of a magnesian oligoclase. It occurs with kjerulfine and quartz at Bamle, Norway.

G. W. Hawes (Am. J. Sci., III., vii., 579, 1874) has analyzed a mineral from the above locality, and labelled tschermakite, with the following results: G. = 2·67.

	$\ddot{\text{Si}}$	$\ddot{\bar{\text{Al}}}$	$\ddot{\bar{\text{Fe}}}$	$\dot{\text{Ca}}$	$\dot{\text{Mg}}$	$\dot{\text{K}}$	$\dot{\text{Na}}$	ign.
$\frac{3}{2}$	66·04	20·37	0·29	1·29	1·10	0·21	9·91	0·96 = 100·17

This gives a composition very near that of albite.

The mineral agreed in all its physical characters with the description of tschermakite, but was almost destitute of magnesia, which suggests the idea that the material analyzed by v. Kobell may have been impure.

Des Cloizeaux has since (C. R., lxxx., Feb. 8. 1875) found that the so-called tschermakite from Bamle is identical with albite in optical properties. He quotes, moreover, the following analysis by Pisani: $\ddot{\text{Si}}$ 66·37, $\ddot{\bar{\text{Al}}}$ 22·70, $\dot{\text{Ca}}$ 1·40, $\dot{\text{Mg}}$ 0·95, $\dot{\text{Na}}$ 9·70, $\dot{\bar{\text{H}}}$ 0·70 = 101·82 G. = 2·60. This gives the oxygen ratio for $\dot{\text{R}}$: $\ddot{\bar{\text{R}}}$: $\ddot{\text{Si}}$ = 1 : 3 : 11, or nearly that of albite.

TURGITE, Min. p. 167.—Terry Cope, N. S., *How*, Phil. Mag., IV., xxxvii., 268.
Salisbury, Conn., anal. and description, *Brush* and *Rodman*, Am. J. Sci., II., xliv., 219.

TURNERITE. See **MONAZITE**.

TYRITE. See **FERGUSONITE**.

TYROLITE, Min. p. 570.—Libethen, Hungary, anal., $\dot{\text{Ca}}\ddot{\text{C}}$ essential not an impurity, *Church*, J. Ch. Soc., II., xi., p. 108, Feb., 1870.
Tyrol, *Pichler*, Jahrb. Min., 1871, 53.

ULEXITE, Min. p. 598.—Nevada and Arizona, *Silliman*, Am. J. Sci., III., vi., 130.
Newport Station, Nova Scotia, in crystals, *How*, Phil. Mag., IV., xxxix., 275, 1870; xli., 275, 1871.
Atacama, anal., Domeyko, 4th App. Min. Chili, p. 35, 1874.

ULLMANNITE, Min. p. 73.—Rinkenberg, Carinthia, Verh. G. Reichs, 1871, 8, p. 131.
From the Lölling, crystals showing inclined hemihedrism, *Zepharovich*, Ber. Ak. Wien, lx., 809, 1869; Lotos, Jan., 1870.
Waldenstein, analyses, *Rumpf* and *Ullik*, Ber. Ak. Wien, lxi., 7, 1870.

URANINITE, Min. p. 154.—Colorado, Am. J. Sci., III., v., 386, 1873.

URANOPHANE, Min. p. 805.—Discussion of composition, = a thomsonite in which $\frac{2}{3}$ alumina is replaced by uranium, *Websky*, ZS. G. Ges., xxi., 92, 1869; see also *Weisbach*, Jahrb. Min., 1873, 326.

624 A. Uranosphærite. Weisbach, Jahrb. Min., 1873, 315; Winkler, J. pr. Chem., II., vii., 5.
In half-globular aggregated forms, sometimes with a dull, or slightly lustrous surface, sometimes rough and drusy, showing under the miscroscope that they are made up of minute acutely-terminated crystals. Structure concentric, also radiated. H. = 2-3, G. = 5·36. Color orange-yellow, brick-red (Winkler). Lustre greasy. Streak yellow.

Analyses, Winkler, l. c., 1. impurities (11 p. c.) deducted, 2. perfectly pure material.

	$\dddot{\bar{\mathrm{U}}}$	$\dddot{\mathrm{Bi}}$	$\dot{\mathrm{H}}$
1.	50·32	44·13	5·56
2.	50·88	44·34	4·75

These give the formula $\dddot{\mathrm{Bi}}\ 2\dddot{\bar{\mathrm{U}}} + 3\dot{\mathrm{H}}$.

Decrepitates on heating, and falls to pieces to a mass of crystalline needles, with silky lustre, homogeneous and of brown color.

Occurs with other related uranium minerals at the mine Weisser Hirsch, near Schneeberg, Saxony.

573 C. Uranospinite. Weisbach, Jahrb. Min., 1873, 315; Winkler, J. pr. Ch. II., vii., 11.

Orthorhombic. In scale-like crystals, with quadratic or rectangular outlines. Cleavage perfect, parallel to the planes of the scales. H. = 2-3. G. = 3·45. Color siskine-green.

Analysis, Winkler (l. c.);

$\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{As}}$	$\dddot{\bar{\mathrm{U}}}$	$\dot{\mathrm{Ca}}$	$\dot{\mathrm{H}}$
19·37	59·18	5·47	16·29 = 100·31

which corresponds approximately with the formula $\dot{\mathrm{Ca}}$, $\dddot{\bar{\mathrm{U}}}\ \overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{As}} + 8\dot{\mathrm{H}}$.

Weisbach regards it as an arsenate corresponding to autunite. Winkler succeeded in making uranospinite artificially with the following composition: $\overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{As}}$ 23·01, $\dddot{\bar{\mathrm{U}}}$ 59·01, $\dot{\mathrm{Ca}}$ 5·62, $\dot{\mathrm{H}}$ 14·27 = 101·91.

Found with other related uranium minerals, at the mine Weisser Hirsch, near Schneeberg, Saxony.

URANOTIL, *Boricky*, Jahrb. Min., 1870, 780; see also Jahrb. Min., 1873, 296, 316.—Appendix I., p. 16.

445 D. Vaalite, *Maskelyne* and *Flight*, Q. J. G. Soc., xxx., 409, Nov., 1874.

Monoclinic. *C* = 76° 30′. Occurring in hexagonal prisms; $I \wedge I$ = 60° 10′. $I \wedge O$ = 96° 40′ (calc. = 96° 41′).

Cleavage *O* easy, *I* much less so. Normal to *O* coincident, or very nearly so, with the mean line of the optic axes; optic-axial angle very small; double-refraction negative.

Color drap, in spots fine blue.

Analysis (l. c.)

$\ddot{\mathrm{Si}}$	$\dddot{\bar{\mathrm{Al}}}$	$\dddot{\bar{\mathrm{Fe}}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{H}}$	$\ddot{\mathrm{C}}$	$\dddot{\bar{\mathrm{Cr}}}$
40·83	9·80	6·84	31·34	0.67	9·72	tr	tr = 99·20.

giving the formula $\dddot{\bar{\mathrm{R}}}\ \ddot{\mathrm{Si}} + 2\ (3\dot{\mathrm{Mg}}, 2\ddot{\mathrm{Si}}, 2\dot{\mathrm{H}})$. Oxygen ratio for $\dot{\mathrm{R}} : \dddot{\bar{\mathrm{R}}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 6 : 3 : 10 : 4$. Expands on heating on a platinum foil to six times original size, in powder no expansion at all. Loses no water at 100 C. Occurs in an altered bronzitic rock from the diamond-diggings, called Du Toit's Pan, So. Africa.

Valleriite, Blomstrand, Œfv. K. Akad. Stockholm, xxvii., p. 19, 1870.

Massive, without a trace of crystalline texture. Color very like that of pyrrhotite. Lustre perfectly metallic; fracture uneven. Resembling graphite in its unusual softness (yields to the nail, and can be cut with a knife), and in its property of leaving a dark streak, when scratched on paper. G. = 3·14.

Analyses (l. c.) in part from different samples, (neglecting a small insoluble portion).

	Fe	Al	Cu	Mg	Ca	Na	K	S	$\dot{\mathrm{H}}$
1.	29·32		17·00	6·26	——	0·59	0·31	22·20	——
2.	——	——	——	——	——	——	——	——	10·77
3.	——	——	18·66	——	——	——	——	22·73	——
4.	27·18	2·29	18·91	4·97	——	0·31	0·16	22·68	——
5.	25·50	3·18	16·51	7·80	0·18	——	——	——	——
Mean	26·34	2·73	17·77	6·34	0·18	0·45	0·23	22·54	10·77 = 87·35

The variation in Cu and Mg in the analyses is regarded by Blomstrand as showing a possible variation in the composition of the species. Regarding all the Cu as combined as CuS,

and giving the remainder of the sulphur to the iron ($\mathrm{\bar{F}eS_2}$), and calculating the other metals as oxyds, we obtain :

CuS	$\mathrm{\bar{F}eS^3}$	$\mathrm{\bar{F}e}$	$\mathrm{\ddot{\bar{A}}l}$	$\mathrm{\dot{M}g}$	$\mathrm{\dot{C}a}$	$\mathrm{\dot{N}a}$	$\mathrm{\dot{K}}$	$\mathrm{\dot{H}}$
26·74	29·40	15·01	5·14	10·57	0·25	0·61	0·27	10·77=98·76

Giving essentially the formula $\mathrm{2CuS,\ \bar{F}eS^3 + 2Mg\bar{F}e + 4\dot{H}}$.

B. B., loses its lustre and becomes darker. In the matrass gives off water and a slight coating of sulphur. The water is strongly combined, and is given off only at a full red heat.

Very rare; occurs in small (large as hazelnuts) fragments in a dark-greenish limestone, which is much mixed with mica and other minerals, at the Aurora Mine, Nya-Kopparberg, Sweden.

Named for the Swedish mineralogist Vallerius. [A very doubtful compound.]

VANADINITE, Min. p. 610.—So. Africa, anal., *Maskelyne* and *Flight*, J. Ch. Soc., II., x., 1053, 1872.

The researches of Roscoe have shown that vanadic acid is V_2O_5, not V_2O_3, which explains the similarity of vanadinite crystals to those of pyromorphite, Phil. Trans., 1869, 1870.

VANADIOLITE, *Hermann*, J. pr. Ch., II., i., 445. Appendix I., p. 16.

VANADITE, Min. p. 610.—Cryst., *Schrauf*, Ber. Ak. Wien, lxiii., 167, 1871.

VARISCITE, Min. p. 582.—According to *Petersen* $\mathrm{\ddot{\bar{A}}l\ddot{\bar{P}}, + 4\dot{H}}$, perhaps identical with callaite (turquoise), Jahrb. Min., 1871, 357; *Kenngott*, Jahrb. Min., 1872, 193.

VERMICULITE, Min. p. 493.—Pelham, Mass., *Adams*, Am. J. Sci., II., xlix., 272; *Shepard*, ibid., l., p. 96.

Relation to the micas, in optical characters and chemical composition, *Cooke*, Mem. Am. Ac. Boston, 1874, 35.

See jefferisite.

VESUVIANITE, Min. p. 276.—Arendal, anal., Damour, Ann. Ch. Phys., IV., xxiii., 157, 1871.

Cryst. (new forms) Jeremejew, Verh. Min. Ges. St. Pet., II., vii., 1873; Jahrb. Min., 1873, 423. Comp. *Rammelsberg*, ZS. G. Ges., xxv., 421.

Canzucoli, anal., Lemberg, ZS. G. Ges., xxiv., 249, 1872.

Altered to fassaite, Döll, Tsch. Min. Mitth., 1874, 85.

Anal., *Janovsky*, Ber. Chem. Ges. Berlin, 1873, 1456.

541 A. Veszelyite, Schrauf, Anzeig. K. Ak. Wien, 1874, p. 135.

Triclinic. a (vert.) : b (brach.) : c := 0·71516 : ·96529 : 1. $\xi=92°\ 1$, $\eta=101°\ 3'$, $\zeta=91°\ 9'$. Observed planes I, I', $i\text{-}\breve{i}$, $1\text{-}\breve{i}$, $1\text{-}\bar{i}$, 2-2, 2-2. $I \wedge i\text{-}\breve{i}=134°\ 18'$, $I \wedge I=93°\ 2'$, $i\text{-}\breve{i} \wedge 1\text{-}\breve{i}=126°\ 36'$, $1\text{-}\breve{i} \wedge 1\text{-}\breve{i}=109°\ 50'$. Crystals formed by combination of prism and domes.

In crystalline crusts on garnet-rock. H.=4. G.=3·5.

Analysis (on a very minute quantity) $\mathrm{\dot{C}u}=57.2$, $\mathrm{\dot{H}}=16·0$ or $\mathrm{4\dot{C}u\ddot{\bar{P}}+5\dot{H}}$, with traces of iron, but no arsenic. Loses at 100° C. one equivalent of water, and the remainder at a red heat. Occurs at Morawicza in the Banat.

Victorite. See ENSTATITE.

VILLARSITE, Min. p. 409.—Genth, Am. Phil. Soc. Philad., xiii., 364, 1873.

VIRIDITE.—A collective name proposed by Vogelsang (ZS. G. Ges., xxiv., p. 529, 1872) for all the indeterminable transparent *green* compounds, which are observed in rocks and may be regarded as hydrous protoxyd silicates of iron and magnesia. They are generally in scaly or fibrous forms and are often the result of the decomposition of hornblende, chrysolite, etc. The name is also used by Dathe (ib., xxvi., p. 10), who shows its relation to Liebe's diabantachronnyn and Sandberger's aphrosiderite.

VIVIANITE, Min. p. 556.—Cryst. description with important correction of hitherto accepted angles, *v. Rath*, Pogg., cxxxvi., 405.

Analyses, *Maskelyne* and *Flight*, J. Ch. Soc., II., ix., 6.

VOLTAITE, Min. p. 652.—Kremnitz, anal., *Tschermak*, Ber. Ak. Wien, 1867, lvi., 831.

WACKENRODITE, Adam, Tableau Min., 1869, p. 76. A variety of wad containing 12·33 p. c. $\mathrm{\dot{P}b}$; see Dana, Min., p. 182, anal. 6.

WAD, Min. p. 181.—Groroilite, district Jacala, Mexico, *M. Barcena*, Naturaleza, iii. 136, 1874.

WAGNERITE, Min. p. 538.—Anal., showing the presence of 4 p. c. alkalies, *v. Kobell*, J. pr. Ch., II., vii., 275, 1873.

WALPURGITE, Weisbach, Jahrb. Min., 1871, 870; 1873, 315; in Appendix I., p. 16. Winkler has analyzed the walpurgite of Weisbach, with the following results:

$\ddot{\bar{\mathrm{A}}}\mathrm{s}$	$\dddot{\bar{\mathrm{U}}}$	$\ddot{\bar{\mathrm{B}}}\mathrm{i}$	$\dot{\bar{\mathrm{H}}}$
11·88	20·29	61·43	4·32 = 97·92
13·03	20·54	59·34	4·65 = 97·56

These correspond to the formula $5\ddot{\bar{\mathrm{B}}}\mathrm{i}, \ddot{\bar{\mathrm{A}}}\mathrm{s} + 3\dddot{\bar{\mathrm{U}}}\,\ddot{\bar{\mathrm{A}}}\mathrm{s} + 10\dot{\bar{\mathrm{H}}}$.

In a red-heat the crystals take a brown color, which passes into an orange-yellow on cooling. No decrepitation on heating takes place, and no change of form. Decomposed by nitric acid, leaving a white residue of arsenate of bismuth, which goes into solution on the addition of hydrochloric acid. J. pr. Ch., II., vii., p. 6, 1873.

520 C. Wapplerite, *Frenzel*, Tsch. Min. Mitth., 1874, 279.

Triclinic. Crystals minute and highly modified, resembling augite or wolframite in habit. Also in incrustations sometimes crystalline, or globular, sometimes glassy, with a reniform surface. Cleavage clinodiagonal. H. 2-2·5. G. 2·48. Color white. Translucent, the crystals colorless. Lustre strongly vitreous. [Crystallographic determination by Schrauf, (priv. contrib., dated Vienna, March 20th, 1875). Triclinic. *a* (vert.) : *b* : *c* = 0·29037 : 1 : 1·11002. $\xi = 90°\ 13'\ 55''$; $\eta = 95°\ 30'$; $\zeta = 90°\ 10'\ 35''$. Observed planes, $i\text{-}\breve{i}$, $i\text{-}\breve{2}$, $i\text{-}\breve{2}'$, I, I', $i\text{-}\bar{i}$, $1\text{-}\breve{i}$, $1\text{-}\breve{i}'$, $3\text{-}\breve{i}$, $3\text{-}\breve{i}'$, $10\text{-}\bar{i}$, $-2\text{-}\breve{2}$, $2\text{-}\breve{2}$, $-2\text{-}\breve{2}'$, $2\text{-}\breve{2}'$, $-4\text{-}\bar{4}$, $4\text{-}\bar{4}$, $-4\text{-}\bar{4}'$ $4\text{-}\bar{4}'$, $-3\text{-}\breve{\tfrac{3}{2}}$, $-3\text{-}\breve{\tfrac{3}{2}}'$, $-5\text{-}\breve{\tfrac{5}{2}}$, $-5\text{-}\breve{\tfrac{5}{2}}'$, $-7\text{-}\breve{\tfrac{7}{2}}$, $-7\breve{\tfrac{7}{2}}'$. $i\text{-}\breve{i} \wedge I = 132°\ 0'$; $i\text{-}\bar{i} \wedge I' = 131°\ 46\tfrac{1}{8}'$; $i\text{-}\breve{i} \wedge 1\text{-}\breve{i} = 104°\ 50'$; $i\text{-}\bar{i} \wedge -2\text{-}\bar{2}' = 123°\ 14'$.]

The crystals are characterized by prevalence of zones, by which means nearly all of the planes could be determined.

Wapplerite undergoes alteration, by taking up one equivalent of water, forming white opaque pseudomorphs which have been described as *rœsslerite* (Dana, Min., p. 556).

Analyses, Frenzel (l. c.).

$\ddot{\bar{\mathrm{A}}}\mathrm{s}$	$\dot{\mathrm{C}}\mathrm{a}$	$\dot{\mathrm{M}}\mathrm{g}$	$\dot{\bar{\mathrm{H}}}$
47·70	14·15	8·29	29·40 = 99·58
47·69	15·60	7·35	29·49 = 100·13

These give for the composition $2\dot{\mathrm{C}}\mathrm{a}\,\ddot{\bar{\mathrm{A}}}\mathrm{s} + 8\dot{\bar{\mathrm{H}}}$, where some lime is replaced by magnesia. Of the water 5 atoms go off at 100° C., the remainder at 360°.

Found with pharmacolite at Joachimsthal.

WARRINGTONITE, Min. p. 664.—See *brochantite*. Domeyko, 2d Appendix, Min. Chili, p. 23, 1867.

WARWICKITE, Min. p. 600.—Description and analysis, *J. L. Smith*, Am. J. Sci., III., viii., 432, 1874.

WAVELLITE, Min. p. 575.—Chester Co., Penn., anal., *Hermann*, J. pr. Ch., cvi., 69, 1869. County of Cork, anal., *Church*, J. Ch. Soc., II., xi., 110, Feb., 1873.

WEBSTERITE. See ALUMINITE.

WERNERITE, Min. p. 319.—Bucks Co., Penn., anal., *Leeds*, Am. J. Sci., III., viii., 432, 1874.

WESTANITE, *Blomstrand*, J. pr. Ch., cv., 341.—Appendix I., p. 16.

813 B. Wheelerite. O. Loew, Am. J. Sci., III., vii., p. 571.

A resin, yellowish in color, found in the Cretaceous beds of northern New Mexico, filling the fissures of the lignite, or interstratified in thin layers in it. Most abundantly observed in the vicinity of Nacimiento.

Two analyses gave Loew (l. c.)

	C	H
1.	73·07	7·95
2.	72·87	7·88

which agree closely with the formula *n* (C_5H_6O), where *n* is probably 5 or 6.

Soluble in ether, less so in bisulphide of carbon. In concentrated sulphuric acid dissolves, producing a dark-brown solution, from which it is precipitated by water. In alcohol the principal portion is readily dissolved, while a small part remains insoluble. The hot alcoholic extract of the resin deposits, on cooling, a few yellow flocculi. The solution, on evaporation, gives a yellowish resin very brittle, and becoming strongly electric on friction · it melts at 154° C.

Named for Lieut. G. M. Wheeler, U. S. Army.

WHEWELLITE, Min. p. 718.—Cryst., *Schmid*, Pogg., cxlii., 111, (Ann. Ch. Pharm., xcvii., 225).

WHITNEYITE, Min. p. 37.—From southern Arizona, analyses, Am. J. Sci., II., xlv., 306. A variety from Fortuna di Paposa, Chili, *Bertrand*, Ann. d. Mines, VII., i., 413, 1872.

459 B. Willcoxite. Genth, Am. Phil. Soc. Philad., xiii., p. 397, 1873.
In scales white to greenish or grayish-white, with pearly lustre, and resembling talc.
Analyses, Kœnig (l. c.). 1. Shooting Creek; 2. Cullakenee Mine.

	$\ddot{\mathrm{Si}}$	$\dddot{\overline{\mathrm{Al}}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Fe}}$	$\dot{\mathrm{Mg}}$	$\dot{\mathrm{Li}}$	$\dot{\mathrm{Na}}$	$\dot{\mathrm{K}}$	ign.
1.	28·96	37·49	1·26	2·44	17·35	tr	6·73	2·46	4·00 = 100·69
2.	29·50	37·56	1·40	2·38	17·20	tr	6·24	2·42	3·32 = 100·02

Oxygen ratio $\dot{\mathrm{R}} : \dddot{\overline{\mathrm{R}}} : \ddot{\mathrm{Si}} : \dot{\mathrm{H}} = 6 : 12 : 10 : 2$ nearly, or $3(2\dot{\mathrm{R}}, \ddot{\mathrm{Si}}) + 2\,(2\dddot{\overline{\mathrm{R}}}\,\ddot{\mathrm{Si}}) + 2\dot{\mathrm{H}}$.

B. B. fuses in fine splinters with difficulty to a white enamel, coloring the outer flame yellow. In hydrochloric acid decomposed with difficulty, with separation of silica in scales. Rare, occurring as a coating about a nucleus of corundum, and resulting from its alteration, at Shooting Creek and Cullakenee Mine, Clay Co., No. Carolina.

Named in honor of Col. Joseph Willcox.

WILLEMITE, Min. p. 262.—Franklin, N. J., analyses, *Mixter*, Am. J. Sci., II., xlvi., 230, 1868; sp. gravity for transparent crystals 4·26, 4·25, 4·29, *Cornwall*, Am. Chemist., Oct., 1873, p. 126.

Altenberg, near Aachen, *Arzruni*, Pogg., clii., 281, 1874.

526 C. Winklerite, Breithaupt, Jahrb. Min., 1872, 816.
Amorphous, massive. H.=3. G.=3·432. Color bluish-black to violet-black. **Streak** dark-brown. Fracture conchoidal, with but slight lustre.
Analysis, Winkler (l. c.) 1. original analysis; 2. same after deduction of $\dddot{\overline{\mathrm{Fe}}}$ and $\ddot{\mathrm{Si}}$.

$\overline{\ddot{\mathrm{As}}}$	$\dot{\mathrm{Cu}}$	$\dddot{\overline{\mathrm{Co}}}$	$\dot{\mathrm{Co}}$	$\dot{\mathrm{Ni}}$	$\dddot{\overline{\mathrm{Fe}}}$	$\dot{\mathrm{Ca}}$	$\ddot{\mathrm{Si}}$	$\ddot{\mathrm{C}}$	$\dot{\mathrm{H}}$
10·29	13·21	10·34	28·91	2·58	3·05	5·35	2·64	10·37	14·08=100·82
10·83	13·89	10·86	33·10			5·62		10·90	14·80=100·00

Breithaupt thinks that the mineral may have been formed by the gradual decomposition of erythrite (cobalt bloom) by water containing carbonic acid in the presence of some copper-mineral.

In the matrass gives off water. On charcoal decrepitates, but does not alter its appearance. B. B. infusible, coloring the flame green. With the fluxes gives reaction for cobalt. Effervesces with hydrochloric acid and the solution thus obtained upon heating evolves chlorine.

Found at Pria near Motril in Spain, occurring with galapectite, also with erythrite and malachite.

WINKWORTHITE, *How*, Phil. Mag., April, 1871.—Appendix I., p. 17.
Kenngott (Jahrb. Min., 1872, 300) repeats the suggestion of Brush that winkworthite is a mixture of gypsum and howlite.

WISERINE, Min. p. 528.—Cryst. memoir, with many new planes and discussion of relation to xenotime and zircon. Brezina remarks that the wiserine from the Binnenthal is very different in habit from that of other localities, and may possibly be a distinct species, Tsch. Min. Mitth., 1872, 8. Klein shows that the supposed mineral from the Binnenthal is in fact octahedrite, Jahrb. Min., 1872, 900.

WITTICHENITE, Min. p. 98.—Böckelsbach, Wittichen, Baden, anal., *Petersen*, Pogg., cxxxiv., 92; cxxxvi., 500. (Jahrb. Min., 1869, 337.)

WOCHEINITE, Min. p. 174.—(beauxite) Kokorjie, Verh. G. Reichs, 1874, 289.

WÖHLERITE, Min. p. 291.—Cryst. memoir, showing the species to be monoclinic, *Des Cloizeaux*, Ann. Ch. Phys., IV., xiii., 425, 1868.
Analyses, *Rammelsberg*, Pogg., cl., 211, 1873.

WOLFACHITE, *Sandberger*, Jahrb. Min., 1869, 313.—Appendix I., p. 17.

WOLFRAMITE, Min., p. 601.—Bayonka, Urals, anal., *Des Cloizeaux*, Am. J. Sci., II., xlviii., 137, 1868.
A variety from Schlaggenwald, *Zerrenner*, B. u. H. Zeit., xxviii., 429, 437.
Crystalline form proved to be monoclinic, *Des Cloizeaux*, Ann. Ch. Phys., IV., xix., 168, 1870.
From Russian localities, *Beck* and *Teich*, Verh. Min. Ges. St. Pet., II., iv., 312.
Relation to columbite, *Jeremejew*, Verh. Min. Ges. St. Pet., II., vii., 1872.
Cryst. form (hübnerite), relation to columbite, *Groth* and *Arzruni*, Pogg., cxlix., 235.
Meymac, Corrèze, anal., *Carnot*, C. R., lxxix., 637, 1874.

WOLLASTONITE, Min. p. 210.—Vesuvius, cryst., *v. Rath.*, Pogg., cxxxviii., 484; Monte Somma, anal., ib., cxliv., 390.
Elba, cryst., *Achiardi*, Nuovo Cimento, II., iii., Feb., 1870.
Santorin, cryst. memoir, *Hessenberg*, Min. Not., ix., 28, 1870.
Orawitza, anal., *Lemberg*, ZS. G. Ges., xxiv., 251, 1872.
In phonolyte from Freiburg, Breisgau, *v. Rath*, Jahrb. Min., 1874, 521.
Piquet describes (Ann. des Mines, VII., i., 415, 1872) what he calls a *new silicate of lime* from Merida (Portugal). It occurred in a vein of dioryte containing magnesite, quarz, apatite. An analysis gave Clemencin (l. c.) $\ddot{S}i$ 48·36, $\ddot{\bar{A}}l$($\ddot{\bar{F}}e$ tr) 1·56, $\dot{C}a$ 46·41, $\dot{M}g$1·30, $\ddot{C}$ 1·00, $\ddot{S}$ 0·56, $\dot{H}$ 1·11=100·30. H.=3·5–4. G.=2·80. Color white. Structure radiated. As Kenngott remarks (Jahrb. Min., 1873, 944) there seems to be no good reason for separating it from wollastonite.

WOLLONGONGITE, *Silliman*, Am. J. Sci., II., xlviii., 85. Appendix I., p. 17.

WOODWARDITE, Min. p. 666.—Anal., *Pisani*, C. R., lxv., 1143, 1871; *Maskelyne* and *Flight*, anal., J. Ch. Soc., II., ix., 1., 1871.

WULFENITE, Min. p. 607.—Wahsatch Mts., *Silliman*, Am. J. Sci., III., iii., 200; vi., 128.
Rucksberg and Phoenixville, cryst., *Schrauf*, Ber. Ak. Wien, lxiii., 184, 1871.
Pzribram, hemimorphic forms, *Zerrenner*, Tsch. Min. Mitth., 1874, 91.

XANTHIOSITE, Adam, Tableau Min., 1869, p. 43. An uncertain arsenate of nickel ($\dot{N}i^3\ddot{\bar{A}}s$) from Johanngeorgenstadt, analyzed by Bergemann (Dana Min., p. 548).

XENOTIME, Min. p. 528.—*Hessenberg*, cryst., Jahrb. Min., 1874, 833.
See *Wiserine.*

YTTROCERITE, Min. p. 125.—*Nordenskiöld*, Œf. Ak. Stockh., xxvii., 549, 1870.

YTTROTANTALITE, Min. p. 519.—Ytterby, anal., *Rammelsberg*, ZS. G. Ges., xxi., 560, 1869; Pogg., cl., 200, 1873.

ZEPHAROVICHITE, *Boricky*,—Ber. Ak. Wien, lix., 593, 1869.—Appendix I., p. 17.

572 A. Zeunerite, *Weisbach*, Jahrb Min., 1872, 207; 1873, 315; see also *Winkler*, J. pr. Ch., II., vii., p. 8, 1873; *Laube*, Lotos, xxii., 1872, p. 210; *Frenzel*, Jahrb. Min., 1873, 947.
Tetragonal. In crystals sometimes tabular, sometimes pyramidal, with planes *I*, *O*, *m*. Cleavage, basal perfect, the surface having a pearly lustre. H.=2-2·5. G.=3·2. Color grass-green and apple-green. In appearance and physical characters very similar to torbernite (Min. p. 585), with which it is isomorphous according to Weisbach.*
Analyses, Winkler, 1. l. c., 2. quoted by Weisbach l. c.

	$\ddot{\bar{A}}s$	$\ddot{\bar{U}}$	$\dot{C}u$	$\dot{H}$		
1.	20·94	55·86	7·49	15·68		= 99·97
2.	15·1	55·6	8·7	14·5	($\ddot{\bar{F}}e$ 5·2, $\dot{C}a$ 1·2)	= 100·3

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* See *Schrauf*, Tsch. Min. Mitth., 1872, 181.

From analysis 1. Winkler writes $\dot{C}u\ 2\ \dddot{\bar{U}}\ \ddot{\bar{A}}s + 8\dot{H}$.

First found with other uranium minerals at the mine Weisser Hirsch, near Schneeberg, Saxony; the crystals rest upon quartz or upon iron ochre. Since identified from Geisterhalde, near Joachimsthal, Laube (l. c.), and from Huel Gorland, Cornwall (on smoky quarz with chalcocite and melaconite), and from Zinnwald, Saxony (on quarz), Frenzel (l. c.).

Winkler (l. c. p. 14) has made zeunerite artificially, having the following composition: $\dot{C}u$ 7·01, $\ddot{\bar{A}}s$ 22·11, $\dddot{\bar{U}}$ 57·21, $\dot{H}$ 14·65 = 100·98.

ZINCITE, Min. p. 135.—Artificial oxyd of zinc in twinned crystals, v. Rath, Pogg., cxliv., 580, 1871.

Hayes has investigated the zincite from New Jersey, and thinks he has confirmed his previous observations that the red color is due to the presence of scales of hematite (Am. J Sci., III., iv., 191, 1872). The writer has made a study of some thin sections under the microscope, and has found that while there are present, at times, irregular scales (the hematite of Hayes) the red or yellow color is always uniformly diffused, and is not due to these scales. See Dana, Min. p. 136.

ZIRCON, Min. p. 272.—Observed in the hypersthenyte, near Harzburg, *Rose*. ZS. G. Ges., xxii., 754.

Expailly, France, anal., *Mylander*, Jahrb. Min., 1870, 488.

Ceylon, analyses, *Forbes*, Chem. News, xxv., 305, June, 1872.

Zirlite. Pichler has given this name to an opal-like hydrate of alumina closely related to, if not identical with, gibbsite. Found at Zirl, in the Tyrol (Jahrb. Min., 1871, 57; 1875, 51).

Zoblitzite. See LIMBACHITE.

ZOISITE, Min. p. 290.—Tuscany, province of Lucca, *Achiardi*, Boll. Com. Geol. Ital., 1871, 137.

No. Carolina, *J. L. Smith*, Am. J. Sci., III., vi., 184; *Genth*, Am. Phil. Soc. Philad., viii., 374, 406, 1873.

Thulite, Norway, anal., Herter, ZS. G. Ges., xxiii., 268.

Rammelsberg, ZS. G. Ges., xxiv., 649.

Zonochlorite, Foote, Rep. Amer. Assoc., 1873, p. 65.

Associated with laumontite, stilbite, prehnite and related minerals in the amygdoid of Neepigon Bay, Lake Superior.

Massive, banded with different shades of dark-green. H.=6½–7. G.=3·113. Water determinations gave 8·7, 12·9 and 7·03 p. c., and the presence of iron and alumina, also lime and soda (spectroscope) was proved. B. B. fuses with difficulty to a dark glass, and with fluxes reacts for iron. Upon this very imperfect examination the author concludes that the species is new. [Probably identical with chlorastrolite, Dana, Min., p. 412.]

PARAGONITE.—**Cossaite.** Gastaldi has given this name to a mineral which in oxygen ratio and chemical composition is identical with paragonite, but he separates it from this species on the ground of the absence of distinct micaceous cleavage. He first identified it in an antique ring (possibly a bracelet) dug up in the neighborhood of Turin, but he has also found it at the mines of Borgofranco, near Ivrea, and at Mt. Blasier.

The description as given by Prof. Cossa is as follows:

Structure crystalline, finely lamellar; in some portions having a micaceous aspect (Borgofranco; this tendency to micaceous structure is absent in the mineral from Mt. Blasier). Opaque, slightly translucent on the edges. H. = 2.5. G. = 2·896 and 2·890. Color green. Streak white.

Analyses; 1. and 2. by Cossa, l. c. 1. Borgofranco; 2. Mt. Blasier; 3. paragonite, Rammelsberg (Dana, Min., p. 488).

	$\ddot{S}i$	$\dddot{\bar{A}}l$	$\dddot{\bar{F}}e$	$\dot{M}g$	$\dot{C}a$	$\dot{N}a$	$\dot{K}$	$\dot{H}$		
1. Cossaite.	46·67	39·02	2·01	——	——	6·37	1·36	4·91	= 100·33	Cossa.
2. "	46·68	39·88	1·06	——	——	6·91	0·84	5·08	= 100·45	Cossa.
3. Paragonite.	46·81	40·06	tr.	0·65	1·26	6·40	tr.	4·82	= 100·	Ramm.

The oxygen ratio for $\dot{R} : \dddot{\bar{R}} : \ddot{S}i : \dot{H} = 1 : 9 : 12 : 2$.

B.B. fusible with difficulty; exfoliates and becomes opaque white, moistened with cobalt solution; after ignition gives an intense blue color. Not decomposed by hydrochloric acid. Gastaldi calls the cossaite a soda-oncosin (pinite). He adds the following analysis by Cossa of what he considers a normal oncosin from Fenestrelle: $\ddot{\text{Si}}$ 47·96, $\dddot{\bar{\text{Al}}}$ 31·03, $\dot{\text{Ca}}$ 1·07, $\dot{\text{Mg}}$ 3·42, $\dot{\text{K}}$ 10·44, $\dot{\text{Na}}$ 4·08, $\dot{\text{H}}$ 2·41 = 100·41. (*O.* ratio $\dot{\text{R}}$: $\dddot{\text{R}}$: $\ddot{\text{Si}}$ = 1 : 3 : 6.) Very similar to cossaite in physical characters. B.B. fusible. (Atti Accad. Sci. Torino, x., Dec., 1874).

652 A. Guanovulite, *Wibel*, Ber. Chem. Ges. Berlin, 1874, 392.

Found in crystalline deposits filling the eggs of birds in Peruvian guano. H. = 2. G. = 2·33–2·65. Color yellowish-white. Lustre silky. An analysis gave, after deduction of impurities, $\dot{\text{K}}$ 35·49, NH_4O 5·09, $\dddot{\text{S}}$ 49·60, $\dot{\text{H}}$ 9·82 = 100·00. Wibel writes the formula $NH_4O\dddot{\text{S}} + 2\dot{\text{K}}\dddot{\text{S}} + 3(\dot{\text{K}}\dddot{\text{S}},\dot{\text{H}}\dddot{\text{S}})$ + 4 aq.

In water it dissolves, leaving a very small residue, and giving a light-yellowish solution, which has a salty taste. Insoluble in ether or alcohol. Heated in a glass tube it first loses water and ammonia, then becomes black, and on stronger heating melts and gives off much sulphuric acid.

THIRD APPENDIX

TO THE

FIFTH EDITION

OF

DANA'S MINERALOGY,

BY

EDWARD S. DANA,

CURATOR OF MINERALOGY, YALE COLLEGE.

COMPLETING THE WORK TO 1882.

NEW YORK:
JOHN WILEY & SONS,
15 ASTOR PLACE.
1882.

PREFATORY NOTE.

THIS Third Appendix to the fifth edition of the System of Mineralogy is designed to make the work complete up to January, 1882. Its publication has been unavoidably delayed long after the date originally set for its completion. The fact that seven years have elapsed since the issue of the Second Appendix (March, 1875), will be a sufficient explanation of the perhaps inconvenient length to which it extends.

This Appendix contains: (1), full descriptions of all species announced asnew since the publication of Appendix II.; and (2), references to all important mineralogical articles which have been published during the same period, with citations from them of many new analyses and new facts as to physical characters and localities. Under each species the entries are, for the most part, arranged under two heads: that of Crystallization (**Cryst.**), for the articles which treat of the crystalline form; and that of Analyses (**Anal.**), for those containing chemical analyses, with or without other matter.

The number of "new species" is very large, aggregating fully three hundred (300). Unfortunately the original descriptions of a large part of them are very incomplete, and in too many cases the names are contributions only to the nomenclature of the Science. If two very simple rules could be conscientiously followed by those investigating supposed new species, the Science of Mineralogy would be vastly benefited. These are: first, that the material analyzed should in every case be proved by a careful microscopic and chemical examination to be *homogeneous;* and, second, that the thorough investigation which is to establish the position of a "new species" should *precede*, not follow, the giving of a new name. A mineral which can be only partially described does not deserve a name.

In the classified list of new names on p. xi., those which seem to have a fair claim to recognition (including the names of some well-characterized varieties) are placed first. Following these in each division, are given in a paragraph the names, (1), of ordinary varieties having no especially distinctive character; (2), of imperfectly described or doubtful species, for which further study is much to be desired; and (3), of those so-called species which are obviously bad. The names of all species, new and old, are arranged in the body of the work in alphabetical order; the former are printed in black-faced type. References are given both to the System and also to Appendixes I. and II.; Appendix III. is, consequently, an index for the earlier Appendixes.

The Bibliography includes a list of mineralogical works published since January, 1875. To this is added a list of new journals devoted wholly, or in part, to mineralogical subjects, and also a list of memoirs upon a single subject of more than ordinary importance. For the explanation of *Abbreviations*, see the System, pp. xxxv.-xlv., and also this Introduction, p. viii. The thanks of the writer are due to Professor George J. Brush for his kindness in reading a set of the proofs as the work was going through the press.

NEW HAVEN, *April 1st*, 1882.

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IV.—NEW JOURNALS.

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Mineralogische Mittheilungen gesammelt von G. Tschermak (*Min. Mitth.*). Commenced 1871. Since 1878 published in separate form of smaller size as

Mineralogische und Petrographische Mittheilungen (*Min. Petr. Mitth.*), in yearly volumes of 6 numbers. Vol. i., 1878; ii., 1879; iii., 1880; iv., 1881.

Zeitschrift für Krystallographie und Mineralogie, unter Mitwirkung zahlreicher Fachgenossen des In- und Auslandes, herausgegeben von P. Groth (*Z. Kryst.*). Commenced in 1877, published in yearly volumes of 9 numbers. Numbers 1 and 2 of each volume are generally published in the closing part of the preceding year.

Annalen der Physik und Chemie: long known as Poggendorff's Annalen (*Pogg. Ann.*); since 1877 published by G. Wiedemann, and hence called Wiedemann's Annalen (*Wied. Ann.*). Three volumes annually; vols. i., ii., 1877; iii., iv., v., 1878, etc.

Neues Jahrbuch für Mineralogie, Geologie und Palæontologie, etc. (*J. Min.*). Since 1880 (strictly Oct., 1879), edited by E. W. Benecke, C. Klein, and H. Rosenbusch; and published in two volumes yearly. Vol. 1880, i., ii. ; 1881, i., ii. Also Beilage-Band i., Heft I., 1880, II., 1881, III., 1882. In the regular volumes the original memoirs and the abstracts of papers (*Referate, ref.*) are separately paged. An Index to the Jahrbuch for 1870–79 was issued in 1880.

V.—MEMOIRS ON THE "OPTICAL ANOMALIES" OF SOME CRYSTALLIZED MINERALS.

The question as to the true explanation of the "optical anomalies" presented by many crystallized minerals has been widely discussed in the past few years. That the crystals of many species exhibit in polarized light optical phenomena, not in harmony with their apparent geometrical form, has long been recognized; and the explanations which have been offered in earlier years are well understood: that is, the theory of lamellar polarization of *Biot*, of internal tension of *Reusch*, of disturbed molecular structure of *Marbach*, and so on. The recent discussion of this subject has taken a wide range, and many new facts have been recorded. Attention has been especially directed to it by the classical memoir of *Mallard*, the importance of which cannot be overestimated, even if his conclusions are not always accepted (for title see below). According to Mallard's view, as far as it can be explained in a word, these optical anomalies are explained on the assumption that the crystal exhibiting them is in fact made up of separate individuals regularly grouped, which are of a lower grade of symmetry than that which the complete form simulates. Thus, an apparent isometric cube may be made up of 6 square pyramids, each optically uniaxial, placed with their vertices at the centre of the solid, and their bases forming its sides. Similarly an apparent isometric octahedron may be made up of eight anisotropic triangular pyramids grouped in an analogous manner; and so on. Mallard thus includes under *pseudo-isometric* species: alum, analcite, boracite, fluorite, garnet, and senarmontite; among the *pseudo-tetragonal* species: apophylite, brookite, mellite, octahedrite, rutile, vesuvianite, zircon; among *pseudo-hexagonal* species: apatite, beryl, corundum, penninite, ripidolite, tourmaline; *pseudo-orthorhombic* species: harmotome, topaz; *pseudo-monoclinic*, orthoclase (microcline). Many additional facts to which the hypothesis of Mallard is applicable have been published by *Bertrand* (see below, and under the various species in the body of this work), who has also devised an arrangement of the microscope by means of which, with a high magnifying power, optical investigations may be made in many cases where it was before impossible. *Grattarola* includes calcite, quartz, nephelite, barite, etc. in the list of species which have an apparent symmetry higher than that which really belongs to them; his conclusions, however, are not based upon observations.

In many other cases observers have, on the basis of variation in angles, or of optical characters, reached the conclusion that the species in question really belongs to a system of lower symmetry than that to which it has been ordinarily referred. These cases are recorded in Appendixes II. and III. These last named observations, however, do not in most cases admit of being explained on the hypothesis of Mallard. In many of them the conclusions reached are beyond doubt correct, in others the question must be regarded as still undecided.

Tschermak proposes the term *mimetic* for those forms ("mimetische Formen"), which imitate a higher grade of symmetry by the grouping (twinning) of individuals of a lower grade of symmetry, as for example, aragonite.

Mallard's hypothesis has been opposed by various investigators on the ground that it does not explain many observed facts and is decidedly at variance with others. The observations of *Klocke, Jannettaz, Klein, Ben Saude*, are especially to be mentioned. A few of the facts bearing upon the question are given under boracite (p. 17) and analcite (p. 5). Klocke shows that the same crystal of alum may contain truly isotropic (normal) and anisotropic (abnormal) portions; also that the so-called distortion of the crystals and their position during their formation influences the optical phenomena observed. He shows, also, that preparations of gelatine, hardened under tension, show all the optical phenomena of the crystals under discussion. This subject cannot be elaborated here; it is enough to say that the observations of the mineralogists mentioned, as also of others, seem to confirm the view of Reusch, that at least in many cases (e. g. analcite, garnet, vesuvianite, etc.) the "optical anomalies" are to be explained as due to the state of molecular tension existing within the crystal. The investigation of this subject cannot, however, be regarded as entirely completed. A good general review of this subject is given by Zirkel in the 11th edition of Naumann's Mineralogy, pp. 152 et seq., also p. 722, 1881. The following are titles of important papers bearing upon this subject.

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Marbach. Ueber die optischen Eigenschaften einiger Krystalle des tesseralen Systems, Pogg. Ann., xciv., 412, 1855.

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Reusch, v. Ueber die sogenannte Lamellarpolarization des Alauns, Pogg. Ann., cxxxii., 618, 1867.

Rumpf. Ueber den Krystallbau des Apophyllits, Min. Petr. Mitth., ii., 369, 1879.

Tschermak. "Mimetische Formen," ZS. G. Ges., xxxi., 637, 1879, and Lehrb. Min., p. 89 et seq., 1881.

CLASSIFIED LIST OF NEW NAMES.

Sulphides, Arsenides, Tellurides, etc., Min., pp. 26–84.

	PAGE		PAGE
Coloradoite	29	Krennerite (Bunsenin)	66
Daubréelite	34	Polydymite	95
Frieseite (near sternbergite)	115	Stützite	117

Animikite, p. 71; Argyropyrite (var. sternbergite), p. 115; Arsenargentite, p. 9; Erythrozincite (var. wurtzite?), p. 43; Huntilite, p. 71; Lautite, p. 67; Leviglianite, p. 86; Sommarugaite (= gersdorffite), p. 51; Telaspyrine, p. 119. —— Bordosite, p. 4.

Sulpharsenites, Sulphantimonites, Sulphobismuthites, etc., Min., pp. 85–109.

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Bjelkite (= cosalite), p. 31; Coppite, p. 120; Dürfeldtite, p. 40; Fredricite (var. tennantite), p. 119; Frigidite (var. tetrahedite), p. 120; Malinofskite (var. tetrahedite), p. 120; Plumbostannite, p. 95.

Chlorides, Bromides, Iodides, and Fluorides, Min., pp. 111–130.

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Chloromagnesite (Bischofite)	25	Iodobromite	63
Daubreite	35	Tysonite	126
Huantajaite (near halite)	55		

Ateline, p. 120; Chloralluminite, p. 25; Cryptohalite, p. 32; Douglasite, p. 43; Eriochalcite, p. 43; Hydrofluorite, p. 61; Lawrencite, p. 67; Melanothallite, p. 75; Nocerite, p. 85; Proidonite, p. 97; Pseudocotunnite, p. 97; Pyroconite (= pachnolite), p. 88.

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Blackmorite (= opal), p. 16; Calvonigrite (= pyrolusite), p. 98; Cotterite (= quartz), p. 101; Eisenbrucite, p. 19; Hetærolite, Hetairite, p. 58; Heubachite, p. 58; Hydrofranklinite, p. 61; Hydroilmenite (alt. menaccanite), p. 76; Hydrotitanite (alt. perofskite), p. 91; Igelströmite (= pyroaurite), p. 99; Iserite (= rutile ?), p. 105; Lepidophæite (= wad), p. 130; Passyite (= quartz), p. 101; Pseudobrookite (= brookite ?) p. 97; Stibianite, p. 116; Yttrogummite, p. 28.

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Cossyrite	31	Kentrolite	65
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Eucryptite	44, 113	Microcline	80
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Ganomalite	40	Siderophyllite (var. biotite)	80

Alshedite (var. titanite), p. 122; Beccarite (var. zircon), p. 134; Bergamaskite (var. amphibole), p. 5; Cuspidine, p. 33; Euchlorite (= biotite), p. 80; Gastaldite (var. glaucophane), p. 52; Giufite (= milarite), p. 81; Hexagonite (= amphibole), p. 5; Hiddenite = spodumene), p. 112; Keatingine (= rhodonite), p. 104; Manganidocrase (var. vesuvianite), p. 129; Marmairolite, p. 74; Neochrysolite (= chrysolite), p. 27; Neocyanite, p. 84; Ontariolite (= scapolite), p. 106; Paroligoclase, p. 89; Phengite (var. muscovite), p. 78; Rosterite (= beryl), p. 14; Szaboite, p. 118; Titanolioine (var. chrysolite), p. 27; Titanomorphite, p. 122; Uranothorite (near thorite), p. 122; Xantholite (staurolite), p. 114.

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Eosphorite (near childrenite)	24	Phosphuranylite	92
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Achrematite, p. 1; Baryturanite (= uranocircite), p. 127; Brackebuschite, p. 36; Chlorotile, p. 26; Destinezite, p. 36; Jogynaite, p. 108; Leucochalcite, p. 69; Leucomanganite, p. 69; Liskeardite, p. 70; Manganapatite (var. apatite), p. 8; Picite, p. 93; Pyrophosphorite, p. 100; Rhabdophane (Rabdophane), p. 103; Spodiosite, p. 112.

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APPENDIX III.

Abriachanite. *Heddle,* Min. Mag., iii., 61, 193, 1879. *Aitken,* ib. p. 69. "An apparently new mineral," *Jolly and Cameron,* Q. J. G. Soc., xxxvi., 109, 1880.

Amorphous, clay-like; sometimes showing a distinct fibrous structure; also pulverulent. Color bright ultramarine blue. G. = 3·326 Heddle; 2·01 J. and C. Analyses: 1, Heddle, fragments from Dochfour; 2, Heddle, similar material crushed and then washed by decantation; 3, mean of several analyses from different localities, Jolly and Cameron.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	H_2O		
1.	51·15	....	14·92	9·80	0·30	10·80	1·12	6·52	0·63	4·77*	S tr.	= 100·01.
2.	52·40	....	9·34	15·17	0·40	10·50	1·17	7·11	0·61	1·00		= 100·67.
3.	55·02	3·37	19·03	3·83	....	12·95	2·53	1·74	....	1·45	P_2O_5 0·33	= 100·25.

* Loss 0·95 at 100° C.

B. B. infusible, but loses color. Occurs abundantly in seams and cavities of the gneiss and granite of the Abriachan district, near Loch Ness, in Inverness-shire, Scotland.

[The material examined by Heddle, and that analyzed by Jolly and Cameron, was derived, at least in part, from the same source, and was similar in appearance; although in specific gravity there is a wide discrepancy, and the analyses do not entirely agree, especially as regards the alkalies. Heddle's analysis is near crocidolite (compare anal. 3, Min., p. 243). The facts at least prove the correctness of the opinion expressed by Jolly and Cameron, that, until a more complete examination can be made on purer material, the substance does not deserve a new name.]

ACANTHITE, Min., p. 51; App. II., p. 1.—*Groth* has described crystals from Annaberg, which are orthorhombic with marked monoclinic symmetry, Min.-Samml., Strassburg, p. 51, 1878.

Achrematite. *J. W. Mallet,* J. Chem. Soc., II., xiii., 1141, 1875.

Massive, crypto-crystalline. Tetragonal or hexagonal (?). H. = 3–4. G. = 5·965, in powder, 6·178. Color pale sulphur-yellow to orange and red, in the mass liver brown, from admixed limonite. Streak pale cinnamon brown. Lustre resinous to adamantine. Translucent on thin edges. Fracture uneven to subconchoidal. Brittle. Analyses:

	As_2O_5	P_2O_5	MoO_3	PbO	Pb(for Cl)	Cl	Fe_2O_3	H_2O	F,Cu,Ag	
1.	15·90	0·02	4·58	60·35	5·51	1·89	9·93	1·63	tr.	= 99·81.
2.	16.25	0·03	4·40	62·32	5·48	1·88	8·53	1·38	tr.	= 100·27.
3.	15·75	0·02	4·19	56·77	5·48	1·88	13·08	2·27	tr.	= 99·44.

The iron and water are present in the amount required for limonite, the presence of which is suggested by microscopic examination; this limonite is deducted, viz., 11·56 p. c. for (1), 9·91 for (2), and 15·35 for (3); then calculating to 100, the results are:

	As_2O_5	MoO_3	PbO	Pb(for Cl)	Cl	
1.	18·02	5·19	68·40	6·25	2·14	= 100.
2.	17·99	4·87	68·99	6·07	2·08	= 100.
3.	18·73	4·98	67·53	6·52	2·24	= 100.
Mean	18·25	5·01	68·31	6·28	2·15	= 100.

The formula calculated is 3 [$3Pb_3As_2O_8 + PbCl_2$] + 4 [Pb_2MoO_5]. [That the mineral is homogeneous, and not a mixture of an arsenate and molybdate of lead, is considered by the author as sufficiently proved; but the composition proposed is certainly not a probable one]. B. B., decrepitates slightly, turns dark brick-red, and fuses easily to a nearly black globule, which shows indistinct crystalline facets on cooling. On charcoal yields arsenical odors, a lead coating, and finally globules of lead. With the fluxes, reacts for iron, which, however, is only present as an impurity.

From the mines of Guanaceré, Chihuahua, Mexico. Named from *ἀχρήματος*, *useless*, in allusion to the fact that it was received as a silver ore, while, in fact, of no intrinsic value.

ACHTARAGDITE.—Min., p. 478; App. II., p. 1.

ACMITE, Min., p. 224; App. II., p. 1.—**Anal.** and discussion of composition, Norway, *Dölter*, Min. Petr. Mitth., i., 379, 1878.

Probable occurrence at Ditró, Transylvania, *Becke*, Min. Petr. Mitth., i., 554, 1878.

ADAMITE, Min., p. 565.—From the ancient mines recently reopened at Laurium, Greece. —Occurrence announced, *Klien*, J. Min., 1878, 53; cryst. and optical description, *Des Cloizeaux*, C. R., lxxxvi., 88, Jan., 1878; cryst. description, *Laspeyres*, Z. Kryst., ii., 147, Feb., 1878; *Des Cloizeaux*, Bull. Soc. Min., i., 30, May, 1878.

Occurs in small crystals, colorless to deep emerald green, implanted on smithsonite; also in radiated mammillary groups. The forms, as shown independently by Des Cloizeaux and Laspeyres, are closely similar to those of the original mineral from Chili, as also of that from Cape Garonne (App. II., p. 1). Laspeyres finds that, with identical prismatic angles, the vertical axes in the colorless and deep green crystals differ, as 20 : 19 respectively; the habit is also different. An analysis of the green mammillary variety gave Friedel (Bull. Soc. Min., i., 31) As_2O_5 40·17, ZnO 55·97, CuO 0·64, FeO 0·18, H_2O 4·01 = 100·97.

ÆGIRITE, Min., p. 223; App. II., p. 1.—**Anal.**, Hot Springs, Arkansas, *J. L. Smith*, Am. J. Sc., III., x., 60, 1875. Analysis and discussion of composition, *Dölter*, Min. Petr. Mitth., i., 374, 1878.

Aërinite. *v. Lasaulx*, J. Min., 1876, 352; *Des Cloizeaux*, ib., 1877, 60 (Bull. Soc. Min., i., 125, 1878). A compact, earthy mineral, of a bright blue color, from the Pyrenees. H. = 3–4, G. = 3·018. Shown by Des Cloizeaux to be a heterogeneous mass, consisting of a blue paste, inclosing different minerals, perhaps owing its blue color to artificial means. Analyses: 1, Lasaulx (see also J. Min., 1877, 60); 2, *id.*, part (18·28 p. c.) soluble in HCl (in other trials 29·17 p. c., and 32·45 p. c., went into solution); 3, Damour; 4, *id.*, insoluble portion; 5, *id.*, soluble portion; 6, total of 4 and 5; 7 and 8, Rammelsberg, ZS. G. Ges., xxviii., 234, 1876.

	SiO_2	Al_2O_3	Mn_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	H_2O	
1.	48·53	7·55	1·17	32·78		0·90	3·59	....	6·16	= 100·67.
2. Sol.	11·85	20·86	2·83	52·37		0·41	11·57	....	.....	= 99·89.
3.	45·36	10·22	....	....	13·67	....	.....	....	8·23	
4. Insol.	31·57	3·58	....	....	5·27	3·55	3·61	1·01	.....	TiO_2 0·41, V_2O_5 tr. = 49.
5. Sol.	12·88	8·22	....	....	7·43	2·31	6·55	0·30	12·74,	V_2O_5, P_2O_5 tr. = 50·43.
6.	44·45	11·80	....	....	12·70	5·86	10·16	1·31	12·74,	TiO_2 0·41, V_2O_5, P_2O_5 tr. = [99·43.
7. G. = 2·670	42·92	15·34	....	7·12	3·16	2·45	15·80	....	12·07	= 99·06.
8.	44·00	15·39	....	8·88	3·16	2·44	13·88	....	13·00	= 100·75.

[It seems to be sufficiently proved that the substance above described is not be regarded as a mineral species.]

ÆRUGITE.—App. II., p. 1.

ÆSCHYNITE, Min., p. 522.—**Cryst.**, Hitterö, Norway, *Brögger*, Z. Kryst., iii., 481, 1879. Miask, an analysis has afforded *Rammelsberg* (ZS. G. Ges., xxix., 815, 1877),

Cb_2O_5	TiO_2	ThO	$(Ce,La,Di)_2O_3$	Y_2O_3, Er_2O_3	Fe_2O_3	CaO	
32·51	21·20	17·55	19·41	3·10	3·71	2·50	= 99·98.

The formula deduced from this is $[R_2]\,Cb_2\,(Ti,Th)_3\,O_{14}$, or $[R_2]\,Cb_2O_8 + 3\,(Ti,Th)\,O_2$.

Aglaite.—See *Spodumene*, p. 112.

Agricolite.—App. II., p. 1.

Ajkite. A resin near amber, Ajka, Hungary (Bull. Soc. Min., i., 126, 1878).

Alabandite, Min., p. 46.—**Anal.**, Morococha, Peru, *Raimondi*, Min. Pérou, p. 239, 1878.

Alaskaite. *G. A. König*, Am. Phil. Soc., Philad., 1881, 472, or Z. Kryst., vi., 42.
Massive, small foliated, with occasional cleavage planes. G. = 6·878. Lustre metallic. Color whitish lead-gray. Powder bluish gray. Opaque. Easily friable in the mortar. Analyses : 1; 1*, after deducting from (1) 2·28 p. c. chalcopyrite, and 15 p. c. barite ; 2, independent variety.

	S	Bi	Sb	Pb	Ag	Cu	Fe	Zn	Insol.
1 ($\frac{2}{2}$)	15·85	46·87	0·51	9·70	7·10	3·64	0·70	0·64	15 00 = 100·01.
1*	17·63	56·97	0·62	11·79	8·74	3·46	....	0·79	..... = 100.
2 ($\frac{3}{3}$)	17·85	51·35	....	17 51	3·00	5·38	1·43	0·20	2·83 = 99·55.

For (1*) the ratio of R : Bi : S = 1 : 2·02 : 4·14, and for (2) after deducting as in (1) = 1 : 1·89 : 3·88, or, approximately 1 : 2 : 4, corresponding to $(R_2, R)S + Bi_2S_3$, with R_2 = Ag_2, Cu_2, and R = Pb.

B. B. in closed tube decrepitates, and melts without giving a sublimate ; in the open tube gives fumes of SO_2 and a slight sublimate of Sb_2O_3. On charcoal a lead coating, and on continued blowing that for silver ; also with potassium iodide and sulphur, a strong reaction for bismuth. After roasting reacts for copper and iron with the fluxes. Slowly attacked by cold concentrated HCl, rapidly decomposed by the hot acid, leaving flocculent silver chloride.

Occurs intimately mixed with quartz, barite, chalcopyrite, and tetrahedrite, at the Alaska mine, Poughkeepsie Gulch, Colorado.

Rammelsberg (ZS. G. Ges., xxix., 80, 1877) has described under the name of Silberwismuthglanz, a mineral which is the bismuth compound corresponding to miargyrite, and is very near alaskaite.—Massive, soft. G. = 6·92. Color gray. Streak light gray. Analysis ($\frac{3}{3}$) after deducting admixed galenite : S 17·24, Bi 54·50, Ag 28·26 = 100. This corresponds to $AgBiS_2$, or $Ag_2S + Bi_2S_3$, requiring S 17·0, Bi 54·7, Ag 28·3 = 100. B. B. on charcoal fuses readily, giving a coating of bismuth oxide, and after long blowing a globule of silver. Soluble in HNO_3 with separation of sulphur. Associated with tetrahedrite, galenite, sphalerite and pyrite at the Matilda mine, near Morococha, Peru. [The two minerals above described are essentially identical, and as the name of Rammelsberg cannot be employed outside of Germany, that of König may be accepted to cover both. The corresponding mineral, miargyrite, has also some varieties which contain lead.]

Albite, Min., p. 348; App. II., p. 1.—**Cryst.** Kuchelbad, near Prague, Bohemia, *Vrba*, Ber. Böhm. Ges., 1879, 472, and Z. Kryst., iv., 360, 1880. Switzerland, *vom Rath*, Z. Kryst., v., 27; Zöptau, ibid., v., 253, 1880. Mt. Cau., Pyrenees, *v. Lasaulx*, Z. Kryst., v., 341, 1881.

Thermo-electrical characters, *Hankel*, Wied. Ann., i., 283, 1877.

Made artificially, identical in form and composition with natural crystals, *Hautefeuille*, C. R., lxxxiv., 1301, 1877.

Anal. (2·3 p. c. K_2O), Guatemala, *v. Lasaulx*, J. Min., 1875, 147.

Pseudomorph after spodumene (q. v., p. 112).

See also *Feldspar Group*, p. 45.

Allanite, Min., p. 285; App. II., p. 2.—Analyses of alteration products produced by weathering, *J. R. Santos*, Chem. News, xxxviii., 95, 1878.

Allophane, Min., p. 419; App. II., p. 2.—**Anal.**, Steinbrück, *Gamper*, Verh. Geol. Reichs., 1876, 354.

Muck describes (Z. Berg.-Sal.-Wesen., xxviii., 192, 1880) an earthy, white to pale wine yellow, or greenish yellow substance, from the clay of the Schwelm mine. It corresponds with the *kieselalluminite* of Kornwestheim (Min., p. 420), but the name SULFATALLOPHAN is preferred, as it behaves like allophane. Soluble in HCl. Analyses: 1, yellowish, translucent; 2, white, earthy; 3, soft, of butter-like consistency; 4, kieselalluminite.

	SiO_2	Al_2O_3	SO_3	H_2O
1.	14·84	38·55	7·98	38·63.
2.	18·74	36·73	6·04	38·49.
3.	21·83	40·07	10·54	27·52.
4.	13·06	42·59	5·04	39·32.

As remarked by Muck, these substances are varying mixtures of aluminum silicate and basic aluminum sulphate.

Allophite.—App. II., p. 2.

Alshedite.—See *Titanite*, p. 122.

Altaite, Min., p. 44; App. II., p. 2.—From Chili, *Domeyko*, C. R., lxxxi., 632, 1875, and 5th App. Min. Chili, p. 50, 1876.

Alum, Min., p. 651.—Apparent tetrahedrism due to distortion, *Wulff*, Z. Kryst., v., 81, 1880.

Containing Cs and Rb, from Vulcano, *Cossa*, Accad. Linc. Trans., III., ii., 34, 1878. Action of solvents upon, etc., *Klocke*, Z. Kryst., ii., 126, 293, 553; iv., 76. See also *L. de Boisbaudran*, C. R., lxxx., 888, 1007, 1450, 1875. *Uzielli*, Accad. Linc. Trans., III., i., March 18, 1877.

Aluminite,, Min., p. 658; App. II., p. 2.—**Anal.**, Mühlhausen, near Kralup, *Raffelt*, Jahrb. Geol. Reichs, 1878, 360.

See also *Werthemanite*, p. 131.

Alunite, Min., p. 658.—**Anal.**, Breuil, Auvergne, *v. Lasaulx*, J. Min., 1875, 142. In large deposits at Madriat, d'Issoire, France, analyses, Rev. Geol., Delesse and Lapparent, xiii., 38, 1877.

Alunogen, Min., p. 649; App. II., p. 2.—**Anal.**, Cerros Pintados, Tarapaca, Peru, *Raimondi*, Min., Pérou, 243, 1878. Celebes, East Indies, *Frenzel*, Min. Petr. Mitth., iii., 295, 1880. Scotia mine, Cumberland Co., N. S., *F. D. Adams*, Geol., Canada, 1879–80. Sierra del Atajo, and Cerro de Famatina, Argentine Republic, *Brackebusch*, Min. Argentin., 76, 1879. Wallerawang, New South Wales, *Liversidge*, Proc. R. Soc., N. S. W., Nov. 3, 1880.

Alvite, Min., p. 511.—According to a suggestion of *W. C. Brögger* (Geol. För. Förh., v., 352, 1881), alvite is to be regarded as simply zircon and xenotime, compounded as described by Zschau (Min., p. 529). Crystals from Anneröd, near Moss, Norway, gave him 36·58 SiO_2 and 18·84 P_2O_5, supporting this view. [This may be true of some so-called alvite, but can hardly apply to the mineral originally analyzed by Forbes.]

Amalgam, Min., p. 13; App. II., p. 2.—Domeyko (3d Ed. Min., Chili, p. 358, 1879) describes several varieties of silver amalgam from Chili. One of these from the mines of Arqueros, Coquimbo, Chili, has Ag 94·4, Hg 5·6, and corresponds to *kongsbergite* (App. II., p. 32). Another has Ag 69·21, Hg 30·76, and is called *bordosite* (but see App. II., p. 8) from the locality, the mines of Bordos. Various intermediate compounds are mentioned.

An amalgam from Vitalle Creek, British Columbia, lat. 53° N., afforded: Ag 86·15, Hg 11·90, SiO_2 0·45 = 98·50 (*Hanks*, priv. contrib.); it hence corresponds with *arquerite* (Min., p. 14). An amalgam from the Sala mine, Sweden, gave *Nordström*: Ag 46·30, Hg 51·12, Fe 0·81, Zn, Pb, tr., $CaCO_3$ 0·21, insol., 1·01 = 99·45, Geol. För. Förh., v., 715, 1881.

AMBLYGONITE, Min., p. 545.—**Analyses** by *Penfield*, Am. J. Sc., III., xviii., 295, 1879.

	P_2O_5	Al_2O_3	Li_2O	Na_2O	H_2O	F	
1. Penig, $(\frac{2}{2})$	48·24	33·55	8·97	2·04	1·75	11·26	Mn_2O_3 0.13 = 105·94, deduct 4·74 O (= F) = 101·20.
2. Montebras, A. $(\frac{2}{2})$ G. 3.088	47·09	33·22	7·92	3·48	2·27	9·93	CaO 0·24 = 104·15, deduct 4·02 O = 100·13.
3. Auburn, Me. $(\frac{2}{2})$ G. = 3·059	48·48	33·78	9·46	0·99	3·57	6·20	= 102·48, deduct 2·61 O = 99·87.
4. Hebron, Me., A.	[48·53]	34·12	9·54	0·34	4·44	5·24.	
5. Paris, Me. $(\frac{2}{2})$ G. = 3·035	48·31	33·68	9·82	0·34	4·89	4·82	K_2O 0·03 = 101·89, deduct 2·03 O = 99·86.
6. Hebron, Me., B. $(\frac{2}{2})$ G. = 3·032	47·44	33·90	9·24	0·66	5·05	5·45	= 101·74, deduct 2·29 O = 99·45.
7. Branchville, Ct. $(\frac{2}{2})$ G. = 3·032	48·80	34·26	9·80	0·19	5·91	1·75	Fe_2O_3 0·29, Mn_2O_3 0·10 = 101·10, deduct 0·74 O = 100·36.
8. Montebras, B. $(\frac{2}{2})$ G. 3·007	48·34	33·55	9·52	0·33	6·61	1·75	CaO 0·35 = 100·45, deduct 0·74 O = 99·71.

These analyses are arranged so as to show the variation in the relative amounts of water and fluorine. For all of them the author shows that the ratio of P : Al : R : (F,OH) = 1 : 1 : 1 : 1 nearly, corresponding to the formula $Al_2P_2O_8 + 2R(F,OH)$. The conclusion reached is that the varieties (see *hebronite* and *montebrasite* in Appendixes I. and II.) differ only in the extent to which the fluorine is isomorphously replaced by hydroxyl (HO). See also *triploidite*, in this Appendix.

Occurrence at Montebras, with analyses, *Thenard*, Monit. Scientif., III., ix., 1175 (Jahresb. Ch., 1879, 1204).

AMBLYSTEGITE.—App. I., p. 1.

AMBROSINE.—App. I., p. 1.

Amesite.—See *Corundophilite*, p. 81.

AMPHIBOLE, Min., p. 232; App. II., p. 2.—**Cryst.** description, *v. Kokscharof*, Min. Russl., viii., 159, 247, 1881.

Practical determination by optical methods in thin sections of rocks, *Fouqué* and *Lévy*, Ann. Min., VII., xii., 429, 1877; *Thoulet*, ib., xiv., 111, 1878.

Analyses of Scottish varieties, and discussion of results of alteration, *Heddle*, Trans. Soc. Edinb., xxviii., 502, 1878. Amelia Co., Va., *Massie;* Amherst Co., Va., *Baker*, Ch. News, xlii., 194, 1880.

A variety of amphibole containing no magnesia is called BERGAMASKITE, by *Lucchetti* (Mem. Acc., Bologna, IV., ii., 397, 1881; Z. Kryst., vi., 199). Occurs in a quartzose hornblende-porphyry, from Monte Altino, Province of Bergamo, Italy. Forms acicular crystals, vertically striated, and arranged in parallel or radiated groups; cleavage prismatic, 124°. G. = 3·075. Analysis: $(\frac{1}{2})$ SiO_2 36·78, Al_2O_3 15·13, Fe_2O_3 14·46, FeO 22·89, CaO 5·14, MgO 0·93, Na_2O 4·00, K_2O 0·42, loss [0·25], MnO tr. = 100; characterized by the small amount of magnesia present.

A manganesian (1·37 p. c. MnO) variety from Edwards, St. Lawrence Co., N. Y., was described under the name HEXAGONITE, as "a new hexagonal bisilicate," by *Goldsmith* (Proc. Acad. Nat. Sc., Philad., 1876, 160). Its true character was shown by *König* (ib., p. 180).

Bertels (Verh. Würzb. Ges., II., viii., in Jahresb. Ch., 1874, 1267) has given the name PHÄACTINITE to an alteration product of amphibole, forming radiated masses, doubly refracting. H. = 2. G. = 2·997–3·057. Color dirty grayish brown. Analysis after deducting a little magnetite: SiO_2 35·5, Al_2O_3 16·9, Fe_2O_3 25·4, MnO 1·4, MgO 5·3, CaO 7·2, H_2O 8·1 = 99·8, corresponding approximately to $R_2[R_2]_2Si_4O_{16} + 3$ aq. From the rock called by the same author isenite, occurring in Nassau, Germany. [An uncertain decomposition product hardly deserves a distinct name; the substance is not very far from delessite.]

ANALCITE, Min., p. 432; App. II., p. 2.—**Cryst.**, Kerguelen Is., *v. Lasaulx*, Z. Kryst., i., 204, 1877. Radauthal, *Lüdecke*, Z. gesammt. Nat., III., iv., 325, 1879.

Anal., Montreal, Canada, *Harrington*, Geol. Canada, 1878. Bohemia, *Preis* and *Vrba*, Ber. Böhm. Ges., 1879, 467.

Bamberger shows (Z. Kryst., vi., 32, 1881) that Bechi's picranalcite is identical with ordinary analcite, containing only a trace of magnesia.

The question as to the CRYSTALLINE SYSTEM of analcite has been recently discussed, as follows: *Schrauf* (Anzeig. Ak. Wien, 1876), referred crystals from Friedeck, Bohemia, to the orthorhombic system, describing them as complex twins, analogous to those of leucite described by vom Rath. *Mallard* (Ann. Min., VII., x., 111, 1876) describes the optical anomalies of the species, and explains them by assuming that a crystal is formed by the interpenetration of three pseudo-tetragonal individuals, each one of which is formed of two orthorhombic crystals, with nearly equal axes; these 24 orthorhombic crystals, composing a single pseudo-isometric crystal, correspond to the 24 planes of a tetrahexahedron. *Lasaulx* (J. Min., 1878, 510) describes the results of an optical examination of crystals of picranalcite from Monte Catini, Tuscany, and concludes (but see below) that they can be only explained by the assumption that a crystal is made up of 12 triclinic individuals interpenetrating each other, analogous to the compound crystals of phillipsite (q. v.). *Schulten* (Bull. Soc. Min., iii., 150, 1880) has obtained trapezohedral crystals by artificial means, and on optical grounds claims for them a complex structure, analogous to that assumed by Mallard (see above); with him, however, the crystals are rhombohedral. Crystals obtained later by a different method were isotropic (ib., v., 7, 1882.)

On the other hand, later investigations by *v. Lasaulx* (Z. Kryst., v., 330, 1881) on crystals from the Cyclopean Is., have led him to the conclusion that the optical phenomena are to be explained (as formerly accepted) by reference to the varying degrees of tension existing in the interior of the crystal. *Arzruni* and *Koch* (Z. Kryst., v., 483, 1881) have also, after a review of the whole subject, and an extended optical examination of specimens, especially from Kerguelen Is. and the Cyclopean Islands, concluded that analcite is to be referred to the isometric system. Finally, the whole subject has been exhaustively reviewed and further investigated by *Ben Saude* (Inaug. Diss., Stuttgart, 1881, and J. Min., 1882, i., 41). He describes the results of an optical examination of sections of many crystals cut parallel to the cubic, octahedral, dodecahedral, and trapezohedral (2–2) planes, and shows that they do not correspond with *Mallard's* hypothesis, but can be explained on the supposition of internal tension. He found, further, that gelatine cast into moulds corresponding to the crystalline forms acquired on solidifying similar optical characters.

ANATASE.—See *Octahedrite*, p. 85.

ANDALUSITE, Min., p. 371; App. II., p. 2.—Optical examination, *Bertrand*, Bull. Soc. Min., i., 94, 1878; *Bertin*, ibid., ii., 54 et seq.

Anal., San Piero, Elba, *Grattarola*, Boll. Com. Geol., 1876, 328.

ANDREWSITE, App. I., p. 1.—Locality described, *Foster*, Trans. Geol. Soc., Cornwall, ix., 1875. Description and anal. (Flight), *Maskelyne*, J. Chem. Soc., July, 1875, p. 586.

ANGLESITE, Min., p. 622; App. II., p. 3.—**Cryst.**, Erzberg, *v. Zepharovich*, Lotos, Dec., 1874. Hungary, *Krenner*, Z. Kryst., i., 321, 1877. Sardinia (list of planes, etc.), *Q. Sella*, Acc. Linc. Trans., III., iii., 150, 1879.

Indices of refraction as affected by change of temperature, *Arzruni*, Z. Kryst., i., 182, 1877.

Recent formation at Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 604, 1875. Occurrence at Vesuvius, *Scacchi*, Rend. Acc. Nap., Dec., 1877.

ANHYDRITE, Min., p. 621; App. II., p. 3.—**Cryst.**, Berchtesgaden, Bavaria, etc., *Groth*, Min.-Samml., Strassburg, 141, 1878.

Occurrence at Vesuvius, *Scacchi*, Att. Acc. Nap., vi., 1873.

Animikite.—See *Macfarlanite*, p. 71.

ANKERITE, Min., p. 685; App. II., p. 3.—**Anal.**, Phenixville, Penn., *König*, Proc. Ac. Nat. Sc. Phil, 1877, 290.

Boricky has examined a series of minerals from Bohemia, related to ankerite, and discusses the relation in composition between them and other similar carbonates (Min. Mitth., 1876, 47). He writes the general formula $CaFeC_2O_6 + x(CaMgC_2O_6)$, for all the related minerals, where x may have one of the values $\frac{1}{2}$, 1, $\frac{4}{3}$, $\frac{3}{2}$, $\frac{5}{3}$, 2, 3, 4, 5, 10; those varieties in which $x < 2$ are included under *ankerite*, and the remainder under the name ***parankerite***. For normal ankerite he takes $x = 1$, and for normal parankerite $x = 2$.

Ånnerödite, *W. C. Brögger*, Geol. För. Förh., v., 354, 1881.

Orthorhombic : Axes—$\dot{c}:\bar{b}:\breve{a}$ = 0·36103 : 1. : 0·40369. Observed. planes *i*-ī, *i*-ĭ, *O*, *I*, *i*-3̆, *i*-5̆, 2-ī, ½-ĭ, 1-ĭ, 1, 2, 2-2̄, 2-2̆, 3-3̆. *I* ∧ *I* = 136° 2′, *i*-3̆ ∧ *i*-3̆ = 100° 44′, 2-ī ∧ 2-ī = 58° 25′. In prismatic crystals of varied habit, often closely resembling columbite ; planes sometimes developed according to monoclinic symmetry. Angles near those of columbite (the position taken is that of Schrauf, *I* = *i*-3̆, Min., p. 516), and also not far from those of polycrase. Twinning plane *i*-5̆. Many crystals often grouped in parallel position, thus forming an apparently single crystal of considerable size.

H. = 6. G. = 5·7 of anhydrous crystals. Lustre metallic to greasy submetallic. Color black. Streak dark blackish brown to brownish or greenish gray. Opaque, or translucent in very thin splinters. Fracture subconchoidal. Brittle. B. B., fuses on the edges to a black glass. Analysis by C. W. Blomstrand :

Cb_2O_5	SnO_2	ZrO_2	SiO_2	ThO_2	Ce_2O_3	Y_2O_3	UO	PbO	FeO	MnO	CaO	MgO	K_2O	Na_2O	Al_2O_3	H_2O
48·13	0·16	1·97	2·51	2·37	2·56	7·10	16·28	2·40	3·38	0·20	3·35	0·15	0·16	0·32	0·28	8·19 = 99·51.

Neglecting the silica, the formula calculated by Blomstrand is $R_2Cb_2O_7$ + 2½ aq., which makes it nearly identical with samarskite, and also to the less certain nohlite (App. II., p. 41), except in the water; Brögger, however, shows that the water is not essential, but is due to a partial alteration which is accompanied by a lowering of the hardness (to 4·5) and specific gravity (to 4·28), and a loss of lustre. A crystal with G. = 5·7 showed only a trace of water. The mineral is consequently hardly to be separated from samarskite in composition, but it is different in form (see E. S. Dana, Am. J. Sc., III., xi., 201, 1876). Brögger shows further, that ånnerödite (euxenite and polycrase) bears the same relation to columbite that samarskite does to tantalite ; the two last being very near in form, as are ånnerödite and columbite. From the pegmatite vein at Ånneröd, near Moss, Norway, where it is associated with monazite, alvite (q. v.), apatite, magnetite, beryl, topaz, and other minerals.

Anomite.—See *Mica Group*, p. 77.

ANORTHITE, Min., p. 337; App. II., p. 3.—**Cryst.,** Albani Mts., *Q. Sella*, Accad. Linc. Mem., III., i., 96, or Z. Kryst., i., 241, 1877. Pesmeda Alp, Monzoni, Tyrol, rose-red variety, *vom Rath*, Ber. nied. Ges. Bonn., July 2, 1877 ; anal. by *Gamper*, Verh. geol. Reichs., 1877, 134. Aranyer Berg, Transylvania, *vom Rath*, Z. Kryst., v., 23, 1880. Mt. Etna (cyclopite) *v. Lasaulx*, Z. Kryst., v., 326, 1880.

Expansion of crystals with heat, *Beckenkamp*, Z. Kryst., v., 441, 1881.

Pseudomorph, Franklin Furnace, N. J., *Rœpper*, Am. J. Sc., III., xvi., 364, 1878.

The esmarkite from Kjörrestad, in Bamle, Norway, is regarded by *Brögger* and *Reusch* (ZS. G. Ges., xxvii., 676, 1875) as probably a distinct species, although they show that it follows the same twinning laws as the anorthite of Vesuvius. For Des Cloizeaux's results see App. II., p. 19.

See also *Feldspar Group*, p. 45, and *Barsowite*, p. 12.

ANTHOPHYLLITE, Min., p. 231; App. II., p. 3.—Opt. exam., Bamle, Norway, *Des Cloizeaux*, C. R., lxxxiv., 1473, 1877. *Pisani* (C. R., lxxxiv., 1510) has analyzed the Bamle mineral (1), and also (2) the *snarumite* of Breithaupt (Min., p. 316). Des Cloizeaux (l. c.), in view of these analyses, and also of the relation in optical character, suggests that the snarumite may be an alteration product of an aluminous anthophyllite. Analysis 3 (by Rosenius) and 4 (by Stadius) are of an orthorhombic mineral referred to anthophyllite (G. = 3·022–3·045) from Stansvik, near Helsingfors, Finland, *F. J. Wiik* (Z. Kryst., ii., 498, 1878).

	SiO_2	Al_2O_3	FeO	MgO	CaO	Na_2O, K_2O	ign.	
1. Bamle, G. 2·98.	51·80	12·40	3·67	27·60	....	1·44	3·00	= 99·91.
2. Snarum	57·90	13·55	1·90	19·40	0·87	4·50	2·86	= 100·98.
3. Stansvik	51·74	8·55	20·35	16·45	1·79	0·41 MnO	.....	= 99·29.
4. Stansvik	52·05	9·46	20·72	17·24	1·35	0·26 MnO	....	= 101·08.

ANTILLITE.—App. I., p. 1.

ANTIMONY, Min., p. 18.—Description of artificial crystals, *Laspeyres*, ZS. G. Ges., xxvii., 574, 1875.

APATITE, Min., p. 530; App. II., p. 3.—**Cryst.**, from different localities, *Groth*, Min. Samml., Strassburg, 174, 1878. Lama dello Spedalaccio, *Uzielli*, Accad. Linc. Mem., i., 159, 1876.

According to *Mallard* (Ann. Min., VII., x., 147, 1876), apatite is to be regarded as pseudo-hexagonal, being formed by the intergrouping of orthorhombic individuals; a thin section of a Schlaggenwald crystal showed three irregularly joined sectors, of different optical orientation, and each distinctly biaxial; others from Estremadura, Spain, showed six sectors, two opposite belonging to the same crystal. In other cases normal uniaxial characters were observed and explained by the intimate union of the different molecular aggregations.

Etching figures corresponding to the pyramidal hemihedrism, *Baumhauer*, Ber. Ak. München, 1875, 169. Pyro-electrical characters, *Hankel*, Wied. Ann., vi., 52, 1879. Absorption bands in spectrum (Ce,La,Di), *Cossa*, Accad. Linc. Mem., III., iii, 17 et seq., 1878.

Analyses, etc. Occurrence at Kjörrestad, Bamle, Norway, *Brögger* and *Reusch*, ZS. G. Ges., xxvii., 646, 1875. Nischne Novgorod (phosphorite), *v. Möller*, Verh. Min. Ges. St. Pet., II., xii., 61. Method of occurrence in Canadian veins, often of immense size, *Harrington*, Geol. Canada, 1878; composition of Canadian apatites, *C. Hoffmann*, Geol. Canada, 1879.

Siewert (Z. Gesammt. Nat., II., x., 339, 1874) found 6·7 p. c. MnO in an apatite from San Roque, near Cordoba, Argentine Republic, and calls this variety, in which part of the calcium is replaced by manganese, MANGANAPATITE. *Penfield* (Am. J. Sc., III., xix., 367, 1880) has analyzed apatites from Branchville, Conn., and Franklin Furnace, N. J., containing manganese; one variety from Branchville afforded 10·59 p. c. MnO.

APHROSIDERITE, Min., p. 502; App. II., p. 3.—Striegau, Silesia, *Websky* (anal. by Rammelsberg), ZS. G. Ges., xxxi., 211, 1879.

APHTHITALITE, Min., p. 615; App. II., p. 3.—Vesuvius, *Scacchi*, Atti Acc. Nap., Dec., 1873 (Contr. Min., ii., 48).

APHTHONITE.—See *Tetrahedrite*, p. 120.

APOPHYLLITE, Min., p. 415; App. II., p. 3.—**Cryst.**, Radauthal, Harz, *Lüdecke*, Z. Kryst., iv., 626, 1880. Utö, Sweden, *Seligmann*, J. Min., 1880, i., 140.

Pyro-electrical characters, *Hankel*, Pogg. Ann., clvii., 163, 1876.

Mallard (Ann. Min., VII., x., 121, 1876) argues that the true form of apophyllite is monoclinic, and that the crystals are only pseudo-tetragonal. *Rumpf* (Min. Petr. Mitth., ii., 369, 1879) has reached a similar conclusion. *Klocke* (J. Min., 1880, ii., 11, ref.), however, opposes the view of Rumpf, shows in what respects his argument is inconclusive, and explains otherwise more satisfactorily the optical anomalies. See also remarks by *Groth*, Z. Kryst., v., 376., 1881.

Anal., Cipite-Alpe, *Mattesdorf*, Verh. G. Reichs., 1876, 32.

AQUACREPITITE.—App. I., p. 2.

ARAGONITE, Min., p. 694; App. II., p. 4.—**Cryst.**, monograph, *v. Kokscharof*, Min. Russl., vi., 261, 1875. Eisenerz and Hüttenberg, *v. Zepharovich*, Ber. Ak. Wien, lxxi., 253, 1875. Oberstein a. d. Nahe, *Laspeyres*, Z. Kryst., i., 202, 1877; ib., iv., 433, 1880.

Anal., 7·29 $PbCO_3$, Austin Mine, Wythe Co., Va., *Dunnington*, Proc. Am. Ch. Soc., ii., 14, 1878.

On surface of meteoric iron, anal., *J. L. Smith*, Am. J. Sc., III., xii., 107, 1876.

ARAGOTITE, App. II., p. 4.—Optical examination, *Bertrand*, Bull. Soc. Min., iv., 87, 1881.

Arctolite. ARKTOLITE, *Blomstrand*, "Ett högnordiskt mineral," Geol. För. Förh., v., 210, 1880.

Occurs in a crystalline limestone, forming small irregularly curved crystalline plates, generally compact, occasionally showing prismatic angles of 124°–126° (Sjögren, l. c.). H. = 5. G. 3·03. Colorless or yellowish to greenish. Analysis (⅔): SiO_2 44·93, TiO_2 0·38, Al_2O_3 23·55, Fe_2O_3 1·24, CaO 13·28, MgO 10·30, Na_2O 1·73, K_2O 0·79, H_2O 3·15 =

99·74. This corresponds to the formula $H_2R_2[Al_2]Si_3O_{12}$. B. B. fuses with difficulty to a white enamel; partially attacked by acids with the separation of flocculent silica. Found in 1861 on Hvitholm, near Spitzbergen. [A relation to prehnite, on the ground of the composition, and to hornblende, because of the prismatic angle, is suggested, but the mineral needs further examination before its true character can be settled.]

ARDENNITE, App. II., p. 4.—Supplementary description by *v. Lasaulx*, J. Min., 1876, 363, and *Bettendorff*, Pogg. Ann., clx., 126, 1877. Analyses by Bettendorff, (1) sulphur-yellow opaque var., G. = 3·656; (2) brown transparent var., G. = 3·643.

	SiO_2	Al_2O_3	Fe_2O_3	MnO	CuO	MgO	CaO	V_2O_5	As_2O_5	H_2O	
1.	27·50	22·76	1·15	30·61	0·17	1·38	1·83	0·53	9·33	5·13	= 100·39.
2.	27·84	24·22		26·70	....	3·01	2·17	9·20	2·76	5·01	= 100·91.

It is concluded by Bettendorff, that in this mineral arsenic and vanadium replace each other in varying proportions, with a consequent variation in color; in several other trials 1·83, 2·31, 2·53, 2·98, 6·64 p. c. As_2O_5 were found; v. Lasaulx (l. c.) shows that the vanadium ardennite is probably the original mineral, and that the presence of the arsenic is due to gradual alteration.

Arequipite.—*A. Raimondi*, Minéraux du Pérou, Paris, 1878, p. 167.

Compact, wax-like. H. nearly 6. Color honey yellow. Fracture conchoidal. According to a qualitative analysis, a silico-antimoniate of lead. B. B. on charcoal fuses with difficulty, yielding buttons of lead, and gives off antimonial vapors. Slightly attacked by nitric acid, dissolves slowly in hydrochloric acid to which a little nitric has been added, and leaves a residue of silica. Occurs sparingly in a quartzose gangue, with argentiferous lead carbonate and chrysocolla, at the Victoria mine, Montagne de la Trinité, near Tibaya, Province of Arequipa, Peru. [Needs further examination, probably a mixture.]

ARFVEDSONITE, Min., p. 243.—**Anal.**, El Paso Co., Colorado, *König*, Am. Phil. Soc., Philad., xvii., 516, 1877, or Z. Kryst., i., 430. Greenland, discussion of composition, *Dölter*, Z. Kryst., iv., 34, 1879.

ARGENTITE, Min., p. 38; App. II., p. 4.—**Cryst.**, description, *Groth*, Min.-Samml. Strassburg, 1878, p. 50.

ARGENTOPYRITE, Min., p. 39; App. II., p. 4.—See *Sternbergite*, p. 115.

Argyropyrite.—See *Sternbergite*, p. 115.

ARITE.—App. II., p. 4.

Arrhenite.—*Nordenskiöld; Engström*, Inaug. Diss., Upsala, 1877 (Abstr. by Brögger, Z. Kryst., iii., 201, 1878).—A substance looking like red feldspar; occurs with fergusonite and cyrtolite at Ytterby, Sweden. G. = 3·68. Analysis: Ta_2O_5 21·28, Cb_2O_5 2·67, SiO_2 17·65, ZrO_2 3·42, Fe_2O_3 1·87, Al_2O_3 3·88, $Ce_2(Di_2, La_2)O_3$ 2·59, Y_2O_3 22·06, Er_2O_3 11·10, CaO 5·22, BeO 0·74, H_2O 6·87 = 100·35.

[Regarded as only a decomposition product, and hence not deserving of a distinct name.]

Arsenargentite.—*J. B. Hannay*, Min. Mag., i., 149, 1877. In orthorhombic acicular crystals imbedded in native arsenic. Analysis gave: As 18·43, Ag 81·37 = 99·80, corresponding to the formula Ag_3As. Source "probably Freiberg."

[An imperfect description from a single specimen of uncertain origin is a most unsatisfactory basis for a new name.]

ARSENIC, Min., p. 17; App. II., p. 5.—**Cryst.**, anal. (Janovsky), Joachimsthal, *v. Zepharovich*, Ber. Ak. Wien, lxxi., 272, 1875.

Arseniosiderite.—Min., p. 76, App. II., p. 5.

Arsenolite, Min., p. 183.—Anomalous optical characters of artificial crystals, perhaps pseudo-isometric, *Grosse-Bohle,* Z. Kryst., v., 233, 1880. See also *Senarmontite,* p. 108.

Arsenopyrite, Min., p. 78; App. II., p. 5.—**Cryst.,** Joachimsthal, *Gamper,* Verh. geol. Reichs., 1876, 354. With pyrite in parallel position, *Sadebeck,* Wied. Ann., v., 576, 1878; do. with galenite, *Groth,* Min.-Samml., Strassburg, p. 39, 1878. Reichenstein, Silesia, *Hare,* Z. Kryst., iv., 296, 1879.

Arzruni (Z. Kryst., ii., 430, 1878) has examined (but see Hare l. c.) crystals from eight localities, and has shown considerable variation in angle between them. He also states that while the composition is different for different localities, it agrees neither with $FeS_2 + AsS_2$, nor with $m FeS_2 + n FeAs_2$, but that the percentage amount of iron remains nearly constant.

Becke (Min. Mitth., 1877, 101) discusses the relations in crystalline axes between arsenopyrite, danaite, and glaucodot, and concludes that they do not correspond with the amount of cobalt present, as suggested by Scheerer; this result, however, is questioned by Groth (Z. Kryst., ii., 520).

Arsenotellurite.—App. II., p. 5.

Arsenstibite.—App. II., p. 5.

Asmanite, App. II., p. 5.—In meteoric iron of Rittersgrün, *Weisbach,* J. Min., 1876, 934; *Winkler,* ib., 1879, 903. According to Weisbach, asmanite is identical with tridymite, as suggested by *v. Lasaulx* (Z. Kryst., ii., 274, 1878). See in Nov. Act. Leopold.-Car. Ak., xl., 358, 1878. See also *Groth,* Tab. Uebers. Min., p. 33, 1882.

Aspidolite.—App. I., p. 2, II., p. 5.

Asteroite.—App. I., p. 2.

Astrophyllite, Min., p. 308; App. II., p. 6.—With arfvedsonite and zirkon, El Paso Co., Colorado, *König,* Am. Phil. Soc., Philad., xvi., 509, 1877 (or Z. Kryst., i., 423). An analysis gave: SiO_2 34·68, TiO_2 13·58, ZrO_2 2·20, Fe_2O_3 6·56, Al_2O_3 0·70, FeO 26·10, MnO 3·48, Na_2O 2·54, K_2O 5·01, H_2O 3·54, MgO 0·30, CuO 0·42, Ta_2O_5 (?) 0·80 = 99·91.

Cryst. and optical exam., Norway and Colorado, *Bücking,* Z. Kryst., i., 433, 1877; *Brögger,* Z. Kryst., ii., 278, 1878. Brögger concludes that the mineral belongs to the triclinic system. It is now referred to the pyroxene group.

Atacamite, Min., p. 121; App. II., p. 6.—**Cryst.,** Chili, *Brögger,* Z. Kryst., iii., 488, 1879; *v. Rath,* Z. Kryst., v., 256, 1880.

Anal., Yorke's Peninsula, Wallaroo, *T. C. Cloud,* Chem. News, xxxiv., 254, 1876. New South Wales, *Liversidge,* Proc. Roy. Soc., N. S. W., Nov. 3, 1880.

From the Nellore District, India, *Mallet,* Rec. Geol. Surv. India, xii., 171, 1879.

Atelestite.—Min., p. 392; App. II., p. 6.

Atelina, Atelite.—See *Tenorite,* p. 119.

Atopite.—*Nordenskiöld,* Geol. För. Förh., iii., 376, 1877.

Isometric; in octahedrons, with cube and dodecahedron, also *m–m,* and *i–n* planes. H. = 5·5–6. G. = 5·03. Lustre greasy. Color yellow to resin brown. Translucent. Composition $R_2Sb_2O_7 = Sb_2O_5$ 73·12, CaO 17·51, FeO 2·71, MgO 1·50, K_2O 0·84, Na_2O 4·32 = 100. Analyses: 1, the mineral fused with sodium carbonate; 2, do. reduced with hydrogen; 3, mean of (1) and (2).

	Sb_2O_5	FeO	MnO	CaO	K_2O	Na_2O	
1.	72·61	3·04	1·34	18·05	....	....	
2.	.....	2·54	1·72	17·65	0·86	4·40	
3.	72·61	2·79	1·53	17·85	0·86	4·40	= 100·04.

B. B. in forceps in O. F. unchanged. On charcoal in R. F. sublimes in part, fuses at first with difficulty, and gives finally, when the antimony pentoxide is all reduced to the metallic state and driven off, a dark infusible slag. In salt of phosphorus dissolves to a clear bead, yellow while hot, and colorless on cooling. Insoluble in acids; decomposed with difficulty by fusion with sodium carbonate. Easily reduced by hydrogen. (cf. *romeite.*)
Occurs as octahedrons imbedded in hedyphane, which in turn forms little veins in rhodonite; rare. Locality Långban, in Wermland, Sweden. Named from ἄτοπος, *unusual.*

AUGITE.—See *Pyroxene*, p. 100.

AUTUNITE, Min., p. 586; App. II., p. 6.—Himmelfahrt mine, Johanngeorgenstadt, Saxony; *Brezina* makes the crystals to be monoclinic (or triclinic), with pseudo-tetragonal symmetry, Z. Kryst., iii., 273, 1879.
Composition, *Church*, J. Chem. Soc., Feb., 1875, 109.

AXINITE, Min., p. 297; App. II., p. 6.—**Cryst.**, Veszverés, Hungary, and Medels, Switzerland, *Schmidt*, J. Min., 1881, i., 371 ref. (or Z. Kryst., vi., 98).
Pyro-electrical characters, *Hankel*, Wied. Ann., vi., 57, 1879. Expansion of crystals with heat, *Beckenkamp*, Z. Kryst., v., 451, 1881.

AZORITE.—Min., p. 761; App. II., p. 6.

AZURITE, Min., p. 715; App. II., p. 6.—**Cryst.** descript. (twins), Chessy near Lyons, *Groth*, Min.-Samml., Strassburg, p. 138, 1878.

BABINGTONITE, Min., p. 227; App. II., p. 6.—Observed in slag from Bessemer steel, *Klemm*, Chem. Centralbl., 1874, 215. See also *Szaboite*, p. 118.

Balvraidite.—*Heddle*, Min. Mag., iv., 117, 1880.
Structure saccharoidal. H. = 6. G. = 2·905–2·908. Color pale purplish brown. Analyses (1) dark var.; (2) paler var.:

SiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	H_2O	
46·04	20·11	2·52	0·79	8·30	13·47	2·72	1·36	4·71	= 100·02.
46·17	20·95	1·86	0·84	7·36	13·25	3·25	1·56	4·90	= 100·14.

B. B. fuses with intumescence to a vesicular pale blue glass. Presents a mottled appearance under the microscope, and was judged to be homogeneous. Occurs in a granular limestone, at Balvraid, Inverness-shire, Scotland. [Needs further examination; as the description stands at present, this substance, "which may prove to be a new mineral," certainly does not deserve a distinct name.]

Barcenite.—*J. W. Mallet*, Am. J. Sc., xvi., 306, 1878.
Massive; structure finely granular, compact or porous; also columnar (pseudomorphous after livingstonite). H. = 5·5. G. = 5·343. Lustre dull, earthy, sometimes slightly resinous. Color, dark gray, nearly black. Streak ash gray, with slight greenish tint. Fracture tolerably even. Brittle. Analysis by J. R. Santos:

Sb*	S	Hg	Ca	O	H_2O	
50·11	2·82	20·75	3·88	[17·61]	4·73 (below 130°C. 1·23)	SiO_2 0·10 = 100.

* Atomic weight = 120.

The sulphur is assumed to exist as HgS, and is accordingly deducted with a corresponding amount of mercury. For the remainder the following atomic ratios are then obtained:—$RO : Sb_2O_3 : Sb_2O_5 = 4 : 1 : 5$, and $Sb_2O_5 : H_2O = 1 : 5$. The antimonic acid (Sb_2O_5, $5\,H_2O$) is again assumed to exist independently as an impurity, and the formula for the remainder written: $[Sb_2O_3\ 4(RO)]\ (Sb_2O_5)_5$ corresponding to a normal antimonate $\overset{I}{M}SbO_3$.
B. B. in O. F. decrepitates slightly, turns nearly white, and becomes rounded on the edges; in R.F. gives off antimony fumes, accompanied with a greenish blue flame. In

the closed tube gives off water, metallic mercury, black mercury sulphide, and a little antimony trioxide; in the open tube metallic mercury is deposited, and also more antimony trioxide, the fumes of sulphur dioxide passing off. On charcoal a white antimonial sublimate, and with soda antimony is obtained in metallic beads. With borax in O. F. a clear colorless glass, which in R.F. becomes turbid.

From Huitzuco, State of Guerrero, Mexico. Associated with livingstonite, from the decomposition of which it has been formed. Named after Sr. Mariano Barcena, the Mexican mineralogist. [That the original material examined is, as assumed, a mixture, cannot be questioned, but that the true nature of the compounds present has been, or in fact can be, definitely settled so as to establish beyond doubt the nature of a new species seems very improbable.]

BARETTITE.—App. I., p. 3.

BARITE, Min., p. 616; App. II., p. 6.—**Cryst.**, *v. Kokscharof*, Min. Russl., vii., 25, 1875. Calafuria, near Leghorn, Italy, *Uzielli*, Acc. Linc. Mem., II., iii., 611, 1876. Valle della Sterza, Tuscany, *D'Achiardi*, Acc. Soc. Tosc., iii., 160, 1877. *Groth*, Min.-Samml. Strassburg, p. 142, 1878. Muzsaj, Hungary (wolnyn), *Schmidt*, Z. Kryst., iii., 428, 1879. Swoszowice, Galicia, *Vrba*, Z. Kryst., v., 433, 1881.

Effect of change of temperature on indices of refraction, *Arzruni*, Z. Kryst., i., 71, 1877.

Anal., earthy barite, St. Louis, Mo., *König*, Proc. Acad. Nat. Sc. Philad., 1876, 156. Last Chance Mine, Morgan Co., Mo., *Broadhead*, Am. J. Sc., III., xiii., 419, 1877.

BARSOWITE, Min., p. 340.—Re-examined microscopically by *Bauer* and analyzed by *Friederici*, and shown to have the composition of anorthite, with which it does not, however, in all respects correspond; G. = 2·584 after deduction for the corundum present, J. Min., 1880, ii., 63.

BARTHOLOMITE.—App. II., p. 6.

Barylite.—*C. W. Blomstrand*, Geol. För. Förh., iii., 128, 1876.

In groups of prismatic crystals, more or less tabular in habit. Two distinct cleavages forming an angle of about 84°. H. = 7. G. = 4·03. Lustre greasy. Colorless. Semi-transparent. Analysis:

	SiO_2	Al_2O_3	Fe_2O_3	BaO	PbO	CaO	MgO	CuO	Bi_2O_3	ign
($\frac{2}{2}$)	34·36	16·02	0·98	46·23	0·93	0·68	0·27	0·09	0·19	0·15 = 99·90.

Formula calculated: $Ba_4[Al_2]_2Si_7O_{24}$, which requires: SiO_2 33·94, Al_2O_3 16·61, BaO 49·45 = 100. B. B. infusible; not attacked by acid. Named from *βαρύς heavy*, and *λίϑος stone*. Occurs with hedyphane in crystalline limestone at Långban, in Wermland, Sweden. [A mineral of so unusual composition deserves to be more thoroughly described on the crystallographical side.]

BARYTOCALCITE, Min., p. 701.—**Anal.** (by Lundström), corresponding to $CaCO_3 + BaCO_3$, Långban, Sweden, *Sjögren*, Geol. För. Förh., iii., 289, 1876. According to Des Cloizeaux (Bull. Soc. Min., iv., 95, 1881), the mineral analyzed by Lundström is rhombohedral with a cleavage angle of about 105°.

BARYTOCELESTITE.—See *Celestite*, p. 21, and App. II., p. 7.

Baryturanite = *Uranocircite*, p. 127.

BASTITE, Min., 469.—Anal., Elba, *Pisani*, C. R., lxxxiii., July 10, 1876.

BASTNÄSITE.—See *Tysonite*, p. 126, and App. I., p. 2.

BEAUXITE, Min., p. 174; App. II., p. 7.—**Analyses**, Feistritz and Nassau, showing wide variation in composition, *Henatsch*, Inaug. Diss., Breslau, 1879 (Z. Kryst., iv., 642, 1880). Age, origin, etc., *Dieulafait*, C. R., xciii., 804, 1881.

Beccarite.—See *Zirkon*, p. 134.

Beegerite.—*König*, Am. Chem. Journ., ii., 379, 1881 (or Z. Kryst., v., 322).

Isometric, in elongated crystals; also massive. Cleavage cubic. G. = 7·273. Color light to dark gray. Lustre brilliant metallic. Mean of 4 partial analyses, after deduction of quartz (2·6 p. c.):

S	Bi	Pb	Cu
14·97	20·59	64·23	1·70 = 10·49.

This corresponds nearly to $Pb_6Bi_2S_9$ or $6PbS + Bi_2S_3$ = S 14·78, Bi 21·36, Pb 63·84. B. B. decrepitates, giving on charcoal reactions for lead and bismuth. Dissolves readily in warm HCl. From the Baltic Lode, near Grant P. O., Park Co., Colorado. Named after Mr. Hermann Beeger, of Denver.

BERAUNITE—ELEONORITE, *Nies*, xix. Ber. Oberhess. Ges. Nat.-u. Heilk., p. 111, 1880. *Streng*, J. Min., 1881, i., 102.

Monoclinic crystals, tabular (*i–i*) and prismatic (in direction of *b*), in habit similar to some crystals of lazulite from Georgia. Axes $\grave{c} : b : \grave{a} = 4{\cdot}0157 : 1 : 2{\cdot}755$, $\beta = 48° 33'$. $O \wedge i\text{–}i = 131° 27'$, $i\text{–}i \wedge 1 = 104° 24'$; $1 \wedge 1$ (clinodiag.) $= 39° 56'$. Twins with *i–i* as twinning plane, also penetration twins. Cleavage *i-i*. Often in druses, and in radiated foliated crusts (Streng). H. = 3–4. Lustre vitreous, on *i–i* inclining to pearly. Color red brown to dark hyacinth red. Streak yellow, strongly dichroic.

Analyses by Streng: 1, crystals; 2, radiated coating on limonite:

	P_2O_5	Fe_2O_3	H_2O
1.	31·88	51·94	16·37 = 100·19.
2.	31·78	52·05	16·56 = 100·39.

Formula $[Fe_2]_3P_4O_{19}, 8H_2O$, or $2\,[Fe_2]\,P_2O_8 + [Fe_2]\,H_6O_6 + 5$ aq. B. B. fuses easily to a black bead metallic in appearance, crystalline on cooling. Easily soluble in HCl. Occurs on limonite at the Eleonore mine on the Dünsberg, near Giessen, and at the Rothläufchen mine near Waldgirmes, in the same region.

Streng (l. c.) calls attention to the close relation of eleonorite to beraunite from St. Benigna, Bohemia (Min., p. 558). The following are analyses of the original beraunite: 1. Tschermak, Ber. Ak. Wien, xlix., 341, 1864; 2, 3. Boricky, ib., lvi., 11, 1867; 4. Frenzel, from Scheibenberg, Saxony, J. Min., 1873, 23.

	P_2O_5	Fe_2O_3	H_2O
1. St. Benigna........	30·5	55·0	14·0 Na_2O 1·5 = 101.
2. "	30·2	55·8	15·1 = 101.
3. "	28·99	55·98	14·41 = 99·38.
4. Scheibenberg.......	28·65	54·50	16·55 = 99·70.

Streng shows that in composition the St. Benigna mineral is nearly identical with eleonorite, but regards the differences in physical characters too great to allow of their being united. The mineral of Frenzel seems to have a different crystalline form.

Bertrand (Bull. Soc. Min., iv., 88, 1881), has subjected both the beraunite and eleonorite to a new examination, and concludes that in angles, dichroism and optical qualities they are the same. There would seem consequently to be little doubt of their identity.

Bergamaskite.—See *Amphibole*, p. 5.

Bernardinite.—Described as a new fossil resin from San Bernardino, Cal., by *J. M. Stillman* (Am. J. Sc., III., xviii., 57, 1879); since shown by him to be an exudation from a species of conifer, which has received its particular characters from exposure to the atmosphere (ib., xx., 93, 1880).

BERYL, Min., p. 245; App. II., p. 7.—**Cryst.**, Eidsvold, Norway, *Websky*, Min. Mitth., 1876, 117. Alexander Co., N. C., *Hidden*, Am. J. Sc., III., xxi., 159 ; xxii., 24, 1881.

Santa Fé, Bogota, New Granada, *Vrba*, Z. Kryst., v., 430, 1881. Gold sands of the Ural, *N. v. Kokscharof, Jr.*, Bull. Ac. St. Pet., xxvii., 35, 1881 (or Min. Russl., viii., 223).

Pyro-electrical properties, *Hankel*, Pogg. Ann., clvii., 161, 1876. Specific gravity of different specimens, *Church*, Geol. Mag., ii., ii., 320, 1875.

Occurrence of emeralds of unusual size (one crystal 10 inches long) and beauty of color, in Alexander Co., N. C., *Hidden*, Am. J. Sc., xxii., 489, 1881.

Mallard (Ann. Min., VII., x., 148, 1876) describes the optical anomalies observed in crystals of beryl, and concludes that it is *pseudo-hexagonal*, the individuals of which a crystal is made up being orthorhombic; the relations are regarded as similar to those in apatite. See also *Des Cloizeaux*, Bull. Soc. Min., iv., 94, 1881.

Atterberg (Geol. För. Förh., ii., 405, 1874) uses the name PSEUDO-EMERALD (pseudosmaragd) to designate a mineral resulting from the alteration of beryl. The name was introduced by Berzelius for pseudomorphous crystals, consisting, as he regarded it, of ordinary beryl and mica. Atterberg retains the name for the hard portion of similar pseudomorphs, which, however, he finds to be not true beryl. Its characters are: hardness 5·5; G. = 2·70; lustre waxy; color dark grayish green; fracture splintery. Intimately mixed with mica scales. Analyses: 1, 2, the latter on material not entirely free from mica:

	SiO_2	Al_2O_3	BeO	FeO	MgO	K_2O	H_2O	
1.	57·32	17·46	13·11	0·30	0·32	7·82	3·64	= 99·97.
2.	56·23	19·05	12·55	0·18	0·50	7·45	4·83	= 100·79.

If the water is considered basic, the ratio for bases to silica is 2 : 3. The mineral differs from ordinary beryl in having lost part of its silica and gained potash and water; the alumina and glucina are sensibly unchanged. From Kårarfvet, near Fahlun, Sweden.

Grattarola (Riv. Scientif.-industr., No. 19, 1880, Florence) has given the name ROSTERITE to a mineral which he regards as a distinct variety of beryl. It occurs in short prismatic to tabular doubly-terminated crystals. Basal plane rounded, and apparently formed of many planes of varying position, belonging to the second series. In polarized light a basal section is divided into six sectors, corresponding to the prismatic edges, for the three alternate of which the extinction is the same. Biaxial interference figures (angle 15°) observed, the extinction plane in part parallel to the prism, in part inclined from 3½° to 7°. Color pale rose red. Analyses: 1, 2, from the respective ends of a crystal, which had a nucleus of normal beryl (anal. 3); 4, "typical rosterite."

	SiO_2	Al_2O_3	BeO	MgO	CaO	Na_2O, K_2O	Li_2O	H_2O	
1. G. = 2·77	61·97	21·93	8·62	1·26	0·42	undet.	....	undet.	
2. G. = 2·74	60·26	21·18	9·71	1·57	2·55	undet. 0·58	tr.	3·07	= 98·92.
3. G. = 2·77	62·88	17·09(?)	15·97(?)	2·62	2·99	undet.	....	2·32	= 103·87.
4. G. = 2·75	61·34	23·20	8·81	0·50	2·19	1·00	....	2·03	= 99·07.

[The reasons for regarding this as a distinct variety of beryl are: its crystalline habit, its optical character, and the variation in chemical composition. To the first, however, no weight can be given, and as little to the second, since analogous optical anomalies have been previously observed in ordinary beryl; as to the composition, further careful analyses are needed to establish that point.] Locality, Island of Elba.

BERZELIITE, Min., p. 544.—*W. Lindgren* (Geol. För Förh., v., 552, 1881) states that the hitherto accepted description of berzeliite is incorrect, in consequence of its having been confounded with another mineral which occurs at Långban, associated with it. The characters of true berzeliite are:

Massive; isometric (Sjögren, Geol. För. Förh., ii., 533, 1875, and A. Wichmann, Z. Kryst., v., 105, 1880); no distinct cleavage. H. = 5. G. = 4·07–4·09. Lustre resinous. Color honey yellow to sulphur yellow. Transparent to translucent. Fracture semi-conchoidal. Brittle. B. B. fuses rather easily to a brown bead. Soluble in hydrochloric and nitric acids. Occurs imbedded in small grains in a granular calcite; with calcite in hausmannite and in braunite; with caryinite. Sometimes of a green color, from minute inclosed hausmannite crystals.

There also occurs at Långban another arsenate, having the following characters: Massive ; anisotrope, but crystalline system uncertain ; no distinct cleavage. H. = 5. G. = 4·03–4·04 ; 3·89. Color dirty yellowish white or light sulphur yellow. An analysis by L. W. McCay gave : As_2O_5 62·00, CaO 20·00, MgO 12·81, MnO 4·18, PbO, FeO tr., insol. (SiO_2) 0·68 = 99·67 ; this corresponds to a simple ortho-arsenate, $R_3As_2O_8$. Occurs massive in a light brown fine granular mixture of calcite and manganiferous mica, often penetrated by hausmannite. This mineral is regarded as the one to which the earlier descriptions belong (Min., p. 544), but while optically distinct from berzeliite, their true relation is still very uncertain.

[The above observations only increase the doubts as to the true nature of berzeliite; as possibly bearing upon the question as to the relation of the isotrope and anisotrope minerals mentioned, attention may be called to the fact that Des Cloizeaux has observed isotropic varieties of gadolinite and also of homilite, supposed to be due to alteration.]

See also *Caryinite*, p. 20.

BEUDANTITE, Min., p. 589.—Optical exam., the same characters belong to the beudantite of Horhausen, of Cork (Adam's corkite), and of Dernbach (Adam's dernbachite); *Bertrand*, Bull. Soc. Min., iv., 255, 1881.

BEYRICHITE.—App. I., p. 3.

Bhreckite (or **Vreckite**), *Heddle*, Min. Mag., iii., 57, 1879. Fine granular, scaly ; soft and friable. Occurs as a light apple-green coating on quartz crystals. An analysis gave : SiO_2 34·92, Al_2O_3 7·16, Fe_2O_3 12·71, FeO 2·11, MnO 0·41, CaO 16·08, MgO 8·26, H_2O 17·77 (1·03 at 100° C.) = 99·42 (alkalies in traces). Soluble in HCl. From a cavity in a bowlder of syenitic granite, found on the hill of Ben Bhreck, near Tongue, in Sutherland, Scotland. [Provisionally named on the ground that "the substance may prove to be a new mineral"—needs further examination. No sufficient proof of the homogeneity of the material analyzed is given.]

BIEIROSITE.—App. II., p. 7.

BINDHEIMITE, Min., p. 591.—**Anal.**, Sevier Co., Ark., *Dunnington*, Amer. Assoc., 1877, 182; *C. E. Wait*, Trans. Am. Inst. Min. Eng., viii., 50, 1880.

BINNITE, Min., p. 90; App. II., p. 7.—**Cryst.**, Binnenthal, *Hessenberg*, Min. Not., xii., 6, 1875; *W. J. Lewis*, Z. Kryst., ii., 192, 1878.

BIOTITE.—See *Mica Group*, p. 77.

Bischofite.—See *Chloromagnesite*, p. 25.

BISMITE, Min., p. 785 ; App. II., p. 7.

BISMUTH, Min., p. 19; App. II., p. 7.—**Cryst.**, Schneeberg, *Fletcher*, Phil. Mag., V., ix., 185, 1880.

Anal. (with galenite), Mossgrufva, Nordmark, *Sjögren*, Geol. För. Förh., iv., 106, 1878.

BISMUTHINITE, Min., p. 30 ; App. II., p. 7.—**Cryst.**, Tazna, Bolivia, *Groth*, Z. Kryst., v., 252, 1880.

Anal., Choroloque, Bolivia, *Domeyko*, 6th App. Min. Chili, p. 22, 1878.

BISMUTITE, Min., p. 716 ; App. II., p. 7.—*Weisbach* (Jahrb. Berg.-Hutt., 1877) has described a supposed new bismuth carbonate under the name of BISMUTOSPHÆRITE.—Occurs in spherical forms with concentric structure, fine fibrous, radiated. H. = 3. G. = 7·28–7·32. Color bright yellow to blackish brown, different in successive layers. Streak yellowish gray. An analysis gave *Winkler* : CO_2 8·97, Bi_2O_3 88·58, quartz 0·98 = 97·83. Formula calculated Bi_2CO_5 (= $Bi_2C_3O_9$ + $2Bi_2O_3$), which requires CO_2 8·66, Bi_2O_3 91·34 = 100 [but uncertain, as the analysis shows a considerable loss] ; found at Neustädtel, near Schneeberg, Saxony. Weisbach states that this mineral is the original *Arsenik-wismuth* of

Breithaupt; Frenzel previously described what he regarded as Breithaupt's mineral under the name of agricolite (App. II., p. 1).

Other analyses of bismuth carbonates have been made by Carnot (C. R., lxxix., 304, 1874) of the mineral from Meymac, Corrèze, he found Bi_2O_3 86–90 p. c., CO_2 8·14–6·43, H_2O 1·94–4·86. He distinguishes three types: 1 (anal. 1), grayish white, somewhat foliated; 2 (anal. 2), dark gray, slightly greenish, fibrous; 3 (anal. 3), white, earthy, with yellowish spots. Anal. 4 by *Frenzel* (J. Min., 1873, 801, 946), from San Luis Potosi, Mexico (see also Barcena, Rev. Cientif. Mex., i., 8, Dec., 1879). Anal. 5 by Liversidge, with stream tin from Pond's Creek, New South Wales (Proc. Roy. Soc. N. S. W., Nov. 3, 1880). Anal. 6 by Winkler, quoted by Weisbach (J. Min., 1880, ii., 112), from Neustädtel, G. = 6·12–6·27, pseudomorph after native bismuth.

		CO_2	Bi_2O_3	H_2O	PbO	FeO	CaO	MgO	As_2O_5	Sb_2O_5	SO_3	HCl	gangue	
1. Meymac,	G. = 6·94	3·74	89·75	2·76	0·55	0·53	0·35	tr.	0·73	0·57	0·25	0·37	0·20	= 99·80.
2. "	G. = 7·26	4·15	87·50	3·55	0·44	0·50	0·55	0·07	0·80	1·25	0·22	0·20	0·30	= 99·53.
3. "	G. = 7·08	5·35	86·90	3·02	0·40	0·43	0·38	0·05	0·65	1·20	0·13	0·14	1·10	= 99·75.
4. San Luis,	G. = 7·59	7·00	90·10	1·80, SO_3 0·27, gangue 0·30 = 99·47.										
5. Pond's Creek		5·43	76·06	[11·84], SiO_2 4·69, Al_2O_3 (Fe_2O_3 tr.) 1·98 = 100.										
6. Neudstädtel,	G. = 6·20	2·91	95·90	1·04 = 99·85.										

[These analyses show a wide variation, due chiefly, without doubt, to the impurity of the material analyzed. Frenzel's mineral is rather near the bismutosphærite of Weisbach, which last seems to be distinct from the other minerals; if the loss (see anal.) is not water, it is an anhydrous carbonate.]

The bismuth carbonate described by Vogl as occurring at Joachimsthal (Min., p. 717, 753 A), since called WALTHERITE, includes, according to Bertrand (Bull. Soc. Min., iv., 58, 1881) two species, the one brown, the other green, optically unlike.

BISMUTOFERRITE.—App. I., p. 8; II., p. 7.

Bjelkite.—See *Cosalite*, p. 31.

Blackmorite.—See *Opal*, p. 86.

BLENDE.—See *Sphalerite*, p. 111.

BLÖDITE, Min., p. 643; App. II., p. 8.—**Cryst.**, Pendschab, India, *Schimper*, Z. Kryst., i., 71, 1877.

Occurrence at Ischl, Min. Mitth., 1877, 97.

Blomstrandite. *Lindström*, Geol. För. Förh., ii., 162, 1874.

Massive. H. = 5·5. G. = 4·17–4·25. Lustre vitreous. Color black. Powder coffee brown. Opaque, only translucent in very thin splinters.

Analyses:

	Cb_2O_5	Ta_2O_5	TiO_2	UO	FeO	CaO	H_2O	
1.	49·76		10·71	23·68	8·33	3·45	7·96,	MgO 0·16, Al_2O_3 0·11, MnO 0·04, precip. by H_2S 0·12 = 99·32.
2.	60·77			23·37	3·39	3·04	8·17,*	MgO tr. MnO 0·06, precip. by H_2S 0·20 = 99.

* At 100° 2·78 (in another trial 2·65), above 100° 5·39.

The atomic ratio of R : Cb, Ti = 1 : 2·5, and for Ti : Cb = 1 : 2·75. B. B. fuses with difficulty. Gives off water in the closed tube. With borax in O. F. a reddish yellow, on cooling a yellow bead; in R. F. reddish brown. With salt of phosphorus in O. F. a red brown bead when hot, and yellow when cold; in R. F. reddish yellow hot, and green cold.

Found very sparingly with nohlite (App. II., p. 41) in a feldspar quarry, at Nohl, Sweden. Named for Prof. C. W. Blomstrand of Lund. [Apparently distinct from other known minerals of this group, but needs further examination.]

Bolivite. *Domeyko*, 6th App. Min. Chili, p. 19, 1878. Described in some detail as a bismuth oxysulphide, Bi_2O_3 with Bi_2S_3. It is derived from the oxidation of the sulphide bismuthinite, and is of very uncertain composition. The description would apply to a mixture of the oxide with the original sulphide, which is enclosed in it, and it is very improbable that they are in chemical combination. The uncertain character of the mineral seems to have been later accepted by Domeyko, for in the 3d Ed. of his Mineralogy (1879, p. 304) the occurrence is only mentioned briefly, and without any name. Locality, mines of Tazna, in the province of Choroloque, Bolivia.

Bombiccite.—App. II., p. 8.

Boracite, Min., p. 595; App. II., p. 8.—The question as to the true explanation of the long recognized "optical anomalies" of boracite has been recently discussed by *Mallard*, Ann. Min., VII., x., 93, 1876; and Bull. Soc. Min., ii., 147; *E. Geinitz*, J. Min., 1876, 484; 1877, 394; *Baumhauer*, Z. Kryst., iii., 337, 1879; *Klein*, J. Min., 1880, ii., 209; 1881, i., 239.

Geinitz shows that (contrary to the earlier explanation) unaltered boracite is anisotropic; Mallard makes the species pseudo-isometric, explaining the optical phenomena by the grouping of twelve orthorhombic individuals (as remarked by Klein this hypothesis was proposed by Hartmann in 1826). Baumhauer reaches a conclusion somewhat similar to that of Mallard on the basis of the results of etching experiments. Klein, however, seems to settle the question conclusively in favor of the true isometric character of the species. He shows, for example, that the interior optical structure does not correspond to the exterior planes; that the distribution of the etching figures does not depend on the interior optical limits; and further, that upon an increase of temperature the former optical limits disappear or become indistinct, and that the optical fields change their position without affecting the form of the etching figures. He concludes that all the optical anomalies can be explained by the internal tension produced in the course of the growth of the crystal.

Borax.—Min., p. 597; App. II., p. 8.

Bordosite.—See *Amalgam*, p. 4; also App. II., p. 8.

Bornite, Min., p. 94; App. II., p. 8.—Analyses from Swedish localities quoted by *Cleve*, Geol. För. Förh., ii., 526, 1875. Relation to magnetite discussed, *Nordenström*, ib., iv., 341, 1878.

Boulangerite.—Min., p. 99; App. II., p. 8.

Bournonite, Min., p. 96; App. II., p. 8.—**Cryst.** Przibram and Waldenstein, *v. Zepharovich*, Lotos, 1876 (J. Min., 1876, 555, 556). Nagyag, *vom Rath*, Z. Kryst., i., 602, 1877. Horhausen, etc., *Groth*, Min.-Samml. Strassburg, p. 61, 1878. Neudorf, Harz, *v. Kokscharof*, Min. Russl., viii., 123, 1881.

Anal., Przibram, *Helmhacker*, Min. Mitth., 1875, 86.

Boussingaultite, Min., p. 635; App. II., p. 8.—A related salt analyzed by *Goldsmith*, Proc. Ac. Nat. Sc. Philad., 1876, 264.

Bowenite, Min., p. 465.—From New Zealand, *Berwerth*, Ber. Ak. Wien, lxxx., 116, 1879.

Bowlingite. *J. B. Hannay*, Min. Mag., i., 154, 1877.

Massive, consisting of minute crystals. Soft, feel like steatite. G. = 2·282–2·290. Color deep green. In thin sections semi-transparent. Analyses: 1, 2, 3, 4, Hannay; 5, Young, Trans. Geol. Soc. Glasgow, ii., 212:

		SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	$CaCO_3$	H_2O	
1. Bowling	G. = 2·282	34·32	18·07	3·65	6·81	9·57	5·14	22·70	= 100·26.
2. "		35·08	16·85	3·92	6·95	10·22	4·89	21·85	= 99·76.
3. Cuthbin	G. = 2·29	35·66	15·09	5·22	7·02	12·41	5·02	19·89	= 100·31.
4. "		35·82	16·14	4·85	6·99	11·73	4·87	19·63	= 100·03.
5. Cathcart		31·95	15·40	....	21·40	20·95	4·30	[6.30]	= 100·00.

Analysis 5, by Young, is said to have been made on the same material as that examined by Hannay! Found at Bowling, near Dumbarton, on the Clyde, and from the Cuthbin hills, Scotland, where it forms little veins in dolerite, being intimately associated with chrysolite, from which it may have been formed. Heddle (Trans. Soc. Edinb., xxix., 97, 1879), gives two analyses of the original mineral, of which the following is one: SiO_2 38·08, Al_2O_3 6·26, Fe_2O_3 4·36, FeO 4·97, MnO 0·23, CaO 2·97, MgO 21·46, K_2O 0·95, Na_2O 0·11, H_2O 20·48 = 99·97 (H_2O at 100°, 12·31). He concludes that Hannay's analyses were erroneous, and that the mineral is really a saponite. [The describer suggests a doubt as to the purity of the original material, which is a suggestion the accuracy of which no one will question.]

Brackebuschite.—See *Des Cloizite*, p. 36.

Braunite, Min., p. 163.—**Anal.**, Nagpur, India, *F. R. Mallet*, Rec. Geol. Surv. India, xii., 73, 1879. See also *Pyrolusite*, p. 99.

Bravaisite. *E. Mallard*, Bull. Soc. Min., i., 5, 1878.

Orthorhombic (on optical grounds); in thin layers and schistose masses consisting of fine crystalline fibres, mostly parallel in position. H. = 1–2. G. = 2·6. Color gray to greenish gray. Double refraction negative, strong; 2 E_a = 40°. Unctuous to the touch. Paste-like when wet. Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	H_2O
51·4	18·9	4·0	2·0	3·3	6·5	13·3 = 99·4.

The formula deduced, after the deduction of the iron as due to the presence of pyrites, is $R_2[Al_2]_2Si_9O_{26} + 8$ aq. B. B. fuses easily to a white glass. In the closed tube gives off water and becomes brown. Partially attacked by acids. Found in layers in the coal and bituminous schists of Noyant (Allier Dept.), France. Named after the French crystallographer M. Bravais. [Near some varieties of glauconite.]

Breislakite, Min., p. 216. According to *v. Lasaulx* (J. Min., 1878, 380), to be referred to amphibole instead of to pyroxene.

Breunerite, Min., p. 686.—**Cryst.**, *v. Kokscharof*, Min. Russl., vii., 181, 221, 1878.

Brochantite, Min., p. 664; App. II., p. 9.—Optical properties determined (orthorhombic?), *Bertrand*, Bull Soc. Min., iii., 56, 1880.

From Pisco, Peru, anal. by Mannington, *Semmons*, Min. Mag., iv., 259, 1881.

Made artificially, *Meunier*, C. R., lxxxvi., 686, 1878.

Bronzite, Min., p. 208; App. II., p. 9.—**Anal.**, Dun Mt., New Zealand, *Hilger*, J. Min., 1879, 129.

Brookite, Min., p. 164; App. II., p. 9.—*Mallard* (Ann. Min., VII., x., 134, 1876), regards the three forms of titanium dioxide—brookite, octahedrite, and rutile—as having the same primitive form (monoclinic), and argues that the differences between the species, in the forms of the crystals and in physical characters, are due to the different ways in which the individuals are grouped together. *Schrauf* (Ber. Ak. Wien, lxxiv., 535, 1876), after an extended study of crystals from different localities, concludes that they are all monoclinic and isomorphous with wolframite; he, however, distinguishes among them three types varying in the crystallographic constants (this result was announced earlier, see App. II., p. 9; also J. Min., 1877, 800; 1878, 50). Later (Z. Kryst., i., 274, 1877) he discusses the optical characters of the species in their relation to the crystalline system. The conclusions of Schrauf are questioned by *Groth* (Min.-Samml. Strassburg, 109, 1878), and measurements by Bücking are quoted agreeing with the orthorhombic form. Vom Rath earlier (Pogg. Ann., clviii., 405, 1876) found crystals from Atliansk to be orthorhombic.

See also *Pseudobrookite*, p. 97.

Brucite, Min., p. 175; App. II., p. 9.—Pyro-electrical properties, *Hankel*, Wied. Ann., vi., 53, 1879. Calculation of the indices of refraction by a method based upon the measured diameters of the rings observed in the axial interference figures in a plate of known thickness, *Bauer*, Ber. Ak. Berlin, 1881, 958.

An anal. of a partially decomposed brucite from Siebenlehn, near Freiberg, gave Petersen: MgO 38·92, FeO 18·73, CO_2 7·38, H_2O 30·46, SiO_2 4·15, Al_2O_3, CaO tr. = 99·64. After deducting the SiO_2 as quartz, and 24·49 p. c. hydromagnesite believed to be present as a decomposition product, and after calculating the remainder to 100, the result is MgO 39·89, FeO 24·92, H_2O 35·19 = 100. This is called EISENBRUCIT. *Sandberger*, J. Min., 1880, ii., 288.

Bunsenin.—See *Krennerite*, p. 66.

BUSTAMENTITE.—App. II., p. 9.

BYERITE.—App. II., p. 9.

BYTOWNITE.—App. II., p. 9.

CABRERITE, Min., p. 561; App. II., p. 9.—From zinc mines, Laurium, Greece, opt. exam. by *Des Cloizeaux*, showing isomorphism with erythrite; anal. by *Damour*, corresponding to the formula $R_3As_2O_8 + 8$ aq.: As_2O_5 41·40, NiO 28·72, CoO tr., FeO 2·01, MgO 4·64, H_2O 23·11 = 99·88 (Bull. Soc. Min., i., 75, 1878).

CACHEUTAITE.—App. II., p. 9.

CACHEUTITE. *Domeyko*, Min. Chili, 3d ed., p. 402, 1879. See App. II., p. 9, and Syst. Min., p. 798.

CACHOLONG, Min., p. 199; App. II., p. 9.—*Nordenskiöld*, Œfv. Ak. Stockholm, xxxi., May 13, 1874.

CACOXENITE, Min., p. 584; App. II., p. 9.—Anal. by Nies of a related mineral from the Eleonore mine, near Giessen, *Streng*, J. Min., 1881, i., 108.

CALAMINE, Min., p. 407; App. II. p. 9.—**Cryst.**, Altenberg, *Seligmann*, Z. Kryst., i., 342, 1877.

According to *Fock* (Groth, Tabell. Uebers. Min., 1882, p. 84), unchanged at 340° C., and loses water only at a red heat.

CALAVERITE, Min., p. 795; App. II., p. 9.—**Anal.**, Keystone and Mountain-Lion mines, Colorado, *Genth*, Am. Phil. Soc., Philad., xvii., 117, 1877 (or Z. Kryst., ii., 6): Te 57·32, Au 38·75, Ag 3·03, V_2O_3 0·05, FeO 0·30, Al_2O_3, MgO, etc, 0·55 = 100 (4·96 p. c. quartz deducted). Formula (Au, Ag) Te_2, with Au : Ag = 7 : 1, this requires Te 57·93, Au 39·01, Ag 3·06. Occurs in small imperfect crystals, imbedded in quartz. H. = 2·5. G. = 9.043.

See also *Krennerite*, p. 66.

CALCITE, Min., p. 670; App. II., p. 9 —**Cryst.**, *Hessenberg*, Min. Not., xii., 13 *et seq.*, 1875. *v. Kokscharof*, Min. Russl., vii., 59, 1875. Brigels, Tavetsch, *Kloos*, J. Min., 1816, 413. Yellowstone Park, coated with quartz crystals in parallel position, *E. S. Dana*, Am. J. Sc., III., xii., 448, 1876, or Z. Kryst., i., 39. Ahrenthal, Tyrol, *vom Rath*, Pogg. Ann., clv., 48, 1875; Elba, etc., Pogg. Ann., clviii., 414, 1876; Bergen Hill, N. J., *id.*, Z. Kryst., i., 604, 1877; Brazil, twins (pseudomorph), *id.*, *Z. Kryst.*, ii., 187, 1878. *Groth*, Min.-Samml. Strassburg, p. 119, 1878. Reichenstein, Silesia, *Hare*, Z. Kryst., iv., 299, 1879. Bleiberg, *v. Zepharovich*, Lotos, 1878. Lancashire, *vom Rath*, Ber. nied. Ges. Bonn, Jan. 3, 1881.

Monograph with list of observed and of new planes on crystals from many localities, *Irby*, Inaug. Diss., Bonn, 1878 (Abstr. in Z. Kryst., iii., 612, 1879).

Twinning ($-\frac{1}{2}R$) produced artificially, *Baumhauer*, Z. Kryst., iii., 588, 1879; *Brezina*, ib., iv., 518, 1880.

Thermo-electric properties investigated, *Hankel*, Pogg. Ann., clvii., 156, 1876. On the relation between the different crystalline forms, *Scharff*, Abhandl. Senck. Ges., x., 1876; Jahresb. Senck. Ges., 1879–80, p. 113.

Långban, Sweden, anal., $CaCO_3$ 87·14, $MnCO_3$ 10·06, $BaCO_3$ 2·04 = 99·24, *Sjögren*, Geol., För. Förh., iv., 111, 1878. Lindgren found 1·09 p. c. $ZnCO_3$ in calcite from Långban, ib., v., 557, 1881. Anal of so-called onyx from Tecali, Mexico, *Damour*, C. R., lxxxii., 1085, 1876; *Barcena*, Proc. Am. Nat. Sc. Phil., 1876, 166. Analyses of calcite and other rhombohedral carbonates, *Heddle*, Trans. Acad. Ed., xxvii., 493, 1876.

"Isomorphism" with soda nitre and relation to the other rhombohedral carbonates discussed, *Tschermak*, Min. Petr. Mitth., iv., 99, 1881.

See also *Thinolite*, p. 51.

Calcozincite. *Shepard*, Contrib. Min., Amherst, 1876 (Am. J. Sc., III., xii., 231). A substance described as having a fine granular to columnar structure, light orange yellow color. H. = 3·5. G. = 3·95. Anal.: ZnO 81·00, CaO 7·56, CO_2 5·80, H_2O 4·26, MnO tr. = 98·62. Effervesces slightly with acid. From Stirling Hill, New Jersey. [5·8 CO_2 requires CaO 7·4 for $CaCO_3$—the substance is doubtless a mechanical mixture of zincite and calcite.]

CALEDONITE.—Min., p. 625; App. II., p. 10.

CALLAINITE.—See *Variscite*, p. 128.

CALOMEL, Min., p. 111.—**Cryst.**, El Doctor, Mexico, *Websky*, Ber. Ak. Berlin, 1877, 461.

The occurrence of native corrosive sublimate ($HgCl_2$) is reported by Besnou near Iquique, in the desert of Atacama; the determination, however, was based only on some qualitative trials, Assoc. Franc. Adv. Sc., 1878, 533.

Calvonigrite.—See *Pyrolusite*, p. 99.

CANCRINITE, Min., p. 329; App. II., p. 10.—*Rauff* (Z. Kryst., ii., 456, 1878) has subjected the original cancrinite of Miask to a thorough microscopic and chemical examination, and *A. Koch* (J. Min. Beil. Bd., i, 144, 1880) has done the same for that occurring in the syenite of Ditró, Transylvania. Both show that there is every reason, both as regards the physical characters and the constancy of chemical composition, to consider the mineral as an original species, and not as a decomposition product arising from the action on nephelite of a carbonated solution. The observations of Koch on the behavior of a thin section, when treated with HCl, are especially conclusive as showing that the CO_2 is present, not as calcite mechanically mixed, but as a true element in the composition of the silicate. Analyses: 1, Rauff; 2, Koch:

	SiO_2	Al_2O_3	Fe_2O_3	CaO	Na_2O	K_2O	CO_2	H_2O	
1. Miask, G. = 2·450, ($\frac{2}{2}$)	37·28	28·20	0·44	6·95	17·75	0·20	6·16	4·03	≐ 101·01.
2. Ditró	38·58	28·72	tr.	5·24	12·22	5·23	8·78		= 98·77.

The formula deduced by Rauff is $Na_8[Al_2]_4Si_9O_{34} + 2Ca(Na_2)CO_3 + 3H_2O$, and that of Koch for the Ditró mineral is $Na_6K_2[Al_2]_5Si_{11}O_{41} + 2Ca(Na_2)CO_3 + 4H_2O$. Rauff finds the ratio in the carbonate of Ca : Na_2 = 8 : 1, and Koch 7 : 1.

CARBONYTTRINE.—App. II., p. 10.

CARNALLITE.—Min., p. 118; App. II., p. 10.

CARPHOLITE, App. II., p. 10; Min., p. 419.—**Anal.**, Meuville, Ardennes, *de Koninck*, Bull. Ac. Belg., II., xlv., 15, 1878; xlvii., 564, 1879.

Caryinite. *C. H. Lundström*, Geol. För. Förh., ii., 178, 223, 1874.

Massive. H. = 3–3·5. G. = 4·25. Lustre greasy. Color brown to yellowish brown. Streak yellowish white. Fracture splintery. Analysis:

As_2O_5	PbO	MnO	FeO	CaO	MgO	CO_2	Cl	insol.
47·17	10·52	15·82	0·54	16·40	4·25	3·86	0·07	0·65 = 99·28.

This corresponds, though only approximately, to the general formula $R_3As_2O_8$, after deducting the calcium carbonate. B. B. fuses easily to a black slag, giving reactions for arsenic, lead, and manganese. Dissolves readily, with slight effervescence in nitric acid. Occurs intimately mixed with calcite and hausmannite, at Långban, Wermland, Sweden. Named from *καρύινος*, *nut-brown*. *Sjögren* remarks that berzeliite occurs with caryinite, and sometimes enclosing it. He finds the berzeliite isotropic (isometric), and the caryinite anisotrope (monoclinic ?), and as the two species have analogous composition, he suggests that the former may have been formed from the latter (Geol. För. Förh., ii., 533, 1875). Lindgren (ib., v., 556, 1881), however, describes the way in which the minerals occur together, and concludes, for certain cases, that the caryinite is altered into berzeliite. [The genetic relation between caryinite and berzeliite merits further examination.]

According to *Des Cloizeaux* (Bull. Soc. Min., iv., 56, 1881), the mineral has two cleavages, at an angle of 130°. $2E = 41° 58'$ to 47°. Dispersion $\rho > v$, also horizontal (hence monoclinic).

CASSINITE.—See *Feldspar Group*, p. 45.

CASSITERITE, Min., p. 157; App. II., p. 10.—**Cryst.** monograph, with a list of all observed planes, also analysis, *Becke*, Min. Mitth., 1877, 244. *Groth*, Min.-Samml., Strassburg, p. 104, 1878. Schlaggenwald, *v. Zepharovich*, Lotos, 1880.

Occurrence of tin stones in Cornwall, *Collins*, Min. Mag., iv., 1, 103, 1880. From Coosa Co., Ala., *Shepard*, Am. J. Sc., xx., 56, 1880. From Tasmania, *Gould*, Q. J. G. Soc., xxxi., 109, 18.

CASTILLITE. Not castillite of Rammelsberg (Min., p. 46), but synonym of guanajuatite (q. v., p. 53), *Domeyko*, Min. Chili, 3d Ed., p. 310, 1879.

CASTORITE.—See *Petalite*, p. 91.

CELADONITE, Min., p. 463.—Analyses, in igneous rocks of Scotland, *Heddle*, Trans. Roy. Soc. Ed., xxix., 102, 1879.

Celestialite. *J. Lawrence Smith*, C. R., lxxxi., 1055, 1875. On treating the graphite from the interior of the meteoric iron of Sevier, Tenn., with ether, Smith obtained small quantities of acicular crystals having a peculiar odor, mixed with some small rounded points. These he regards as identical with crystals obtained from the iron of Alais, France (Mar. 15, 1806), by Roscoe (Proc. Lit. Phil. Soc. Manchester, iii., 57, 1863). Smith has obtained the same crystals from the Alais meteorite. In the closed tube he finds that they fuse at 115°-120°, and at a higher temperature the sulphur is sublimed, and a black residue left behind. He regards these crystals as proof of the presence of a sulpho-hydrocarbon, for which he proposes the name CELESTIALITE. Roscoe (l. c.) found that 1·94 p. c. of the meteorite dissolved in ether, and from the solution he obtained crystals melting at 114° C., and in two forms: acicular, which he considered as near to könlite (Min., p. 737), and rhombic, which he identified as free sulphur.

CELESTITE, Min., p. 619; App. II., p. 10.—**Cryst.**, twins, Sicily, *Kenngott*, J. Min., 1875, 293. *Neminar* (barytocelestite), Min. Mitth., 1876, 59. Cryst. and optical exam., Jühnde, near Göttingen, *Babcock*, J. Min., 1879, 835. Perticara, *Schmidt*, J. Min., 1881, ii., 169 ref., (or Z. Kryst., vi., 99). Ville-sur-Saulx, *v. Lasaulx*, Z. Kryst., v., 203, 1881.

Effect of heat on indices of refraction, *Arzruni*, Z. Kryst., i., 177, 1877. Pyro-electrical characters, *Hankel*, Wied. Ann., vi., 54, 1879.

Anal., occurrence in marl at Bristol, England, *Stoddart*, Min. Mag., i., 4, 1876. Clifton, England (barytocelestite), *Collie*, ib., ii., 220, 1879. Found at Bell's Mills, Blair Co., Pa. (not Frankstown, Huntington Co.). Recent formation at Bourbon d'Archambault, *de Gouvenain*, C. R., lxxx., 1299, 1875.

CENTRALLASSITE, Min., p. 796.—Composition discussed, *How*, Phil. Mag., V., i., 128, 1876.

CERARGYRITE, Min., p. 114; App. II., p. 10.—A mercurial variety of cerargyrite, from the mine "la Julia," of the Cerro de Caracoles, Desert of Atacama, is described by Domeyko

(Ann. d. Min., VII., x., 15, 1876; or Min. Chili, 3d Ed., 1879, p. 416). Amorphous, forming irregular masses. Lustre waxy, less brilliant than the pure chloride. Color on the fresh fracture reddish, yellowish, or hair-brown, becoming nearly black on exposure. Malleable and sectile, but less so than ordinary cerargyrite. Can be crushed in a mortar, yielding a bright yellowish powder. The mean of two analyses gave :

$$\underbrace{\text{Ag } 66{\cdot}68 \quad \text{Hg } 2{\cdot}20 \quad \text{Cl } 22{\cdot}64}_{91{\cdot}52} \quad \text{NaCl } 1{\cdot}75 \quad Fe_2O_3\ 1{\cdot}60 \quad SiO_2\text{ (insol.) } 1{\cdot}07 \quad CaCO_3\text{ and loss } [4{\cdot}06] = 100.$$

According to Moesta, the cerargyrite of Los Bordos, Copiapo, contains 1·31 p. c. of mercury.

CERBOLITE.—App. II., p. 10.

CERITE, Min., p. 413 ; App. II., p. 10.—**Anal.** by *Stolba* and *Kettner*, of cerite from Bastnäs, giving: SiO_2 18·18, Ce_2O_3 33·25, La_2O_3 + Di_2O_3 34·60, FeO 3·18, CaO 1·69, H_2O 5·18 = 96·08, Ber. Böhm. Ges., p. 372, 1879.

CERUSSITE, Min., p. 700 ; App. II., p. 11.—**Cryst.**, twins, *Sadebeck*, Pogg. Ann., clvi., 558, 1875. *Groth*, Min.-Samml., Strassburg, p. 133, 1878. Rodna, Transylvania, *Vrba*, Z. Kryst., ii., 157, 1878 ; *Krenner*, ib., ii., 304. Mine Friedrichssegen, near Ems, Nassau, *Seligmann*, Verh. Nat. Ver. Bonn, xxxiii., 244, 1876, and xxxv., 175, 1878 ; also J. Min., 1880, i., 137. Bleiberg, *v. Zepharovich*, Lotos, 1878.

Recent formation at Pompeii, *de Luca*, C. R., lxxxiv., 1457, 1877.

CERVANTITE, Min., p. 187.—Occurrence in Sevier Co., Ark., *Dunnington*, Amer. Assoc., 1877, 182.

CHABAZITE, Min., p. 434; App. II., p. 11.—*Becke* has studied minutely the optical characters of chabazite crystals from different localities, and concludes that the long recognized optical anomalies are to be explained by the assumption of a complicated twinning of triclinic individuals; this twinning, however, is according to the accepted principles (analogous to aragonite), and does not require any new hypothesis as that of Mallard. He finds, for example, that a basal section in polarized light shows a composition of six differently orientired individuals, of which the extinction directions of two neighboring portions are symmetrically arranged with reference to the line of union. A section parallel to a rhombohedral plane, under the same conditions, is divided into two parts along the shorter diagonal. For further details see the original paper (Min. Petr. Mitth., ii., 391, 1879), or the abstracts (Z. Kryst., v., 377, and J. Min., 1880, ii., 135). *Streng* (see below) also discusses the same problem, but without arriving at so definite a conclusion. *Becke* finds gmelinite related in structure to chabazite, while herschelite (q. v.) differs from both, and to the latter levynite is probably related. *Des Cloizeaux* (Bull. Soc. Min., iv., 259, 1881) has examined optically the haydenite of Baltimore, double-refraction positive.

Discussion of chemical composition with several analyses (by Burkhardt and Hammerschlag), *Streng*, Ber. Oberhess. Ges., xvi., 74, 1877 (abstr., Z. Kryst., i., 519, 1877); he shows the variation in composition (e. g. of 4·4 p. c. in SiO_2), and argues from it that this and the related species (phacolite, gmelinite, levynite) may be regarded as varying isomorphous mixtures of two end compounds, as has been assumed in the case of the triclinic feldspars.

Anal., Csódiberg, Hungary, *Koch*, ZS. G. Ges., xxviii., 304, 1876. Lausanne, in a gelatinous condition (Bischoff), *Renevier*, Bull. Soc. Vaud., II., xvi., 15, 1879. Branchville, Conn. (Penfield), *Brush* and *Dana*, Am. J. Sc., xviii., 49, 1879. Elba, *Sansoni*, Att. Soc. Tosc., iv., 316, 1879.

Recent formation at Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 606, 1875; at Oran, Algiers, ib., lxxxiv., 157, 1877.

CHALCOCITE, Min., p. 52.—Recent formation at Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 462, 1875; see also xciii., 572, 1861.

Chalcomenite, *Des Cloizeaux* and *Damour*, Bull. Soc. Min., iv., 51, 1881.

Monoclinic; in isolated crystals and crystalline crusts. $I \wedge I = 108° 20'$. $O \wedge i\text{-}i = 89° 9'$. Commonly in prismatic crystals terminated by the basal plane and 1-*i*. Optic axial plane parallel, and acute (negative) bisectrix perpendicular, to the horizontal edge $O \mid i\text{-}i$. Angle small, dispersion strong $\rho < v$; so that in the polariscope with a green glass the lemniscates have the form of circular rings traversed by a black cross, while with a blue glass they take the form of ellipses elongated normal to the plane of polarization. G. = 3·76. Color bright blue. Transparent. Analysis, Damour (Bull. Soc. Min., iv., 167, 1881):

SeO_2	CuO	H_2O
48·12	35·40	15·30 = 98·82.

Corresponding to the formula $CuSeO_3 + 2aq$ or a copper selenite, an example of a group of compounds not before met with in mineralogy. B. B. on charcoal fuses to a black slag, giving off selenium fumes, and coloring the flame deep blue. In the closed tube yields a little water and a sublimate of SeO_2 in white needles. In salt of phosphorus gives in O. F. a greenish blue glass, which becomes blood-red when reduced with the addition of metallic tin. Soluble in acids.

Occurs in minute crystals in the various selenides of silver, copper, and lead, which are found in small veins; Cerro de Cacheuta, Mendoza, Argentine Republic. Often intimately mixed with azurite, iron oxide, and lead carbonate, which have been formed by the alteration of the selenides and of the pyrites which form the gangue.

MM. Friedel and Sarasin have succeeded in forming artificially (Bull. Soc. Min., iv., 176, 225, 1881) a copper selenite having the same form and composition as chalcomenite, and another differing in crystalline form.

CHALCOMICLITE.—App. II., p. 11.

CHALCOMORPHITE.—App. II., p. 11.

Chalcophanite. *G. E. Moore*, Amer. Chemist, July, 1875.

Rhombohedral; in druses of minute tabular crystals. $R \wedge R = 114° 30'$, $R \wedge O = 103° 48'$; $\dot{c} = 3{\cdot}5267$. Also in foliated aggregates; in stalactitic and plumose forms. Cleavage basal perfect. H. = 2·5. G. = 3·907. Lustre metallic, brilliant. Color bluish to iron black. Streak chocolate brown, dull. Opaque. Flexible in thin laminæ. Analyses: 1, of crystals; 2, of the stalactitic form:

	MnO_2	MnO	ZnO	Fe_2O_3	H_2O
1.	59·94	6·58	(½) 21·70	0·25	11·58 = 100·05.
2.*	(½) 61·57	4·41	20·80	....	12·66 = 99·44.

* After deduction of 1·27 p. c. limonite as impurity.

Formula $(Mn, Zn)O + 2MnO_2 + 2aq$. If half the water be made basic, the formula may be written $2(\overset{\text{II}}{R} + \overset{\text{IV}}{R})O_3 + aq$, which is equivalent to $2[R_2]O_3 + aq$. In the closed tube gives off water and oxygen, exfoliates slowly, and changes to a golden bronze color. B. B. becomes yellowish bronze to copper red in color, and fuses slightly on the edges. With borax a manganese bead; on charcoal with soda a zinc coating.

Occurs at the calamine deposits of Sterling Hill, N. J. It is a product of the decomposition of franklinite. Named from χαλκός, *brass*, and φαίνω, *to appear*, in allusion to the change of color on ignition.

CHALCOPYRITE, Min., p. 65; App. II., p. 11.—**Cryst.**, *v. Kokscharof*, Bull., Soc. St. Pet., xix., 562, 1875. With tetrahedrite in parallel position, *Sadebeck*, Ber. Ges. Nat. Fr. Berlin, Oct., 1878 (J. Min., 1879, 154). *Groth*, Min.-Samml., Strassburg, p. 53, 1878.

Recent formation at Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 463, 1875; do. at Bourbon d'Archambault, *de Gouvenain*, ib., p. 1297.

CHALCOPYRRHOTITE.—App. II., p. 11.

Chalcosiderite. *Maskelyne* (J. Ch. Soc., July, 1875) identifies a mineral from Cornwall with the chalcosiderite of Ullmann, and shows it to be a distinct species, and not to be united with dufrenite (see Min., p. 583). Occurs in minute triclinic crystals, generally in sheaf-like groups. Cleavage easy in one direction. H. = 4·5. G. = 3·108. Color light siskin green. Analysis, Flight (l. c.):

P_2O_5	As_2O_5	Fe_2O_3	Al_2O_3	CuO	H_2O*	U_2O_3
29·93	0·61	42·81	4·45	8·15	15·00	tr. = 100·95.

* Loss at 100° C. 0·46, at 120°–130° additional loss 0·13; remainder at a red heat.

Composition expressed by the formula $2[Fe_2]\ P_2O_8 + [Fe_2]\ H_6O_6 + CuH_2O_2 + 4aq$. Implanted on andrewsite at the West Phœnix mine, Cornwall.

Chalypite.—App. II., p. 11.

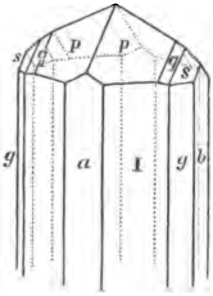
Childrenite, Min., p. 579; App. II., p. 11.—Tavistock, Cornwall, analyses by *S. L. Penfield*, Am. J. Sc. III., xix., 315, 1880:

	P_2O_5	Al_2O_3	FeO	MnO	CaO	H_2O	Quartz.
1.	30·19	21·17	26·54	4·87	1·21	15·87	0·10 = 99·95.
2.	29·98	21·44	26·20	....	....	....	....

Penfield removes the doubt as to the true composition of childrenite, the formula deduced being $R_2Al_2P_2O_{10}, 4H_2O$ or $Al_2P_2O_8 + 2RH_2O_2 + 2aq$. This requires P_2O_5 30·80, Al_2O_3 22·31, FeO 26·37, MnO 4·87, H_2O 15·65. It also follows from this that childrenite and eosphorite (see below) are essentially the same species.

Childrenite—Eosphorite. *G. J. Brush* and *E. S. Dana*, Am. J. Sci., III., xvi., 35, 1878; xviii., 47, 1879.

Orthorhombic. Axes, $\dot{c} : \bar{b} : \breve{a} = 0·66299 : 1·28732 : 1$. Observed planes (see figure): $i\text{-}\bar{i}$ (*a*), $i\text{-}\breve{i}$ (*b*), *I*, $i\text{-}\breve{2}$ (*g*), 1 (*p*), $\frac{3}{2}\text{-}\breve{\frac{3}{2}}$ (*q*), $2\text{-}\breve{2}$ (*s*). $I \wedge I = 104° 19'$, $p \wedge p$ (front) = 133° 32′, $p \wedge p$ (side) = 118° 58′, $a \wedge p$ = 120° 31. In prismatic crystals vertically striated. Also more generally massive, cleavable to closely compact. Cleavage: macrodiagonal nearly perfect.



H. = 5. G. = 3·11–3·145. Lustre vitreous to sub-resinous, of massive mineral often greasy. Color rose-pink, yellowish to colorless, also of compact forms grayish, bluish, yellowish white, and white. Streak white. Transparent to translucent. Fracture uneven to subconchoidal. Optic axial plane macrodiagonal; acute bisectrix negative, normal to brachypinacoid. Axial angle in air 54° 30′ red, 60° 30′ blue. Axial colors yellowish ($\parallel \bar{b}$), deep pink ($\parallel \breve{a}$), faint pink to nearly colorless ($\parallel \dot{c}$).

Composition: $R_2Al_2P_2O_{10}, 4H_2O$ or $Al_2P_2O_8 + 2RH_2O_2 + 2aq$. If R = Mn : Fe = 10 : 3, percentage composition: P_2O_5 30·93, Al_2O_3 22·35, FeO 7·24, MnO 23·80, H_2O 15·68 = 100. Analyses: 1, S. L. Penfield (Am. J. Sc., xvi., 40), pure crystals, G. = 3·134; 2, H. L. Wells (xvi., 41), white compact mineral, containing 14·41 p. c. impurities, mostly quartz, here deducted; 3, H. L. Wells (xviii., 48), pink massive mineral, G. = 3·11.

	P_2O_5	Al_2O_3	FeO	MnO	CaO	Na_2O	H_2O	
1. ($\frac{3}{2}$)	31·05	22·19	7·40	23·51	0·54	0·33	15·60	= 100·62, Penfield.
2.	31·43	21·83	6·84	22·43	3·01	....	15·07	= 100·61, Wells.
3.	31·39	21·34	6·62	22·92	1·48	....	15·28,	insol. 1·46 = 100·49, Wells.

In the closed tube decrepitates, whitens, gives off abundance of neutral water, and the residue turns first black, then gray, and finally liver brown with a metallic lustre, and becomes magnetic. B. B. in the forceps cracks open, sprouts and whitens, colors the flame pale green, and fuses at about 4 to a black magnetic mass. Reacts for iron and manganese with the fluxes. Soluble in acids.

Occurs at Branchville, Fairfield Co., Conn., in a vein of pegmatite associated with rhodochrosite and the manganesian phosphates, triploidite, dickinsonite, lithiophilite. Also as imbedded nodules (anal. 3, above), in a massive green chloritic mineral. The massive mineral (anal. 2, above, G. = 2·92–3·08) often impure from the presence of quartz, dickinsonite, and apatite. Named from έωσφύρος (synonym of φωσφόρος) which means *dawn-bearing*, in allusion to the characteristic pink color.

[Since the hitherto uncertain composition of childrenite (q. v.) has been settled by Penfield, it appears that eosphorite and childrenite, having similar form and composition, are essentially the same mineral, only differing in that the first contains mostly manganese and the second mostly iron.]

Chloralluminite. *Scacchi*, Att. Accad. Napoli, vi. (read Dec. 13, 1873). Aluminum chloride ($Al_2Cl_6 + xH_2O$), produced with molisite and chloromagnesite, at Vesuvius, at the eruption of April, 1872.

CHLORASTROLITE.—See *Prehnite*, p. 96.

CHLORITE. Pseudomorph after garnet, Lake Superior, *Pumpelly*, Am. J. Sc., III., x., 17, 1875.

Chemical monograph of the "Chlorite Group," *Heddle*, Trans. Roy. Soc. Ed., xxix., 55 et seq., 1879.

CHLORITOID, Min., p. 504.—See *Clintonite*, p. 28.

CHLOROCALCITE, App. II., p. 11.—*Scacchi*, Att. Accad. Napoli, vi., 1873.

Calcium chloride, from Guy's Cliff, Warwickshire, *Spiller*, J. Ch. Soc., p. 154, Feb., 1876. Calcium chloride, more or less mixed with clay, has been identified in the Province of Tarapaca, of Chincha, and elsewhere in Peru, by *Raimondi* (Min. Pérou, p. 267, 1878); it was called HYDROPHILITE by Adam.

Chloromagnesite. *Scacchi*, Att. Accad. Napoli, vi., 1873. Magnesium chloride ($MgCl_2 + x$aq), formed at Vesuvius at the eruption of April, 1872.

A mineral, apparently identical with that of Scacchi, has been called BISCHOFITE by *Ochsenius* and *Pfeiffer*, Arch. Pharm., III., xi., 296, 1877 (Bull. Soc. Min., i., 128, 1878, and Jahresb. Ch., 1877, 1284, 1285). Crystalline-granular and foliated, sometimes fibrous. H. = 1–2. G. = 1·65. Colorless (pure) to white. Lustre vitreous to dull. Mean of two analyses by König gave: Mg 11·86, Cl 35·04, H_2O 53·10 = 100; this corresponds to $MgCl_2$ + 6aq, requiring Mg 11·83, Cl 34·95, H_2O 53·22. Soluble in 0·6 parts of cold water. Occurs in layers 2–3 cm. thick in halite, with kieserite and carnallite, fibres transverse to the layers; Leopoldshall, Prussia. The assumption of water is said to commence as soon as the layer is exposed to the air. The artificial salt is monoclinic.

CHLOROPAL, Min., p. 461.—**Anal.**, Mugrau, Bohemia, *Schrauf*, J. Min., 1877, 255. Mudgee, New South Wales, *Liversidge*, Proc. Roy. Soc. N. S. W., Nov. 3, 1880. A related mineral from Sweden, *Weibull*, Geol. För. Förh., v., 627, 1881.

Composition of related minerals discussed, *Collins*, Min. Mag., i., 67, 1877.

CHLOROPHÆITE, Min., p. 510.—**Anal.**, from the Scuir More ridge, in Rum, Scotland, *Heddle* (Trans. Soc. Edinb., xxix., 84, 1879): SiO_2 36·00, Fe_2O_3 22·80, FeO 2·46, MnO 0·50, CaO 2·52, MgO 9·50, alkalies tr., H_2O 26·46 = 100·25 (H_2O at 100° 19·23).

Chlorothionite, *Scacchi*, Att. Accad. Napoli, vi., 1873 (Contrib. Min., ii., p. 59).

Occurs in thin crystalline mammillary crusts of a bright blue color. An analysis gave: SO_4 32·99, Cl 20·04, Cu 19·56, K 26·29, loss 1·12 = 100. Crystals obtained by recrystallization from a solution, and thus purer than the original material, gave essentially the same result. The composition is expressed by the formula $K_2SO_4 + CuCl_2$, which requires: SO_4 31·12, Cl 22·98, Cu 20·55, K 25·35 = 100. From Vesuvius, as a result of the eruption of April, 1872. The name records the presence of chlorine and sulphur (ϑεῖον). [Is not this a mixture of two salts ?].

Chlorotile. *Frenzel*, Min. Mitth., 1875, 42 ; J. Min., 1875, 517.

In minute capillary crystals of prismatic habit (orthorhombic), also fibrous and massive ; soft. Color in the mass pale green to emerald green, microscopic crystals colorless. Transparent. Composition asserted to be $Cu_3As_2O_8$ + 6aq ; an approximate analysis gave: As_2O_5 41, CuO 41, H_2O 18 = 100. Occurs with aragonite and wapplerite, at Schneeberg, and with quartz and scheelite at Zinnwald. [A more complete description is to be desired.]

CHONDRODITE, Min., p. 363 ; App. II., p. 12.—**Cryst.**, Brewster, N. Y., monograph by *E. S. Dana*, proving the presence of crystals corresponding to each of the so-called "types" of the Vesuvian humite ; also giving measurements and many occurring planes. Further, it is shown, that the optical characters of the crystals of the more common "second type" prove them to be, in fact, *monoclinic:* the axes lie in the plane of symmetry, axial plane inclined 25° 48′ to the basal plane, $2H_{a\rho} = 88° 48'$ ($n = 1·466$), Conn. Acad., iii., 67–96, 1875 (abstr. in Am. J. Sc, III., x., 89). It has also been proved by the same author, that the crystals of the "third type" belong to the monoclinic system (Am. J. Sc., III., xi., 139, 1876). The measured angles alone, however, would not imply any variation from the orthorhombic type, although it has long been observed that the hemihedral development of the planes was in accordance with monoclinic symmetry.

The corresponding Vesuvian species, HUMITE, has been studied by *Des Cloizeaux* (Phil. Mag. III., ii., 286, 1876, and iii., 357, 1877 ; or see J. Min., 1876, 641 ; 1877, 500) and by *Klein* (J. Min., 1876, 633). Des Cloizeaux finds the three types of humite to be optically distinct, and proposes to retain for the "first type," which he shows to be orthorhombic, the name HUMITE ; for the "second type," which he finds to be monoclinic, he retains the name CHONDRODITE, and to the "third type," also monoclinic, he gives the name CLINOHUMITE (the observations on the second and third types confirm those of E. S. Dana on Brewster crystals). Klein (l. c.) obtained for third type crystals of humite (*clinohumite*) results agreeing with those of Des Cloizeaux.

Sjögren describes crystals from the Ladu mine, Wermland, Sweden, which are holohedral orthorhombic, and near in angle to "Type I." of the Vesuvian mineral, also others from Kafveltorp, Westmanland, which are monoclinic, and similar (see above) to common chondrodite, Œfv. Ak. Stockh., xxxviii., 5, p. 29, 1881. An exhaustive monograph of the Kafveltorp chondrodite is given by the same author in vol. xvii. of the Lund. Univ. Årsskrift (abstr. in Geol. För. Förh., v., 655, 1881).

Analyses and discussion of composition : Brewster, N. Y., *Hawes*, Am. J. Sc., III., x., 96, 1875; Kafveltorp, Sweden, *Widman*, Geol. För. Förh., iii., 113, 1876; *Websky*, Ber. Ak. Berlin, 1876, 201; Pargas, Finland, *Berwerth*, Min. Mitth., 1877, 272.

CHROMITE, Min., p. 153 ; App. II., p. 12.—In thin sections not opaque, but transmits a yellowish-red color, according to *Thoulet*, Bull. Soc. Min., ii., 34, 1879. See also *Fischer*, Mikr. Stud., 1870, and Z. Kryst., iv., 363.

Anal., platinum washings, Wisimo Schaitansk, Ural, *Waller*, Œfv. Ak. Stockh., xxxiii., No. 10, p. 23, 1876.

Occurrence in meteorites, *J. Lawrence Smith*, Am. J. Sc., III., xxi., 461, 1881.

Chromowulfenite.—See *Wulfenite*, p. 132.

CHROMPICOTITE.—App. I., p. 3.

CHRYSOBERYL, Min., p. 155 ; App. II., p. 12.—Specific gravity determinations, *Church*, Geol. Mag., II., ii, 321, 1875.

CHRYSOCOLLA, Min., p. 402.—An aluminous variety of chrysocolla is called PILARITE by *Kramberger* (Z. Kryst., v., 260, 1880). Like chrysocolla in appearance. Apparently homogeneous under the microscope. H. = 3. G. = 2·62. Lustre dull. Color light greenish blue. **Analysis** ($\frac{1}{2}$) : SiO_2 38·6, Al_2O_3 16·9, CuO 19·0, CaO 2·5, ign. 21·7 = 98·7. Locality, Chili. Named after Prof. Pilar in Agram.

J. R. Santos (Chem. News, xxxvi., 167, 1876) has analyzed an aluminous chrysocolla from Utah : SiO_2 37·19, Al_2O_3 10·78, CuO 26·03, H_2O 25·76 = 99·76. König describes a substance from Bergen's Ranch, 25 m. from Denver, Col., forming a thin, slightly bluish crust on limonite ; it contains 33·85 p. c. Al_2O_3, 5·40 CuO, and corresponds to allophane and chrysocolla in the ratio of 5 : 1, probably to be regarded as a mixture, Proc. Ac. Nat. Sc. Philad., 1877, 294. See also *Semmons*, Min. Mag., ii., 197, 1879.

Other analyses, Lower California, *Hutchings*, Chem. News, xxxvi., 18, 1877 ; also xxxiv., 141, 1876; Cerro Blanco, Chili, *Pellegrini*, Z. Kryst., iv., 408; Wheco, New South Wales, *Liversidge*, Proc. Roy. Soc. N. S. W., Nov. 3, 1880.

Chrysolite, Min., p. 256 ; App. II., p. 12.—Vesuvius (hyalosiderite), *Scacchi*, Att. Acc. Nap., vi., 1873 (Contr. Min., II., 66) ; with humite (clinohumite) crystals in parallel position, *Scacchi*, J. Min., 1876, 637. Determinations of specific gravity, *Church*, Geol. Mag., II., ii., 321, 1875.

Anal., Skurruvuselv, Norway, *Hjortdahl* (Z. Kryst., ii., 305). Zermatt, with 6 p. c. TiO_2 (titanolivine, Groth), *Damour*, Bull. Soc. Min., ii., 15, 1879. In meteoric iron of Bragin, Retschinsk, *Inostranzef*, Min. Russl., vi., 216 ; Ste. Anne, Ottawa River, Canada, *Harrington*, Geol. Canada, 1878.

A variety is called NEOCHRYSOLITE, by *Scacchi* (Rend. Accad. Napoli, Oct. 14, 1876). In small, black, crystalline plates, crystallographically identical with chrysolite. Peculiar in containing a considerable amount of manganese (compare hortonolite). Found in the cavities of the lava of 1631, at the Cupa di Sabataniello, Vesuvius.

Chrystophite.—See *Sphalerite*, p. 111.

Cimolite, Min., p. 457.—**Anal.**, Richmond, N. S. W., *Liversidge*, Proc. Roy. Soc. New South Wales, Dec. 6, 1876.

Cinnabar, Min , p. 55 ; App. II., p. 12.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 257, 1875. With metacinnabarite, Reddington mine, Cal., *Bertrand*, Z. Kryst., ii., 199, 1877. Tuscany, *d'Achiardi*, Att. Soc. Tosc., iii., 232, 1877.

Anal., Oregon, *Dabney*, Chem. News, xxxiv., 180, 1876.

Occurrence in California, etc., *Blake*, Bull. Soc. Min., i., 81, 1878 ; Rolland, ib., i., 98. Genesis, etc., *Christy*, Am. J. Sc., III., xvii., 453, 1879 ; Mernyik, Hungary, *Krenner*, Z. Kryst., ii., 304.

Clarite, App. II., p. 12.—*Sandberger*, J. Min., 1875, 382.

Monoclinic (?). Crystals in tufted groups, on account of alteration not to be measured; planes identified *O*, *i-ì*, *I*, *m*. Cleavage *i-ì* perfect, *i-ĭ* less so. H. = 3·5. G. = 4·46. Color dark lead gray. Streak black. Analysis, Petersen ·

S	As	Sb	Cu	Fe	Zn
32·92	17·74	1·09	46·29	0·83	tr = 98·87.

Formula that of enargite, viz. : $Cu_3AsS_4 = 3Cu_2S + As_2S_5$.

B. B. fuses easily ; in the closed tube decrepitates violently, and gives a reddish yellow sublimate of the sulphide of arsenic (and antimony), with also one of sulphur ; in the open tube gives both As_2O_3 and Sb_2O_3. Soluble in nitric acid, with the separation of a white precipitate ; not attacked by boiling in a solution of caustic potash. Occurs on barite from the Clara mine, near Schapbach, Baden. Sometimes altered to chalcopyrite and covellite. [Clarite and luzonite have both the composition of enargite ; the former differs from it in color, and apparently in form ; the latter in color and absence of cleavage, form unknown. All three have essentially the same specific gravity, which is not ordinarily the case with well established trimorphous groups—a further examination seems to be required to prove that they are in fact distinct.]

Clausthalite.—Min., p. 497 ; App. II., 12.

Cleveite. *Nordenskiöld*, Geol. För. Förh., iv., 28, 1878.

Isometric ; in cubes with octahedron and dodecahedron ; crystals rare, also in irregular grains. H. = 5·5. G. = 7·49. Lustre dull. Color iron black. Streak blackish brown.

O. D. Allen (priv. contrib.); 2, Northfield, Mass., *W. J. Comstock*, Am. J. Sc., III., xix., 131, 1880; 3, Branchville, Conn., *Comstock*, ib.

		Cb_2O_5	Ta_2O_5	$\underbrace{SnO_2, WO_3}$	MnO	FeO	CaO	
1. Standish,	G. = 5·65	68·99	9·22	1·61	3·65	16·80	...	= 100·27.
2. Northfield,	G. = 6·84($\frac{2}{3}$)	26·81	56·90	...	5·88	10·05	...	= 99·64.
3. Branchville,	G. = 6·59	30·16	52·29	...	15·58	0·43	0·37	= 98·83.

The Standish crystals are small, but highly modified, and of brilliant lustre (see Z. Kryst., i., 380). The Northfield mineral had the form and habit of ordinary columbite, though it is essentially a tantalite. This was also true of the Branchville mineral (*Brush* and *Dana*, Am. J. Sc., III., xvi., 34, 1878), which, moreover, was in thin tabular crystals, slightly *translucent*; it is also remarkable as containing only MnO, and also in the fact that the ratio of $Cb_2O_5 : Ta_2O_5 = 1 : 1$ nearly, that is, the formula is $MnCb_2O_6 + MnTa_2O_6$. See also *Tantalite*, p. 118.

Shepard's HERMANNOLITE (Am. J. Sc., II., 1, 90, 1870; III., xi., 140, *Hermann*, J. Pr. Ch., II., xiii., 386, 1876, or Bull. Soc. Mosc., xlix, 179, 1875; *Delafontaine*, Am. J. Sc., III., xiii., 390, 1877, and Bibl. Univ. Gen., II., lix., 184, 1877) is a mineral from Haddam, Conn., related to (or identical with) columbite. Hermann (l. c.) finds in it "hypotantalic acid 7·03, hypoilmenic acid 14·92, niobous acid 56·15, iron protoxide, 12·56, manganese protoxide 9·34 = 100." This result is, to say the least, problematical, as no one but the analyst himself has any confidence in the existence of the chemical compounds named. Delafontaine (l. c.) found a large proportion of Cb_2O_5, about 16 p. c. Ta_2O_5, and possibly a little TiO_2. He states further, that the low specific gravity supposed to be a specific character of this substance is explained by its containing less Ta_2O_5 (Brainerd's columbite contains 37 p. c.), and by the admixture of some foreign material. [As far as investigation has gone, hermannolite is not distinct from columbite.]

CONNELLITE, Min., p. 627.—Optically uniaxial, positive, *Bertrand*, Bull. Soc. Min., iv., 88, 1881.

COPIAPITE, Min., p. 655; App. II., p. 13.—Optical characters, *Bertrand*, Bull. Soc. Min., iv., 11; *Des Cloizeaux*, ib., 41, 1881.

COPPER, Min., p. 14; App. II., p. 13.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 209, 1874, Altai, *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xii., 281. Mine Friedrichssegen, Nassau, *Seligmann*, Verh. Nat. Ver. Rhein., xxxiii., 261, 1876. Lake Superior, *vom Rath*, Z. Kryst., ii., 169, 1878; *Fletcher*, Phil. Mag., V., ix., 180, 1880.

Pseudomorphs after aragonite, from Coro-Coro, Bolivia, described fully, *Domeyko*, 6th App. Min. Chili, p. 6, 1878.

COQUIMBITE, Min., p. 650; App. II., p. 13.—Copiapo, Coquimbo, Chili, revision of angles, *c* (vert.) = 1·5645, optical examination, *Arzruni*, with analyses by *Bamberger*, confirming Rose's results, Z. Kryst., iii., 516, 1879.

CORDIERITE.—See *Iolite*, p. 63.

CORKITE.—App. II., p. 13; see also *Beudantite*, p. 15.

CORNWALLITE.—Min., p. 569; App. II., p. 13.

Coronguite, *Raimondi*, Minéraux du Pérou, 1878, pp. 88, 91.

Amorphous, earthy, pulverulent, sometimes slightly lamellar. H. = 2·5–3. G. = 5·05. Color, exterior, grayish yellow; interior, blackish, with lustre slightly resinous. Intimately mixed with small quantities of sulphur, antimony, silver, and lead. An analysis, after the deduction of impurities, gave: Sb_2O_5 58·97, PbO 21·48, Ag_2O 7·82, FeO 0·52, H_2O 11·21 = 100; accordingly, an antimonate of lead and silver. Found at the mines of Mogollon, Huancavelica, and Empalme, in the district of Corongo, province Pallasca, and at Pasacancha, province of Pomabamba, Peru. [Of doubtful homogeneity.]

CORUNDOPHILITE, Min., p. 504; App. II., p. 13.—A mineral, apparently identical with corundophilite, is called **AMESITE**, by Shepard. Occurs with diaspore at Chester, Mass. Examined by Pisani (C. R., lxxxiii., 166, 1876). In hexagonal plates, foliated, resembling the green talc from the Tyrol. Uniaxial figure (positive), seen through cleavage fragment. H. = 2·5–3. G. = 2·71. Color apple green. Lustre pearly on cleavage face. Analysis:

SiO_2	Al_2O_3	Fe	MgO	H_2O	
21·40	32·30	15·80	19·90	10·90	= 100·30.

Q. Ratio for Si : $[Al_2]$: R : H = 9 : 12 : 10 : 8. B. B. nearly infusible.

CORUNDUM, Min., p. 137; App. II., p. 13.—**Cryst.**, Ceylon, *v. Kokscharof*, Min. Russl., vi., 223, 1874. Taschkent, etc., *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xiii., 426, 440; xiv., 227 (Z. Kryst., ii., 504, 505; iii., 438; iv., 642).

Specific gravity determinations, *Church*, Geol. Mag., II., ii., 321, 1875.

Made artificially (rubies, sapphires), *Frémy* and *Feil*, C. R., lxxxv., 1029, 1877; *Meunier*, ib., xc., 701, 1880.

Occurrence of emery in Westchester Co., N. Y., *Kimball*, Am. Chem., iv., 9, 321, 1874; *J. D. Dana*, Am. J. Sc., III., xx., 200, 1880.

Mallard (Am. Min., VII., x., 150, 1876), describes crystals, in which a basal section consisted of six sectors; he assumes that the apparently rhombohedral crystals are really composed of three orthorhombic individuals. *Bertrand* (Bull. Soc. Min., i., 95, 1878), describes crystals from Siam (ruby) which are distinctly biaxial, with a widely varying axial angle from nearly 0° up to 58°. *Tschermak* (Min. Petr. Mitth., ii., 362, 1878), mentions crystals from Ceylon having a monoclinic symmetry in the distribution of the planes, and also optically biaxial. He concludes that many crystals are built up of monoclinic particles, occasionally so grouped as to give uniaxial effects in polarized light.

COSALITE, Min., p. 797; App. II., p. 13.—A mineral, apparently identical with cosalite, is called **BJELKITE** by *Sjögren* (Geol. För. Förh., iv., 106, 1878; ett nytt vismuthsvafladt svafelbly, *Lundström*, ib., ii., 178, 1874). Its characters are as follows: Massive, fibrous, radiated. H. = 2·5–3. G. = 6·39–6·75. Lustre metallic. Color steel gray. Streak grayish black. Composition $Pb_2Bi_2S_5 = 2PbS + Bi_2S_3$. Analyses: 1, Lundström (l. c.); 2, 3, Sjögren (l. c.).

	S	Bi	Pb	Fe
1.	17·83	39·40	37·64	5·13 = 100, Lundström.
2.	15·98	41·55	40·10	0·67, insol. 2·19 = 100·49, Sjögren.
3.	16·48	41·86	39·19	1·32 = 98·85, Sjögren.

The material used in (1) was probably more or less impure through the presence of a little pyrrhotite. B. B. fuses easily, giving reactions for lead, bismuth, and sulphur; slowly attacked by HCl, dissolved in fuming nitric acid, with the separation of lead sulphate. From the Bjelke mine, in Nordmark, Wermland, Sweden.

Cossyrite, *H. Foerstner*, Z. Kryst., v., 348, 1881.

Triclinic, with $\alpha = 90° 6'$, $\beta = 102° 12'$, and $\gamma = 89° 54'$, $I \wedge I' = 114° 5'$. Form near that of amphibole, but differing in the prismatic zone. Cleavage *I* and *I'* distinct. Twins with the brachypinacoid as twinning plane. Crystals minute, 1·5 mm. long, and 0·5–0·6 mm. broad. G. = 3·74–3·75. Color black. Analysis:

SiO_2	Fe_2O_3	Al_2O_3	FeO	MnO	CuO	MgO	CaO	Na_2O	K_2O
43·55	7·97	4·96	32·87	1·98	0·39	0·86	2·01	5·29	0·33 = 100·21.

Approaches in composition some ferruginous amphiboles. B. B. fuses easily to a brownish black glass. Partially decomposed by acids. Found imbedded in the liparite lavas of the island Pantellaria, whose ancient name was Cossyra. The crystals examined were weathered out of the ground mass.

Cotterite.—See *Quartz*, p. 101.

COTUNNITE, Min., p. 117; App. II., p. 13.—In semi-crystalline masses of a whitish color, with a tinge of yellow or green, with other lead minerals, Montagne de Challacallo, *Raimondi*, Min. Pérou, p. 172, 1878.

COVELLITE, Min., p. 83.—**Anal.**, New Annan, Nova Scotia, *Louis*, Trans. N. S. Inst., iv., 424, 1878.

CROCIDOLITE, Min., p. 243; App. II., p. 13.—An analysis by Dölter (Z. Kryst., iv., 40, 1879), afforded: SiO_2 52·11, Al_2O_3 1·01, Fe_2O_3 20·62, FeO 16·75, MgO 1·77, Na_2O [6·16], H_2O 1·58 = 100; locality South Africa. This confirms the ordinary belief as to its close relation to arfvedsonite (q. v., p. 9).
See also *Abriachanite*, p. 1.

CROCOITE, Min., p. 628.—**Cryst.**, *v. Kokscharof*, Min. Russl., vii., 97, 1877.
Occurrence in Arizona, *Silliman*, Am. J. Sc., III., xxi., 203, 1881.

CRONSTEDTITE, Min., p. 503; App. II., p. 13.—**Cryst.**, Przibrām, etc., *v. Zepharovich*, Ber. Ak. Wien, lxxi., 276, 1875. In parallel position with pyrite crystals, *id.*, Lotos, 1880. **Anal.**, Przibram, *Janovsky*, J. pr. Chem., II., xi., 378, 1875. Cornwall, *Field*, Phil. Mag., V., v., 52, 1878.

CRYOCONITE, App. II., p. 13.—Original material examined by *v. Lasaulx* proved to consist principally of quartz and mica, with also feldspar, hornblende, magnetite, garnet, and probably epidote and cyanite; metallic iron was not identified. The composition is near that of a gneiss, and *v. Lasaulx* concludes that the supposed cosmical dust of *Nordenskiöld* is in fact terrestrial, and probably came from the gneiss region of the coast of Greenland. Min. Petr. Mitth., iii., 521, 1881.

CRYOLITE, Min., p. 126; App. II., p. 14.—Greenland, monoclinic instead of triclinic, according to *Krenner*, J. Min., 1877, 504.
Artificial alteration products, *Nöllner*, ZS. G. Ges., xxxiii., 139, 1881.

Cryptohalite. A fluo-silicate of ammonium (NH_4F, SiF_2), whose probable existence with sal ammoniac in a Vesuvian fumarole is suggested by *Scacchi*, Att. Accad. Napoli, vi.; Contr. Min., ii., 37, 1874.

CRYPTOLITE, Min., p. 529.—In apatite from Arendal, *Fischer*, Z. Kryst., iv., 374, 1880.
See also *Rhabdophane*.

CRYPTOMORPHITE, Min., p. 599; App. II., p. 14.—Relation to priceite, *How*, Min. Mag., i., 257, 1877.

CRYSTALLITES.—App. II., p. 14.

CUBANITE.—Min., p. 65; App. II., p. 14.

CULSAGEEITE.—App. II., p. 14 (30)

CUPRITE.—Min., p. 133; App. II., p. 14.

CUPROAPATITE.—App. II., p. 14.

Cuprocalcite. *Raimondi*, Domeyko, 5th Append., Min. Chili, 1876; Min. Pérou, p. 135, 1878. In small masses and in bands intimately mixed with a ferruginous calcite. H. = 3. G. = 3·90. Color bright vermilion red. Analysis gave: Cu_2O 50·45, CaO 20·16, CO_2 24·00, H_2O 3·20, Fe_2O_3 0·60, Al_2O_3 0·20, MgO 0·97, SiO_2 0·30 = 99·88. Formula deduced $(Cu_2O)_2CO_2 + 2CaCO_3 + H_2O$. Soluble in hydrochloric acid with effervescence; the solution, formed out of contact with the air, has a strong deoxidizing power, precipitating gold from solutions of gold salts. From the mines of Canza, near the city of Ica, Peru. [According to the results of Damour this is only an intimate mixture of calcium carbonate and copper oxide (Cu_2O), Bull. Soc. Min., i., 130, 1878.]

Cupromagnesite.—App. II., p. 14.

Cuproscheelite.—Min., p. 606; App. II., p. 14.

Cuprotungstite.—App. II., p. 14.

Cuprovanadite.—App. II., p. 15.

Cuspidine. *Scacchi*, Rend. Accad. Napoli, Oct., 1876; Z. Kryst., i., 398, 1877. Orthorhombic. In spear-shaped crystals, formed of two pyramids, 1 and 2–⅓, with also 1–$\bar{\imath}$ and i–$\bar{\imath}$. $1 \wedge 1 = 112° \ 8'$ and $77° \ 50'$ terminal, and $146° \ 30'$ basal. $1\text{–}\bar{\imath} \wedge 1\text{–}\bar{\imath} = 40° \ 38'$. $\dot{c} : \bar{b} : \breve{a} = 1{\cdot}9376 : 1 : 0{\cdot}7173$. Cleavage in one direction (basal). H. = 5–6. G. = 2·853–2·860. Color pale rose red. Contains SiO_2, CaO, F, and CO_2, the last probably from incipient alteration; composition stated to be perhaps Ca_2SiO_4, with about one-third of the lime replaced by CaF_2, but analysis not given. B. B. fusible with difficulty. Readily soluble in dilute acids. From Vesuvius. Named in allusion to the spear-shaped crystals. [A more complete chemical examination is to be desired.]

Vom Rath has described crystals of a mineral which resembled cuspidine, but which could not be positively identified with it (Ber. nied. Ges. Bonn, Feb. 7, 1881). He has since shown that this mineral is not cuspidine. He has also made a more exact determination of the form of the original cuspidine. It is monoclinic with c (vert) : $\bar{b} : \breve{a} = 1{\cdot}9623 : 1 : 0{\cdot}7247$, and $\beta = 90° \ 55' \ 41''$. The crystals are twins, which Scacchi suggested might be the case. Ber. nied. Ges. Bonn, Nov. 7, 1881.

Cyanite, Min., p. 375; App. II., p. 14.—The hitherto imperfectly known crystalline form of cyanite has been fully described by *Bauer* (ZS. G. Ges., xxx., 283, 1878; xxxi., 244, 1879; xxxii., 717, 1880); and *vom Rath* (Z. Kryst., iii., 187, 1878; v., 17, 1880). See also *Mallard* (Bull. Soc. Min., ii., 9, 1879).

Made artificially, *Frémy* and *Feil*, C. R., lxxxv., 1032, 1877.

Pseudomorph from Pregratten, Tyrol, *Böhm*, Min. Petr. Mitth., ii., 522, 1879.

Anal., North Thompson R., British Columbia, *Hoffmann*, Geol. Canada, 1880.

Cymatolite.—See *Spodumene*, p. 112.

Cyprusite. *P. F. Reinsch*, Proc. Roy. Soc., xxxiii., 119, 1881. A supposed new iron sulphate, of very doubtful character. Occurs in large quantities, but in an impure condition, incrusting the surface of a hill in the western part of the island of Cyprus. Soft, chalk-like. Color yellowish; in powder intense sulphur yellow. H. = 2. G. = 1·7. Slightly soluble in water, soluble in boiling HCl, leaving a siliceous residue. An approximate analysis gave: SO_3 21·5, Fe_2O_3 (Al_2O_3 tr.) 51·5, insol. siliceous substance 25, H_2O (hygroscopic) 2 = 100. Contains a large percentage of well preserved siliceous shells of microscopic Radiolaria.

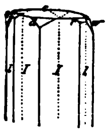
Cyrtolite, Min., p. 275.—A mineral regarded as related to cyrtolite by *Nordenskiöld* (Geol. För. Förh., iii., 229, 1876), has the following characters: In tetragonal crystals (1 and i–i), resembling dodecahedrons. Color yellow to yellowish brown. Translucent. H. = 5·5–6. G. = 3·29. Analysis: SiO_2 27·66, ZrO_2 (with a little Al_2O_3) 41·78, Er_2O_3, Y_2O_3 8·49, Ce_2O_3 3·98, CaO 5·06, MgO 1·10, H_2O 12·07, FeO tr. = 100·14. Occurs with fergusonite, arrhenite, xenotime, at Ytterby, Sweden.

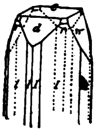
Damourite.—See *Mica Group*, p. 77.

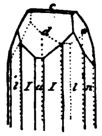
Danaite.—See *Arsenopyrite*, p. 10; and App. II., p. 15.

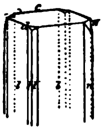
Danalite, Min., p. 265.—A mineral occurring in isometric octahedrons with magnetite and quartz, at the iron mine, Bartlett, N. H., is referred to danalite by *Wadsworth* (Proc. Bost. Soc. Nat. Hist., xx., 284, 1879). All the characters so far as observed agreed with that species, and the result of the blowpipe examination seems to set the matter above doubt.

Danburite, Min., p. 299.—From Russell, N. Y., described by *G. J. Brush* and *E. S. Dana* (Am. J. Sc., III., xx., 111, 1880; or Z. Kryst., v., 188). The crystals belong to the orthorhombic system (not triclinic), and are closely homœomorphous with topaz; $I \wedge I = 122° 52'$, $4\text{-}\breve{i} \wedge 4\text{-}\breve{i} = 54° 58'$, $1\text{-}\bar{i} \wedge 1\text{-}\bar{i} = 97° 7'$. Some of the common and simpler forms are shown in the adjoining figures. Here $l = i\text{-}\breve{2}$, $n = i\text{-}\breve{4}$, $d = 1\text{-}\bar{i}$, $w = 4\text{-}\breve{i}$, $r = 2\text{-}\dot{2}$. The optic axes lie in the basal plane, the bisectrix normal to the brachypinacoid is negative and is acute for red ($2V_a = 87° 37'$), but obtuse for blue ($2V_o = 90° 56'$); $\beta = 1{\cdot}634$ (Li). H. = 7–7·25. G. = 2·986–3·021. Color pale wine yellow, honey yellow to yellowish brown. Transparent. Lustre brilliant, vitreous to greasy (massive). Fracture uneven to subconchoidal. An analysis by Comstock gave:









	SiO_2	B_2O_3	CaO	Al_2O_3 (Fe_2O_3 tr.)	ign.
(⅔)	48·23	26·93	23·24	0·47	0·63 = 99·50.

Formula, same as that for the original mineral from Danbury, viz.: $CaB_2Si_2O_8 = SiO_2$ 48·78, B_2O_3 28·46, CaO 22·76 = 100. Occurs in small brilliant crystals imbedded in calcite, also in larger crystals in cavities from which the calcite has been weathered out, and massive. Associated minerals, quartz, calcite, mica, pyroxene, titanite.

The optical properties of the danburite from Danbury, Conn., have been examined by Des Cloizeaux (Bull. Soc. Min., iii., 195).

Datolite, Min., p. 380; App. II., p. 15.—**Cryst.**, Fossa della Castellina, near Porretta, Italy, *Bombicci*, Mem. Acc. Bologna, III., viii., 311, 1877 (Z. Kryst., ii., 505). *Groth*, Min.-Samml. Strassburg, p. 186, 1878. Kuchelbad, near Prague, Bohemia, *Vrba*, Z. Kryst., iv., 358, 1880; Theiss, Tyrol, ib., v., 425, 1881. Niederkirchen, Nahethal, *Lehmann*, Z. Kryst., v., 529, 1881. Andreasberg, *v. Kokscharof*, Min. Russl., viii., 139, 1881.

Thermal and optical properties, *Bodewig*, Pogg. Ann., clviii., 230, 1876. Pyro-electrical properties, *Hankel*, Wied. Ann., vi., 57, 1879.

Anal., Casarza, Liguria, *Issel*, Boll. Com. Geol., 1879, 530. Kuchelbad, near Prague, Bohemia, *Preis*, Z. Kryst., iv., 360, 1880. The datolite described by Smith (App. II., p. 16), as occurring with garnet and vesuvianite, was from San Carlos, Inyo Co., Cal. (Hanks), not from Santa Clara.

Dauberite.—App. II., p. 16.

Daubréelite. *J. L. Smith*, Am. J. Sc., III., xii., 109, 1876; xvi., 270, 1878.

Massive; somewhat scaly, structure crystalline. Cleavage in one direction. G. = 5·01. Lustre metallic, brilliant. Color black. Streak black. Brittle. Fracture uneven. Not magnetic. Composition (analogous to spinel group) FeS + Cr_2S_3 = FeS 30·45, Cr_2S_3 69·55 = 100. Analysis:

	S	Cr	Fe		
($\frac{3}{3}$)	42·69	35·91	20·10	= 98·70,	or,
	43·26	36·38	20·36	= 100.	

B. B. infusible, loses lustre and (R. F.) becomes magnetic. With borax reacts for chromium. Not attacked by cold nor by hot hydrochloric acid, but completely dissolved in nitric acid, without the liberation of free sulphur.

Occurs associated with troilite, on the borders of troilite nodules, or as minute veins running across them, in the meteoric irons, from Cohahuila, Mexico. Also identified in the iron of Toluca, Mexico, of Sevier, Tenn., and of Cranbourne, Australia. Named after M. Daubrée, of Paris.

The name schreibersite was given by Shepard to a supposed chromium sesquisulphide, occurring in the Bishopville meteorite (Am. J. Sc., II., ii., 383, 1846): the name was afterward changed by Haidinger to shepardite.

Daubreite. *I. Domeyko*, C. R., lxxxii., 922, 1876 ; Min. Chili, p. 297, 1879.

Amorphous ; structure compact, earthy, in part fibrous. H. = 2–2·5. G. = 6·4–6·5. Color yellowish to grayish white. Opaque.

Composition—4(Bi_2O_3) + Bi_2Cl_6 = Bi_2O_3 76·16, Bi_2Cl_6 23·84 = 100. Analysis, Domeyko (l. c.): Bi_2O_3 89·60, Cl 7·50, H_2O 3·84 (?), Fe_2O_3 0·72, or Bi_2O_3 72·60, Bi_2Cl_6 22·52, H_2O 3·84, Fe_2O_3 0·72 = 99·68. In the closed tube gives off acid water, and becomes grayish in color; but on continued heating below fusion turns yellow again. B. B. colors the flame slightly blue ; in very thin splinters fuses on the end instantly, the fused part becoming black and compact. Soluble in hydrochloric acid in the cold without residue, the solution having a more or less yellow color.

Occurs at the Constancia mine, Cerro de Tazna, Bolivia. Named after M. Daubrée, of Paris. Daubreite is related to the artificial compounds 2(Bi_2O_3) + Bi_2Cl and 6(Bi_2O_3) + Bi_2Cl_6.

Davreuxite. *De Koninck*, Bull. Ac. Roy. Belg., II., xlvi., 240, 1878.

Orthorhombic (on optical grounds). Resembles asbestos. In aggregates of slender transparent acicular crystals, light extinction parallel and perpendicular to longitudinal direction. Cleavage transverse to needles(?). Color white, with a tinge of flesh red. Analysis of material free from impurity, except quartz :

	SiO_2	Al_2O_3	MnO	MgO	H_2O	
($\frac{3}{3}$)	55·94	33·59	5·25	1·10	4·19	Fe_2O_3 or FeO tr. = 100 07.

The amount of quartz was determined as from 13 to 18 p. c.; in the above analysis 16·63 p. c.; and the remainder corresponds approximately to the formula H_4(Mn, Mg)$[Al_2]_3Si_6O_{24}$, which requires: SiO_2 46·89, Al_2O_3 40·19, MnO 6·93, MgO 1·30, H_2O 4·69 = 100. B. B. infusible ; with soda a manganese reaction ; with cobalt solution a blue color. Slightly attacked by acids. Occurs in quartz veins in the Ardennes schists, at Ottré, Belgium. Named after M. Ch. Davreux.

Davyne, Min., p. 328.—Relation to cancrinite and microsommite, *Rauff*, Z. Kryst., ii., 478, 1878.

Dawsonite, App. II., p. 16.—Optical examination, *Des Cloizeaux*, Bull. Soc. Min., i., 8, 1878.

Occurs in the province of Siena, Pian Castagnaio, Tuscany, according to *Chaper* (Bull. Soc. Min., iv., 155, 1881). Found in thin plates, radiated, and formed of fine fibres in a quartzose rock, impregnated with dolomite, in part argillaceous ; associated with calcite, dolomite, pyrite, fluorite, and cinnabar. An analysis by Friedel (ib., iv., 28) afforded: ($\frac{2}{2}$) CO_2 29·09, Al_2O_3 35·89, Na_2O 19·13, H_2O 12·00, MgO 1·39, CaO 0·42 ; formula $Na_2[Al_2]C_2O_8$, $2H_2O$ or $3Na_2CO_3$ + $Al_2C_3O_9$ + 2$[Al_2]H_6O_6$, which requires: CO_2 30·4, Al_2O_3 35·6, Na_2O 21·5, H_2O 12·5 = 100.

Recently found at the Montreal reservoir, Canada, *Harrington* (Can. Nat., x., 1881). Analysis, after deducting impurities, principally calcite: CO_2 27·78, Al_2O_3 36·12, Na_2O 22·86, H_2O 13·24 = 100.

Dechenite.—Min., p. 609 ; App. II., p. 16.

Delafossite.—App. II., p. 16.

DELESSITE, Min., p. 497 ; App. II., p. 16.—Analyses of several related minerals, Scotland, *Heddle*, Trans. Soc. Edinb., xxix., 81, 1879.

A blackish green chloritic mineral, filling cavities in eruptive rocks in the Thüringer Wald, gave Pufahl (G. = 2·836):

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	K_2O	Na_2O	P_2O_5	SO_3	CO_2	H_2O	
28·79	0·18	16·74	4·83	18·30	0·31	16·62	0·98	0·28	0·24	0·08	0·26	0·35	12·25	= 100·21.

For this the formula is calculated $R_7[R_2]_2Si_5O_{23} + 7aq$. Weiss proposes the name SUBDELESSITE for varieties of delessite which show but little Fe_2O_3, and much FeO. ZS. G. Ges., xxxi., 801, 1879.

See also *Diabantite*, p. 37; *Hullite*, p. 60, etc.

DELVAUXITE, Min., p. 583.—Ausstrich, Bohemia, occurrence and composition, *Vala* and *Helmhacker*, J. Min., 1875, 317. Visé, Belgium, *Jorissen* finds 0·30 As_2O_5 and 0·10 V_2O_5, and deduces the formula $[Fe_2]_5P_4O_{25}$, $15H_2O$, or if the water lost by desiccation at ordinary temperatures is included, the same with 11aq additional. Mem. Soc. Geol. Belg., vi., 38, 1879.

DERNBACHITE, App. II., p. 16.—See *Beudantite*, p. 15.

DESCLOIZITE, Min., p. 609; App. II., p. 16.—**Cryst.** description, probably monoclinic, Venus mine, Department de Minas, and other localities in the Sierra de Cordoba, Argentine Republic, *Websky*, Z. Kryst., v., 542, 1881 (Ber. Ak. Berlin, 1880, 672).

Analyses, Cordoba: 1, dark brown crystals, Rammelsberg; 2, Döring:

		V_2O_5	As_2O_5	PbO	ZnO	FeO	MnO	CuO	H_2O	Cl	
1.	G. = 6·080	$(\frac{3}{3})$ 22·74	....	56·48	16·60	....	1·16	....	2·34	0·24	= 99·56.
2.		$(\frac{3}{3})$ 21·41	0·27	56·20	17·03	0·97	0·58	0·28	2·35	0·26	insol. 0·47 = 99·82.

In light brown crystals (G. = 5·915) Rammelsberg obtained PbO 54·35, ZnO 20·93. These analyses lead to the formula $R_4V_2O_9$, H_2O or $R_3V_2O_8 + RH_2O_2$ (Ber. Ak. Berlin, 1880, 652; and ZS. G. Ges., xxxii., 709, 1880). This formula is analogous to that of libethenite, the form of which, as shown by Des Cloizeaux, is also near that of descloizite. On the other hand, Rammelsberg shows that the analysis of Damour (Min., p. 609) after the deduction of the soluble portion reduces to V_2O_5 24·80, PbO 60·40, ZnO 2·25, FeO 1·48, MnO 5·87, CuO 0·99, H_2O 2·43, Cl 0·35 = 98·57, and this corresponds to $R_3V_2O_8$, H_2O, with R = (Mn, Zn, Fe, Cu) : Pb = 1 : 2. Rammelsberg throws some doubt over the correctness of Damour's analysis.

Probable occurrence of descloizite in Arizona, *Silliman*, Am. J. Sc., III., xxii., 201, 1881.

A vanadate, related to descloizite, has been called BRACKEBUSCHITE by Döring (Rammelsberg, ZS. G. Ges., xxxii., 711, 1880). The description is as follows:

Occurs in small striated prismatic crystals. Color black. An analysis gave Döring, after the deduction of 4·36 p. c. insoluble : V_2O_5 25·32, P_2O_5 0·18, PbO 61·00, FeO 4·65, MnO 4·77, ZnO 1·29, CuO 0·42, H_2O 2·03 = 99·66. Rammelsberg deduces the formula $R_3V_2O_8 + H_2O$, with Fe : Mn : Pb = 1 : 1 : 4, this gives : V_2O_5 25·45, PbO 62·09, FeO 5·01, MnO 4·95, H_2O 2·50 = 100. Occurs with descloizite and vanadinite, at several localities in the State of Cordoba, Argentine Republic. Named for Dr. D. Luis Brackebusch, of Buenos Ayres. [It is of interest, that the analysis of Döring of this mineral, and that of Damour (as recalculated by Rammelsberg) on the supposed original descloizite, give very nearly identical results ; the relation of the two minerals is still uncertain.]

Destinezite. *Forir* and *Jorissen*, Bull. Soc. Geol. Belg., vii., 117, 1881. Announced as an iron phosphate, near delvauxite, containing, according to Jorissen, P_2O_5, As_2O_5, V_2O_5, Fe_2O_3, Al_2O_3, CaO, MgO (tr.), CuO (tr.). Dissolves in hydrochloric acid leaving a slight residue of impurities. Occurs in yellowish white nodular masses of an earthy aspect on the surface, but dull on the fracture. From the ampelite at Argenteau, Belgium. Named after M. Destinez. A complete description is promised.

DEWALQUITE.—App. II., p. 16 (4).

Diabantite. *G. W. Hawes*, Am. J. Sc., III., ix., 454, 1875. DIABANTACHRONNYN, Liebe, Jahrb. Min., 1870 (Appendix I., p. 4).

Massive, with a foliated radiated structure. H. = 1. G. = 2·79. Color dark green. Strongly dichroic. Analyses by Hawes (l. c.), on separate samples, each proved by the microscope to be homogeneous :

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	H_2O	
1. $(\frac{2}{2})$	33·24	11·07	2·26	25·11	0·41	16·51	1·11	0·25	9·91	= 99·87.
2. $(\frac{1}{2})$	33·68	10·84	2·86	24·33	0·38	16·52	0·73	0·33	10·02	= 99·69.

These analyses give a quantivalent ratio of $R : [R_2] : Si : H = 4 : 2 : 6 : 3$, or that of a unisilicate. This corresponds to the formula $R_{12}[R_2]_2Si_9O_{36} + 9aq$, which is near to that of pyrosclerite. Occurs filling amygdaloidal cavities in the trap of the Farmington Hills, Conn.

The above mineral is similar to the diabantachronnyn of Liebe, in mode of occurrence and in composition ; Hawes suggests the name diabantite as a substitute for the earlier name. It is also very near to Wiik's euralite (App. I., p. 6). These and several other similar minerals, epichlorite, hullite, etc., may fairly be classed with delessite, Min., p. 497.

DIADOCHITE, Min., p. 588.—**Anal.**, Peychagnard, Isère, *Carnot*, Bull. Soc. Min., iii., 39, 1880 ; Védrin, Belgium, Bull. Soc. Geol. Belg., vii., 114, 1881.

DIALLAGE.—See *Pyroxene*, p. 100.

DIALOGITE.—See *Rhodochrosite*, p. 103.

DIAMOND, Min., p. 21; App. II., p. 16.—**Cryst.**, *Rose-Sadebeck*, Abh. Akad. Berlin, 1876, 85 (Z. Kryst., ii., 93, 1877), and ZS. G. Ges., xxx., 605, 1878. *Hirschwald*, Z. Kryst., i., 212, 1877. *Groth*, Min.-Samml. Strassburg, p. 4, 1878. *Baumhauer*, Wied. Ann., i., 462, 1877. *Martin*, ZS. G. Ges., xxx., 521, 1878.

Striations on black diamond (carbonado), due to friction, *Daubrée*, C. R., lxxxiv., 1277, 1877.

Anomalous optical characters explained, *Jannettaz*, Bull. Soc. Min., ii., 124, 1879.

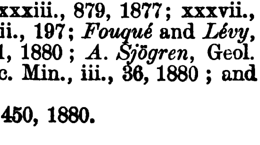
Occurrence in South Africa, *E. J. Dunn*, Q. J. Geol. Soc., xxxiii., 879, 1877; xxxvii., 609, 1881; *Chapet*, Bull. Soc. Min., ii., 195, 1879; *Friedel*, ib., ii., 197; *Fouqué* and *Lévy*, ii., 216 ; iii., 189 ; *J. A. Roorda Smit*, Arch. Néerland, xv., 61, 1880 ; *A. Sjögren*, Geol. För. Förh., vi , 10, 1882. In South America, *Gorceix*, Bull Soc. Min., iii., 36, 1880 ; and C.R., xciii., 98, 1881.

Made artificially, *J. B. Hannay*, Proc. Roy. Soc., xxx., 188, 450, 1880.

DIAPHORITE.—App. I., p. 4; see also *Freieslebenite*, p. 48.

DIASPORE.—Min., p. 168; App. II., p. 17.

Dickinsonite. *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xvi., 114, 1878.



Monoclinic; pseudo-rhombohedral. Axes, $\dot{c} : \bar{b} : \grave{a} = 0·6917 : 0·5773 : 1$; $\beta = 61° 30'$. Observed planes (see figure) : O (c), $\bar{i}$-$\bar{i}$ (b), i-$\bar{i}$ (a), 1 (p), 2 (s) – $\bar{3}$-$\bar{i}$ (x). $I \wedge I = 66° 36'$, $c \wedge a = 118° 30'$, $c \wedge x = 137° 30'$, $c \wedge p = 118° 52'$, $c \wedge s = 97° 58'$. Crystals rare, tabular in habit, with triangular striations on basal plane; commonly foliated to micaceous. Massive ; also curved lamellar, radiated or stellated. Cleavage : basal perfect.

H. = 3·5–4. G. = 3·338–3·343. Lustre vitreous, on cleavage face somewhat pearly. Color olive to oil green, in masses dark grass green. Streak nearly white. Transparent to translucent. Fracture uneven. Brittle. Planes of light-vibration parallel (grass-green) and normal (yellow-green) to edge c / a in basal section.

Composition : $4R_3P_2O_8 + 3aq$. If $R = Mn : Fe : Ca : Na_2 = 5 : 2\frac{1}{2} : 3 : 1\frac{1}{2}$, percentage composition : P_2O_5 40·05, FeO 12·69, MnO 25·04, CaO 11·85, Na_2O 6·56, H_2O 3·81 = 100.

Analyses : 1, 2, by S. L. Penfield ; 1, after deduction of impurities, viz., 3·30 p. c. quartz, and 6·89 p. c. eosphorite ; 2, after deducting 1·89 p. c. quartz, 6·89 p. c. eosphorite.

	P_2O_5	FeO	MnO	CaO	Li_2O	Na_2O	K_2O	H_2O	
1.	39·36	12·40	25·10	13·36	0·03	5·25	0·89	3·86	= 100·25.
2.	39·53	11·90	23·96	[14·98]	0·24	4·78	0·73	3·88	= 100·00.

In the closed tube gives water, the first portions of which are neutral, but the last portions react faintly acid; the residue is magnetic. Fuses in the naked lamp-flame, and B. B. in the forceps colors the flame at first green then greenish yellow; reacts for iron and manganese with the fluxes. Soluble in acid.

Occurs at Branchville, Fairfield Co., Conn., intimately associated with eosphorite, triploidite, and other species in nests in a vein of albitic granite. Often disseminated in minute plates through massive eosphorite, giving it a green color ; similarly imbedded in lithiophilite. Named after Rev. Wm. Dickinson, formerly of Redding.

Dietrichite. *V. Schröckinger*, Verh. G. Reichs., 1878, 189. *Arzruni*, Z.-Kryst., vi., 92, 1881. In fine fibrous, tufted forms, as an efflorescence or incrusting. Monoclinic (?), Arzruni. H. = 2. Lustre silky. Color dirty white to brownish yellow. Easily soluble in water; taste like vitriol. B. B. fusible. Composition $(Zn,Fe,Mn)\ SO_4 + Al_2S_3O_{12} + 22aq$. Analysis by Dietrich:

SO_3	Al_2O_3	ZnO	FeO	MnO	MgO	H_2O	
35·94	10·92	8·70	3·11	1·74	0·33	44·38	= 100·12.

A recent formation (within 14 years) in an abandoned working at Felsöbanya, Transylvania. [Belongs with the related alums, mendozite, bosjemanite, halctrichite, etc.]

DIOPSIDE.—See *Pyroxene*, p. 100.

DIMORPHITE.—Min., p. 28; App. II., p. 17.

DIOPTASE, Min., p. 401; App. II., p. 17.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 285, 1875; vii., 218, 1878. Chili, *vom Rath*, Z. Kryst., v., 257, 1880; *Bauer*, ZS. G. Ges. xxxii., 714, 1880. [Bauer states that the reported occurrence of dioptase in Nassau is a mistake, see Syst. Min., p. 402; Text-Book, p. 279.]

DOLEROPHANITE.—App. II., p. 17.

DOLOMITE, Min., p. 68; App. II., p. 17.—**Cryst.**, Bex, Switzerland, *v. Kokscharof*, Min. Russl., vii., 1, 1875; Bull. Ac. St. Pet., xxi., 47, 1875. Binnenthal, etc., *Groth*, Min.-Samml. Strassburg, p. 127, 1878.

Relation to the other rhombohedral carbonates discussed, *Tschermak*, Min. Petr. Mitth., iv., 99, 1881.

Anal., Bleiberg, Carinthia, *von Zepharovich*, Z. Kryst., iii., 100. Anal. of var. miemite (by John), from Zepce, Bosnia, *F. v. Hauer*, Verh. G. Reichs., 1879, 121.

Origin of dolomite discussed, *Doelter* and *Hoernes*, Jahrb. G. Reichs., xxv., 293, 1875; *Hoppe-Seyler*, ZS. G. Ges., xxvii., 495, 1875.

DOMEYKITE.—Min., p. 36; App. II., p. 17.

DOPPLERITE, Min., p. 749.—A black gelatinous hydrocarbon, related to dopplerite, is described by *T. Cooper* (Eng. Min. Journ., Aug. 13, 1881), as found in a stratum of muck below a peat bed at Scranton, Penn. More particularly described by *H. C. Lewis* (Am. Phil. Soc. Philad., Dec. 2, 1881). When first found it was jelly-like in consistency, but on exposure to the air it becomes tougher and is elastic, somewhat like india-rubber, and finally when quite dry it is brittle and nearly as hard as coal. Only partially dissolved in hot alcohol, but completely in caustic potash. When dry burns with a yellow flame. Analysis by J. M. Stinson, of material dried at 100° C., gave: C 28·99, H 5·17, N 2·46, O 56·98, ash 6·40 = 100; for which the empirical formula $C_{10}H_{22}O_{16}$ is calculated. Lewis suggests that the various allied jelly-like hydrocarbons may be grouped together under the name PHYTOCOLLITE (*φυτόν, κόλλα,* or *plant jelly*), but the new name is hardly needed.

DUDLEYITE.—App. II., p. 18.

DUFRENITE, Min., 583; App. II., p. 18.—**Anal.**, Dept. of Freirina, Atacama, *Domeyko*, Min. Chili, 3d ed., p. 161, 1879. From the Rothläufchen mine, near Waldgirmes (kraurite), *Streng*, J. Min., 1881, i., 110.

In radiated coarsely fibrous masses of a dark greenish-brown color, forming an irregular bed of about 10 inches in depth, underlying limonite, in Rockbridge Co., Va.; anal. by J. L. Campbell: P_2O_5 31·76, Fe_2O_3 50·85, Al_2O_3 0·21, FeO 6·14, MnO 0·40, CaO 1·12, MgO 0·76, H_2O 8·53, insol. 0·12 = 99·89. Am. J. Sc., III., xxii., 65, 1881. The same occurrence was earlier analyzed by *Massie* (Ch. News, xlii., 24, 181, 1880), and with almost identical results.

DUFRENOYSITE.—Min., p. 92; App. II., p. 18.

Dumortierite. *Gonnard*, Bull. Soc. Min., iv., 2, 1881; *Bertrand*, ib., iii., 171; and iv., 9; *Damour*, ib., iv., 6.

Orthorhombic (on optical grounds). Occurs in minute prismatic crystals, always twins, prismatic angle inferred to be about 120°. Biaxial, negative bisectrix parallel to the longitudinal direction of the crystals, axial angle small, dispersion $\rho < v$. Remarkably dichroic; colorless when the crystals are parallel, and deep cobalt blue when perpendicular to the plane of polarization. The phenomenon of *houppes* observed in fragments of ·01 mm. thickness, even more strikingly than in andalusite (Bertrand). G. = 3·36 (see below). Color light blue. Analysis, Damour:

SiO_2	Al_2O_3	Fe_2O_3	MgO	ign
29·85	66·02	1·01	0·45	2·25 = 99·58.

Calculated formula $[Al_2]_4Si_3O_{18}$, which requires: SiO_2 30·40, Al_2O_3 69·60. [The material analyzed was obtained by attacking the granite in which it occurred with a mixture of HF and H_2SO_4. This mineral was then separated from the quartz and other substances undecomposed by the Thoulet liquid. Necessarily, therefore, more or less doubt surrounds the chemical composition; the loss by ignition is also neglected in the formula.] Damour thinks the blue color may be due to blue oxide of titanium. B. B. infusible, loses color on strong ignition; with cobalt solution a beautiful blue, characteristic of aluminum. With salt of phosphorus gives a slightly bluish opaline bead.

Found in fibrous forms imbedded in feldspar in blocks of gneiss at Chaponost, near Lyons, France, original locality probably Beaunan. Named for the palæontologist M. Eugène Dumortier.

Duporthite, *J. H. Collins*, Min. Mag., i., 226, 1877.

In fibrous masses occupying fissures in serpentine. H. = 2. G. = 2·78. Lustre silky. Color greenish to brownish gray. Flexible in thin fibres like asbestos. Analysis gave: SiO_2 49·21, Al_2O_3 27·26, FeO 6·20, MgO 11·14, CaO 0·39, Na_2O 0·49, H_2O 3·90, do. hygroscopic 0·68 = 99·27. About half the water goes off only at an elevated temperature. A relation to neolite (Min., p. 406), is suggested. From Duporth, near St. Austell, Cornwall. [Needs further examination.]

DURANGITE, App. I., p. 4.—Des Cloizeaux has investigated the crystalline form and optical properties (Ann. Ch. Phys., V., iv., 401, 1875). An analysis by G. W. Hawes (*Brush*, Am. J. Sc., III., xi., 464, 1876), of small dark-colored crystals (G. = 4·07, other light-colored crystals gave G. = 3·937), afforded:

As_2O_5	Al_2O_3	Fe_2O_3	Mn_2O_3	Na_2O	Li_2O	F
53·11	17·19	9·23	2·08	13·06	0·65	7·67* = 102·99, deduct 3·23 O cor- [responding to F = 99·76.

* A second determination gave F = 7·49.

This gives the atomic ratio $R : [\overset{vi}{R}_2] : As = 2 : 1 : 2$; the ratio of $\dot{O} : F = 4·7 : 1$. The formula may be written $\overset{i}{R}_2 [\overset{vi}{R}_2] As_2 (O, F_2)_8$ or nearly $[R_2] As_2O_8 + 2\overset{i}{R}F$; which is analogous, as remarked by Brush (l. c.), to amblygonite, to which, however, in form and optical characters it has apparently no relation (Des Cl.).

Durangite is described by H. G. Hanks (Am. J. Sc., III., xii., 274, 1876), as occurring at the Barranca tin mine, eighteen miles north-east of Coneto, State of Durango, and about ninety miles north-east of the city of Durango. The mineral is found not with the stream tin, but in a vein four to six inches in thickness; the crystals are sometimes attached to the walls of the vein (here the large, light, orange-colored variety, App. I., p. 4), sometimes with cassiterite in the white pulverulent matter which fills the veins (small, dark-colored variety, see above). The largest crystal found was 19 mm. long, 11 mm. thick, and weighed 3·022 grams.

Dürfeldtite. *Raimondi*, Minéraux du Pérou, p. 125, 1878.
In masses with indistinct fibrous structure, also in fine needles. H. = 2·5. G. = 5·40. Color light gray. Lustre metallic. Associated with quartz as gangue. After deduction of impurities (31·31 p. c. gangue), the composition is:

S	Sb	Pb	Ag	Cu	Fe	Mn
24·15	30·53	25·81	7·34	1·86	2·24	8·06 = 100.

For this the formula $3RS + Sb_2S_3$ is deduced. B. B. on charcoal gives off antimonial fumes, gives a lead coating, and leaves a globule rich in silver. With borax reacts for manganese. From the Irismachay mine, Anquimarca, province Cajatambo, Peru. Named after M. R. Dürfeldt. [This mineral is very near stylotypite, but differs in containing lead instead of copper. An analysis of the pure mineral is to be desired.]

Duxite. *Dölter*, Verh. G. Reichs., 1874, 145. A resin from the lignite of Dux, Bohemia. Opaque. Color dark brown. G. = 1·133. Melts at 246°. Fischer obtained besides 2·72 water and 1·94 ash: C 78·25, H 8·14, O 13·19, S 0·42 = 100. Near walchovite, Min., p. 741.

Dysanalyte. *A. Knop*, Z. Kryst., i., 284, 1877. PEROFSKITE of former writers.
Isometric; in cubes. Cleavage cubic. G. = 4·13. Color black. Analyses: 1, 2, Seneca (Ann. Chem. Pharm., civ., 371, 1856); 3, Knop; 4, same as 3 after deduction of impurities:

	TiO_2	Cb_2O_5	FeO	MnO	CeO	CaO	Na_2O	
1.	58·95	....	6·23	....	....	35·69	....	= 100·87.
2.	59·30	....	5·99	....	....	35·94	....	= 101·23.
3.	40·57	22·73	5·70	0·42	5·58	19·36	3·50	SiO_2 2·31, MgO, K_2O, Al_2O_3 F, tr. = 100·17.
4.	41·47	23·23	5·81	0·43	5·72	19·77	3·57	= 100.

The atomic ratio for $R : Cb : Ti : O = 7 : 2 : 6 : 24$, corresponding approximately to the formula $RCb_2O_6 + 6RTiO_3$. Found in the granular limestone of Vogtsburg, Kaiserstuhlgebirge, Baden. The mineral has previously been called perofskite, but is in fact closely related to pyrochlore (Min., p. 512), and koppite (App. II., p. 32. Named, in allusion to the difficulty of the analysis, from δυςανάλυτος, *hard to undo.*

DYSCRASITE.—Min., p. 35; App. I., p. 5.

DYSODILE, Min., p. 746.—**Anal.**, Church, Ch. News, xxxiv., 155, 1876.

Eggonite. *Schrauf*, Z. Kryst., iii., 352, 1879.
Triclinic. In minute (⅓ to 1 mm.) crystals resembling common forms of barite (Min., p. 616, figs. 505 E, F), hence orthorhombic in habit. Closely related in angle to hopeite (Min., p. 544, see also this Appendix, p. 59). H. = 4–5. Color light grayish brown. Streak white. Lustre sub-adamantine. Translucent to transparent. B. B. infusible, becomes gray and opaque. On charcoal with soda a cadmium coating (no zinc observed). With salt of phosphorus a colorless bead enclosing a skeleton of silica. Insoluble in HCl or HNO_3. Regarded as essentially a silicate of cadmium.

Occurs on and implanted in crystallized calamine, which in turn fills cavities in smithsonite; the last mineral is massive, coarse granular, and of a light brown color, and mixed more or less with red clay. The eggonite is so called from ἔγγονος, *grandson*, as being the third generation in the series of zinc-cadmium compounds. From Altenberg. [Needs further examination.]

EHLITE.—See *Pseudomalachite*, p. 97.

Eisenbrucit.—See *Brucite*, p. 18.

Ekdemite. *Nordenskiöld*, Geol. För. Förh., iii., 379, 1877.

Tetragonal (?). Massive, coarsely granular: also as a crystalline incrustation. Cleavage: basal, nearly perfect. Optically uniaxial. H. = 2·5–3. G. = 7·14. Lustre on cleavage plane vitreous, on fracture surfaces greasy. Color bright yellow to green. Translucent in thin splinters. Brittle. Composition: $Pb_6As_2O_8 + 2PbCl_2 = As_2O_5$ 10·59, PbO 59·67, Cl 7·58, Pb 22·16 = 100. Analysis (l. c.):

As_2O_3	PbO	Cl	Pb		
10·60	58·25	8·00	23·39	=	100·24.

Fuses easily to a yellow mass, with the loss of lead chloride as a white sublimate; gives a lead coating on charcoal. Soluble readily in nitric or warm hydrochloric acid.

Found at Långban, Wermland, Sweden, in small granular masses, imbedded in a yellow manganesian calcite; also as an incrustation. Named from ἔκδημος, *unusual.*

A mineral of similar appearance, also a compound of arsenic, lead, and chlorine, having the same pyrognostic characters, occurs at Långban, as small lemon yellow grains in calcite. Held to be orthorhombic on basis of crystalline form and optical character. $O \wedge 1 =$ 114° 36′, $1 \wedge 1 =$ 101° ′28; but as Groth shows (Z. Kryst., ii., 307), these angles give a ratio 1 : ·967 for the lateral axes, so that it may be identical with ekdemite, and not as Nordenskiöld suggests, a dimorphous form.

ELÆOLITE.—See *Nephelite*, p. 84; and App. II., p. 18.

Eleonorite.—See *Beraunite*, p. 13.

Elroquite. *C. U. Shepard*, Min. Contr., 1877.—An apple green to gray, massive substance; translucent to nearly opaque. H. = 6. G. = 2·35–2·40. Composition: SiO_2 16·4, Al_2O_3 16·4, Fe_2O_3 13·8, H_2O 21·8 [P_2O_5 32·00 by difference] = 100. Regarded as a hydrosilicate of Al_2O_3 and Fe_2O_3, mixed with opaline silica and a supposed chromium phosphate, to which "the green color was found to be due." To the chromium phosphate the name PHOSPHOCHROMITE is given [see App. I., p. 9]. From the Island of Elroque, Caribbean Sea. [The description of the mixture is so incomplete that the existence of the supposed species cannot be regarded as proved.]

EMBOLITE, Min., p. 115; App. II., p. 18.—A mineral from the silver mines in the Troitzker Bezirk, Orenburg, gave *W. von Beck* (J. Min., 1876, 165): Br 28·44, Cl 8·21, Ag 63·35 = 100, or AgBr 66·83, AgCl 33·17 = 100, which corresponds to 3AgBr + 2AgCl. It occurs in minute octahedral crystals, and in thin crusts.

EMERALD.—See *Beryl*, p. 13.

EMPLECTITE, Min., p. 86; App. II., p. 18.—**Anal.**, Aamdal, Thelemarken, Norway, *Daw*, Ch. News, xl., 225, 1879.

ENARGITE, Min., p. 107; App. II., p. 18.—**Cryst.**, Matzenköpfl, near Brixlegg, Tyrol, *von Zepharovich*, Z. Kryst., iii., 600, 1879. In compound crystals, twins and star-shaped threelings, twinning plane i–$\frac{3}{2}$, Argentine Republic, *vom Rath*, Z. Kryst., iv., 426. Also from Mancayan, Luzon, twins, etc., *Zettler* (Klein), J. Min., 1880, i., 159 (ref.).

Anal., quoted by Brackebusch, Min. Repub. Argentina, 49. 1879.

Occurrence in Mexico, *Burkhart*, Naturaleza, iii., 336, 1875.

See also *Clarite*, p. 27, *Famatinite*, p. 45.

ENSTATITE, Min., p. 208; App. II., p. 18.—**Cryst.**, Kjörrestad, near Bamle, Norway, in enormous crystals, with analyses, *Brögger* and *vom Rath*, Z. Kryst., i., 18, 1877. Gröditzberg, near Liegnitz, Silesia, cryst. and optical exam., *v. Lasaulx*, J. Min., 1878, 673. Snarum, pseudomorphous crystals, *Seligmann*, Z. Kryst., iii., 81, 1878.

Anal., Georgia, *König*, Proc. Acad. Nat. Sc. Philad., 1877, 198.

Enysite, *Collins*, Min. Mag., i., 14, 1876; *C. Le Neve Foster*, ibid., p. 9.

Forms a bluish green stalagmitic crust. H. = 2–2·5. G. = 1·59. An analysis gave: SO_3 8·12, Al_2O_3 29·85, CuO 16·91, CaO 1·35, SiO_2 3·40, CO_2 1·05, H_2O (over H_2SO_4 after 3 days) 14·04, at 150° C. 18·21, at a red heat 7·17, Fe_2O_3, Cl, Na_2O tr. = 100·10. Compare analyses by Flight (J. Ch. Soc., Jan., 1871) and Pisani (Phil. Mag., Ap., 1868).

Found at St. Agnes, Cornwall, in one of the caves at the old quay. Named after J. S. Enys, F. G. S. [A most improbable compound. Groth shows that it is to be regarded as merely a mechanical mixture (Z. Kryst., i., 75).]

EOSITE.—App. I., p. 5.

Eosphorite.—See *Childrenite*, p. 24.

EPIBOULANGERITE.—App. I., p. 5.

EPIDOTE, Min., p. 281; App. II., p. 18.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 297, 1874. Heponselkä, Finland, *Wiik*, Œfv. Finsk. Vet. Soc., xix., 69, 1876–7. Optical exam., *Fouqué-Lévy*, Ann. Min., VII., xii., 434, 1877, *Groth*, Min.-Samml., Strassburg, p. 195, 1878. Cryst. monograph, description of crystals from many localities, with a large number of new forms, and a catalogue of all occurring planes, *Bücking*, Z. Kryst., ii., 321, 1878. Cryst. monograph, giving many measurements, and the constants deduced from them, *N. von Kokscharof, Jr.*, St. Petersburg, 1879 (Min Russl., viii., 43, 1881).

Photometric measurements of light absorption, *Pulfrich*, Z. Kryst., vi., 157, 1881.

Anal., Allochetthal, Tyrol, *Dölter*, Min. Mitth., 1875, 175. Syra, *Lüdecke*, ZS. G. Ges., xxviii., 262, 1876. Quenast, Belgium, *Renard*, Bull. Ac. Belg. II., l., 170, 1880. Amelia Co., Va., *Lippit*, Ch. News, xliii., 208, 1881. Analyses of varieties occurring crystallized together in parallel position, Zöptau, Silesia, *Bauer*, J. Min., 1880, ii., 78. Analyses and discussion of composition of the species of the epidote group, *Laspeyres*, Z. Kryst., iii., 525, 1879. The doubts suggested by Laspeyres in regard to the correctness of the accepted formula $H_2Ca_4[Al_2]_3Si_6O_{26}$ are answered by *Tschermak* and *Sipöcz*, Ber. Ak. Wien, lxxxii., 141, 1880, and still further by *Ludwig*, Min. Petr. Mitth., iv., 153, 1881.

EPIGENITE.—App. I., p. 5.

EPIPHANITE.—App. I., p. 6.

EPISTILBITE, Min., p. 443; App. II., p. 19.—*Des Cloizeaux* finds epistilbite to be monoclinic in optical characters (Bull. Soc. Min., ii., 161, 1879). A similar result is reached by *Tenne* (J. Min., 1879, 840; 1880, i., 43), who discusses fully the crystalline form. He also quotes an analysis by Jannasch, SiO_2 58·55, Al_2O_3 17·15, CaO 8·99, H_2O 15·41 = 100·10, which corresponds nearly to the accepted formula $Ca[Al_2]Si_6O_{16}$ + 5aq.

Found by Seligmann with heulandite, stilbite, etc., at Viesch, Canton Wallis, Switzerland, *Tenne*, J. Min., 1880, i., 285.

Tenne has examined the PARASTILBITE of von Waltershausen, and refers it with little question to epistilbite, J. Min., 1881, ix., 195.

Lüdecke finds that REISSITE (App. I., p. 14) is nearly identical in form with epistilbite (monoclinic), so that it should probably be united to that species; it differs only in hardness, and in that it is said to contain alkalies, J. Min., 1880, ii., 200; 1881, i., 162.

EPSOMITE, Min., p. 463.—Argentine Repub., analyses quoted by *Brackebusch*, Min. Argentin., 73, 1879.

A massive variety is called REICHARDTITE by Krause (Arch. Pharm., III., v., 423, and vi., 41, in Z. Ges. Nat., II., x., 554)—[the new name, however, is most unnecessary]. Crystalline, granular or foliated. Cleavage easy. G. = 1·6–1·7. Transparent to translucent. Fracture conchoidal. The analyses agree closely with the formula $MgSO_4 + 7aq$, viz.:

		SO_3	MgO	H_2O		
1. Stassfurt	$(\frac{3}{3})$	39·23	9·83	51·17	=	100·22.
2. Leopoldshall		39·31	9·77	51·20	=	100·28.

Occurs forming thin layers associated with carnallite, at Stassfurt and Leopoldshall.

ERDMANNITE.—Engström (Inaug. Diss. Upsala, 1877. abstr. in Z. Kryst. iii., 199, 1878) has analyzed a mineral from the Stockö, Norway, which he regards as probably the same as that named erdmannite by Esmark (Min., p. 414, see Berlin, Pogg. Ann., lxxxviii., 162), and also identical with that analyzed by Michaelson and Nobel (Michaelsonite, Min., p. 289). He obtained: SiO_2 25·15, B_2O_3 8·18, ZrO_2 2·14, ThO_2 9·93, Fe_2O_3 3·01, Ce_2O_3 9·00, $Di_2(La_2)O_3$ 8·66, Y_2O_3 1·64, Er_2O_3 0·50, FeO 3·16, CaO 18·78, BeO 3·16, Na_2O 1·02, K_2O 0·42, H_2O 5·25 = 100. The author writes the formula $R_3SiO_5 + Be_2SiO_5 + 3aq$, and suggests a relation to datolite.

Another mineral related to erdmannite, analyzed by Damour (Ann. Ch. Phys., V., xii., 411, 1877) gave results varying somewhat widely from the above analysis; he found 12·10 p. c. H_2O (see *Homilite*, p. 59).

Erilite. *H. C. Lewis*, Proc. Ac. Nat. Sc. Philad., 1880, 292. Minute acicular crystals, looking like tufts of white wool, observed in a cavity in quartz from Herkimer Co., N. Y.; chemical nature unknown. The cavity also contained a liquid of undetermined character. [A substance of unknown characters, not even proved to be new, does not deserve a name —the practice of provisionally attaching names in such cases is to be condemned.]

Eriochalcite. Copper chloride from Vesuvius (1870), by *Scacchi* (Bull. Soc. Min., i., 132).

ERSBYITE.—Min., p. 361; App. II., p. 19.

ERYTHRITE.—Min., p. 558; App. II., p. 19.

ERYTHROSIDERITE, App. II., p. 19.—Vesuvius, *Scacchi*, Contrib. Min., II., p. 42, 1874. DOUGLASITE, from Douglasshall, is 2KCl, $FeCl_2$, $2H_2O$, *Ochsenius*, *Precht*, Ber. Ch. Ges., xiii., 2328, 1881.

Erythrozincite. *Damour*, Bull. Soc. Min., iii., 156, 1880. Occurs in thin plates apparently crystalline. Color red. Streak pale yellow. Translucent. Contains sulphur, zinc, and manganese, as proved by a qualitative examination on the small amount of material available. B. B. gives sulphurous fumes in the open tube, fuses in the forceps to a blackish slag. Dissolves in nitric acid with the separation of a little sulphur. Occurs in veins of lapis lazuli, from Siberia. *Des Cloizeaux* (ib., iv., 40, 1881) finds that cleavage plates of this mineral show in polarized light a black cross (positive), resembling that of wurtzite, both natural and artificial. He concludes that it is probably a manganesian variety of this mineral.

ESMARKITE.—See *Anorthite*, p. 7; and App. II., p. 19.

ETTRINGITE, App. II., p. 19.—Optically uniaxial, negative, *Bertrand*, Bull. Soc. Min., iv., 34, 1881.

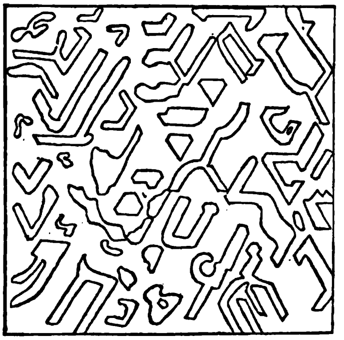
Euchlorite.—See *Mica Group*, p. 77.

EUCLASE, Min., p. 379; App. II., p. 19.—**Cryst.**, *Kulibin*, Verh. Min. Ges. St. Pet., II., xiv., 147, 1879. Brazil, *Guyot*, Z. Kryst., v., 250, 1880. From the Hohe Tauern, Tyrol, perhaps from Rauris, crystals described by *Becke*, Min. Petr. Mitth., iv., 147, 1881.

Eucrasite. *S. R. Paijkull*, Geol. För. Förh., iii., 350, 1877.
Orthorhombic (?). H. = 4·5–5. G. = 4·39. Lustre greasy. Color blackish brown. Streak

brown. Slightly translucent in thin splinters. Fracture uneven. Brittle. Analysis: SiO_2 16·20, TiO_2 1·27, SnO_2 (?) 1·15, ZrO_2 0·60, MnO_2 2·34, ThO_2 35·96, CeO_2 5·48, Ce_2O_3 6·13, La_2O_3 (Di_2O_3) 2·42, Y_2O_3 4·33, Er_2O_3 1·62, Fe_2O_3 4·25, Al_2O_3 1·77, CaO 4·00, MgO 0·95, K_2O 0·11, Na_2O 2·48, H_2O 9·15 = 100·21. The quantivalent ratio for $\overset{II}{R} : [\overset{VI}{R}_2] : \overset{IV}{R} : Si(Ti) : H = 2·18 : 4·47 : 6·67 : 9·14 : 8·13$. B. B. fusible (at 4) on the edges. The borax bead in the R. F. is violet, in the O. F. yellow. In hydrochloric acid partially soluble, with the evolution of chlorine. Completely soluble in sulphuric acid. Occurs near Barkevik, Brevig, Norway. Named from εὐ and κρᾶσις. [This is the mineral which has been referred, with a question, to polycrase, and also to polymignite, Dana, Min., p. 523. It seems, however, to be closely related to thorite, Min., p. 413.]

Eucryptite. *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xx., 266, 1880. Hexagonal. Cleavage probably basal. In symmetrically arranged crystals, imbedded in albite (see figure). G. = 2·667. Color white. Composition $Li_2[Al_2]Si_2O_8$, which requires: SiO_2 47·51, Al_2O_3 40·61, Li_2O 11·88 = 100. Gelatinizes in hydrochloric acid.



Eucryptite forms with albite an apparently homogeneous substance, called by the authors "β spodumene;" it is derived from the alteration of spodumene. The microscope shows the two minerals of which this substance is made up, and chemical analysis serves to separate the latter into a soluble portion (eucryptite), and an insoluble portion, albite. This is further explained, with analyses, on p. 113. From Branchville, Conn. Named from εὐ, *well*, and κρυπτός, *concealed*.

Eudialyte, Min., p. 248; App. II., p. 19.—Greenland, *v. Kokscharof*, Verh. Min. Ges. St. Pet., II., xiv., 205, 1878; Min. Russl., viii., 29, 1878.

Eudnophite, Min. p. 433.—**Anal.**, *Damour*, Bull. Soc. Min., iv., 239, 1881.

Eulytite, Min, p. 391; App. II., p. 19.—*Bertrand* regards the apparently tetrahedral crystals as formed of four rhombohedrons of 120°, placed with their vertices at a common point. A section cut parallel to a tetrahedral face exhibits, in converging polarized light, a single negative axis perpendicular to it, Bull. Soc. Min., iv., 61, 1881.

Euralite.—App. I., p. 6.

Eusynchite, Min., p. 609.—A related mineral from Laurium, Greece, gave *Pisani* (C. R., xcii., 1292, 1881): V_2O_5 25·53, PbO 50·75, CuO 18·40, CaO 1·53, H_2O 4·25 = 100·46, corresponding to $(Pb, Cu)_3V_2O_8$, if the water is neglected. Occurs in crystalline crusts on quartz; color greenish black to olive green.

Another closely related mineral is called tritochorite by *A. Frenzel* (Min. Petr. Mitth., iii., 506; iv., 97, 1881). Massive, structure fibrous-columnar. Cleavage parallel to fibres, distinct. H. = 3·5. G. = 6·25. Color blackish brown to yellowish brown. Analysis:

	V_2O_5	As_2O_5	PbO	CuO	ZnO		
$(\frac{2}{3})$	24·41	3·76	53·90	7·04	11·06	=	100·17.

Formula approximately $R_3V_2O_8$, with R = Pb, Cu, Zn. B. B. fuses easily with intumescence, giving off arsenical fumes. On charcoal gives coatings of lead and zinc, and in R. F. a lead globule. Soluble in HNO_3 and in HCl. From "Mexico or South America." Named from τρίτος, *third*, and χωρέω, *to follow*, in allusion to its relation to eusynchite and araeoxene (Rammelsberg, Min. Chem., 2d ed., p. 290, 291).

Euxenite, Min., p. 521; App. II., p. 20.—**Cryst. form**, *Brögger*, Z. Kryst., iii., 483, 1879.

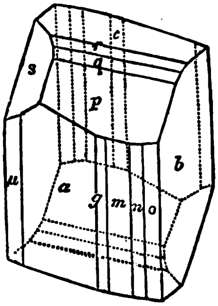
A mineral occurring with samarskite in Mitchell Co., N. C., gave *J. L. Smith* (Am. J. Sc., III., xiii., 365, 1877): Cb_2O_5 54·12, WO_3, SnO_2 0·21, Y_2O_3, Ce_2O_3 24·10, U_2O_3 9·53, CaO 5·53, MnO 0·08, FeO 0·31, H_2O 5·70 = 99·58. G. = 4·593–4·642. Color brownish black to hair brown; translucent in thin fragments; lustre resinous. [Smith calls this euxenite, but that it cannot be; for example, Rammelsberg finds in true euxenite 20–23·5 p. c. TiO_2, and G. = 4·67–5·1.]

FAHLERZ.—See *Tetrahedrite*, p. 120.

FAHLUNITE.—Min., p. 484; App. II., p. 20.

Fairfieldite. *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xvii., 359, 1879.

Triclinic. Axes: $\dot{c} : \bar{b} : \breve{a} = 0·7065 : 3·5757 : 1·0000$ Observed planes (see figure) $i\text{-}\bar{i}$ (*a*), $i\text{-}\breve{i}$ (*b*), O (*c*), $i\text{-}\frac{5}{2}'$ (*g*), I' (*m*), $i\text{-}\frac{3}{2}'$ (*n*), $i\text{-}\breve{2}$ (*o*), I (*μ*), $-1'$ (*p*), $-\frac{1}{2}'$ (*q*), $-\frac{1}{3}'$ (*r*), $-4\text{-}4$ (*s*). Angles $ab = 78°$, $ac = 92°$, $ap = 123° 30'$, $cp = 147°$, $bp = 101° 30'$. Cleavage *b* highly perfect, *a* less so. Usually in foliated to lamellar crystalline aggregates; occasionally curved, foliated, or fibrous, in radiating masses. H. = 3·5 G. = 3·15. Color white to pale straw yellow. Streak white. Lustre pearly to sub-adamantine, on the surface of perfect cleavage (*b*) very brilliant. Transparent. Brittle. The planes of light vibration intersect *a* in lines making angles of 40° and 50° with the obtuse edge *a* / *b*; in the latter, an optic axis is visible toward the edge named. The planes intersect *b* in lines making angles of 10° and 80° with the edge *a* / *b*, the second axis visible in this plane.



Analyses by S. L. Penfield, 1, of a clear transparent variety, filling cavities in reddingite; 2, of the massive, somewhat friable variety:

	P_2O_5	FeO	MnO	CaO	Na_2O	K_2O	H_2O	Quartz		
1.	38·39	5·62	15·55	28·85	0·73	0·13	9·98	1·31	=	100·56.
2.	39·62	7·00	12·40	30·76	0·30	....	9·67	0·55	=	100·30.

The ratio of $P_2O_5 : RO : H_2O$ is 1 : 3 : 2, and the formula $R_3P_2O_8 + 2aq$, with R = Ca : (Mn + Fe) = 2 : 1. This requires: P_2O_5 39·30, FeO 6·64, MnO 13·10, CaO 30·99, H_2O 9·97 = 100. B. B. glows, blackens, and fuses at 4·15 to a dark yellowish brown mass, coloring the flame pale green, with faint reddish yellow streaks on the upper edge. Reactions for iron and manganese with the fluxes. In the closed tube gives off neutral water; turns first yellow, then dark brown, and becomes magnetic. Soluble in HCl and HNO_3. Occurs with other manganesian phosphates at Branchville, Fairfield Co., Conn. In composition fairfieldite is analogous to roselite, p. 105.

FAMATINITE, App. II., p. 20.—With enargite from Cerro de Pasca, Peru, anal. *Frenzel* (J. Min., 1875, 679) S 33·46, Sb 10·93, As 7·62, Cu 41·11, Fe 6·43 = 99·55, corresponding to the formula $3Cu_2S + (Sb, As)_2S_5$, or that of enargite.

According to *vom Rath* (Z. Kryst., iv., 426), the famatinite from the Argentine Republic, which also occurs with enargite (App. II., p. 20), has the same form and angles as the latter mineral, as was to be expected from the essential identity in composition.

See also *Enargite*, p. 41, and *Clarite*, p. 27.

FAUJASITE.—Min., p. 433; App. II., p. 20.

FELDSPAR GROUP, Min., pp. 335 to 361; and App. II., p. 20.—**Cryst.**, methods of twinning of triclinic feldspars, *vom Rath*, J. Min., 1876, 169.

Microscopic structure, *Rutley*, Q. J. G. Soc., 1875, 479. Optical examination of microcline, orthoclase, and various triclinic feldspars, *Des Cloizeaux*, Ann. Ch. Phys., V., ix., 433, 1876. Cryst. and opt. examination, *Wiik*, Œfv. Finsk. Vet. Soc., xix., 60, 1876–77, giving results similar to those more fully obtained by Schuster (see below). Determination by optical methods in thin rock sections, *Lévy*, Ann. Min., VII., xii., 440 et seq., 1877;

see also *Thoulet*, Ann. Min., xiv., 115 et seq., 1878. Discussion of the specific gravities of the feldspar species, *Goldschmidt*, J. Min., Beil.-Bd., i., 208, 1881.

Schuster (Min. Petr. Mitth., iii., 117, 1880), has carried through a long series of observations as to the optical characters of the triclinic feldspars; and has established the important conclusion that in an optical sense there is the same gradual transition from one extreme (albite), to the other (anorthite), as is observed in the chemical composition. Thus, he finds that the position of the extinction-directions, as observed on the basal and clinodiagonal planes, the position of the axes of elasticity, the dispersion of the axes, and the axial angle, all show this gradual change in the same direction. These conclusions obviously confirm the now almost universally accepted view of Tschermak, that the intermediate triclinic feldspars (plagioclase) are to be regarded as isomorphous mixtures of albite and anorthite.

Mallard (Bull. Soc. Min., iv., 96, 1881), has gone further and shown that by means of formulas deduced by him (ib., p. 71), on the view that in isomorphous mixtures (as of albite and anorthite) each element usually enters without change of its own characters, it is possible to calculate the direction of extinction for the two planes (*O* and *i-ī*): the results of calculation and experiment agree very closely. Experiments by *Fouqué* and *Lévy* (Bull. Soc. Min., iv., 63, 1881), on a series of feldspathic microlites intermediate between albite and anorthite, give results at variance with the above conclusions.

Analyses of feldspars from various localities in Scotland, monograph, *Heddle*, Trans. Roy. Soc. Edinb., xxviii., 197 et seq., 1877; Min. Mag., ii., 36, 1878. From volcanic rocks of the Andes, *vom Rath*, ZS. G. Ges., xxvii., 295 et seq., 1875. Discussion of composition by the same, J. Min., 1875, 397. *Smita*, Min. Mitth., 1877, 265.

Examination of the feldspar pseudomorphs of the Wilhelmsleite, near Ilmenau, *Dalmer*, J. Min., 1878, 225.

Species determined by the flame reactions, *Szabó* (for title see Bibliography in Introduction); determined by their fusibility, *Bischof*, Dingl. Pol. Journ., ccxxii., 319; ccxxiii, 265.

Artificial formation of feldspar species: *Fouqué* and *Lévy*, C. R., lxxxvii., 700, 779; xc., 620, 1880; Bull. Soc. Min., iv., 63, 1881 (see also under *Orthoclase*, p. 87).

Genth (Report Min. Penn., p. 224, 1876) shows that the varieties of orthoclase, called by Lea lennilite and delawarite, are identical; an analysis showed 9·11 K_2O, 4·88 Na_2O. Analysis of Lea's cassinite from Blue Hill, Delaware Co., gave:

		SiO_2	Al_2O_3	Fe_2O_3	BaO	CaO	MgO	SrO	Na_2O	K_2O	ign	
G. = 2·692	$(\frac{2}{3})$	62·60	19·97	0·12	3·71	0·19	0·02	tr.	4·43	9·00	0·19	= 100·23.

This feldspar is remarkable for affording 3·7 p. c. BaO, but an optical examination is needed to decide its true relations.

Another feldspar containing barium has been described optically by Des Cloizeaux, and chemically by Pisani (Bull. Soc. Min., i., 84, 1878); locality unknown. Triclinic, with the angle between the cleavage planes = 86° 37′ (near labradorite), in optical relations, approaches oligoclase and albite. An analysis gave:

	SiO_2	Al_2O_3	Fe_2O_3	BaO	CaO	MgO	Na_2O	K_2O	ign	
G. = 2·835	55·10	23·20	0·45	7·30	1·83	0·56	7·45	0·83	3·72	= 100·44.

Quantivalent ratio of R : [R_2] : Si = 1 : 3 : 8, or that of hyalophane, giving the formula (Na_2, Ba) [Al_2] Si_4O_{12} [but note the loss of 3·7 p. c.].

See also *albite, anorthite, labradorite, microcline, oligoclase, orthoclase.*

FERGUSONITE, Min., p. 524; App. II., p. 21.—New localities: Rockport, Mass., anal. *J. L. Smith*, Am. J. Sc., III., xiii., 367, 1877; Burke Co., N. C., *id.*, Bull. Soc. Min., iii., 195, also *Hidden*, Am. J. Sc., III., xx., 150, 1880. Mitchell Co., N. C., *Shepard*, Am. J. Sc., III., xx., 57.

FERRITE.—App. II., p. 21.

FERROILMENITE.—App. I., p. 6.

Ferrotellurite. *F. A. Genth*, Am. Phil. Soc., xvii., 119, 1877; or Z. Kryst., ii., 8. In delicate radiating tufts, also in very minute prismatic crystals. Color between straw and lemon-yellow inclining to greenish yellow. Contains iron, tellurium. Composition suggested on the basis of a qualitative analysis, $FeTeO_4$. Insoluble in ammonia; soluble in HCl. Found as a coating on quartz associated with native tellurium and tellurite, at the Keystone mine, Magnolia District, Colorado. [Needs further examination.]

FERROTUNGSTEN.—App. II., p. 21.

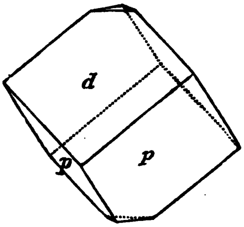
FIFBROFERRITE, Min., p. 656; App. II., p. 21.—**Anal.**, $[Fe_2]\,S_2H_4O_{11} + 8aq$, Chili, *Brun*, Z. Kryst., v., 104, 1880.

FIBROLITE, Min., p. 373; App. II., p. 21.—St. Michel, Finland, *F. J. Wiik*, Z. Kryst., ii., 496.
Optical examination, orthorhombic, *Des Cloizeaux*, Bull. Soc. Min., iv., 258, 1881.

FICHTELITE.—Min., p. 735; App. II., p. 21.

Fillowite. *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xvii., 363, 1879.
Monoclinic; pseudo-rhombohedral. Axis *c* (vert.) : *b* : *ă* = ·8201 : ·5779 : 1; $\beta = 89°\ 51'$. Observed planes (see fig.): *O* (*c*), 2-*i* (*d*), 1 (*p*). Angle *cd* = 121° 29′, *cp* = 121° 20′, *pp* = 84° 37′. Cleavage basal, nearly perfect. In granular crystalline masses. H. = 4·5. G. = 3·43. Lustre sub-resinous to greasy. Color wax-yellow, yellowish to reddish brown, colorless. Streak white. Transparent to translucent. Analysis by S. L. Penfield :

	P_2O_5	FeO	MnO	CaO	Na_2O	Li_2O	H_2O	Quartz.
($\frac{2}{3}$)	39·10	9·33	39·42	4·08	5·74	0·06	1·66	0·88 = 100·27.



The ratio for $P_2O_5 : RO : H_2O = 1 : 3 : \frac{1}{3}$, and the formula is $3R_3P_2O_8 + aq$. If $R = Mn : Fe : Ca : Na_2 = 6 : 1 : 1 : 1$, this requires: P_2O_5 40·19, FeO 6·80, MnO 40·19, CaO 5·28, Na_2O 5·84, H_2O 1·70 = 100. B. B. fuses at 1·5, with intumescence to a black feebly magnetic mass, coloring the flame momentarily pale green, then intensely yellow. In the closed tube a little neutral water. With the fluxes reactions for manganese and iron. Soluble in HCl and HNO_3.
Occurs with other manganesian phosphates, especially reddingite and triploidite, in a vein of albitic granite at Branchville, Conn. Named after Mr. A. N. Fillow, of Branchville.

FISCHERITE, Min. p. 582.—*Des Cloizeaux*, Verh. Min. Ges. St. Pet., II., xi., 32, 1876; *v. Kokscharof*, Min. Russl., vii., 23.

FLUOCERITE.—Min., p. 126; App. II. p. 21.

FLUORITE, Min., p. 123; App. II., p. 21.—**Cryst.**, Striegau, Silesia, *v. Lasaulx*, J. Min., 1875, 134, and Z. Kryst., i., 359, 1877; Kongsberg, Norway, same, ib., p. 368; Münsterthal, *Klocke*, Ber. Nat. Ges. Freiberg, vi., 461, 1876. Natural etchings on crystalline faces, due to trapezohedron 3–3, *Werner*, J. Min., 1881, i., 14.
"Photo-electricity," *Hankel*, Wied. Ann., ii., 66, 1877. Constants of elasticity, *Klang*, Wied. Ann., xii., 321, 1881.
Dark-colored varieties from Wölsendorf ("antozonite") yield free fluorine on fresh fracture, perhaps from ceric fluoride, *Loew*, Ber. Chem. Ges., xiv., 1144, 1881.
According to Mallard (Ann. Min., VII., x., 115, 1876), fluorite is only pseudo-isometric, the method of grouping of the individual crystals being analogous to analcite (q. v.; also see p. viii).

FORESITE, App. II., p. 22.—Similar to stilbite in optical characters, *Des Cloizeaux*, J. Min., 1876, 640.
Analysis by *Sansoni*: ($\frac{2}{3}$) SiO_2 49·97, Al_2O_3 24·12, CaO 8·33, Na_2O, K_2O 0·46, H_2O 17·06, MgO tr. = 99·94. He calls attention to the similarity to stilbite, and questions whether the species is really independent of it. Att. Soc. Tosc., iv., 317, 1879.

Franklandite, *Reynolds,* Phil. Mag., V., iii., 284, 1877.
Massive, with fine fibrous structure. H. = 1. G. = 1·65. Color white. An analysis gave:

B_2O_3	CaO	Na_2O	H_2O	$(Na,K)Cl$	$CaSO_4 + 2aq.$
[43·76*]	12·10*	12·37	27·92	2·41	1·44 = 100.

* Other independent determinations gave B_2O_3 41·81, CaO 11·94, H_2O 27·66.

Deducting impurities, the formula deduced is $Na_4Ca_2B_{12}O_{22}$, $15H_2O$. Slightly soluble in water, readily in dilute HCl and HNO_3. Fuses easily. From Tarapaca, Peru. [Very near ulexite, Min., p. 598.]

FRANKLINITE, Min., p. 152; App. II., p. 22.—Franklin Furnace, N. J., analyses giving the spinel ratio, *Seyms,* Am. J. Sc., III., xii., 210, 1876.

Fredricite.—See *Tennantite,* p. 119.

FREIESLEBENITE, Min., p. 93; App. I., p. 4.—**Cryst.,** twins, Hiendelaencina, Spain, *Bücking,* Z. Kryst., ii., 425, 1878. *Vrba* obtained identical results for the specific gravity of freieslebenite from Hiendelaencina, and diaphorite of Przibram, viz., 6·040; analysis by Morawski, quoted by him, yielded the same result, Z. Kryst., ii., 159, 1878.
Bertrand mentions diaphorite from Zancudo, New Granada, Bull. Soc. Min., iii., 111, 1880.

FRENZELITE.—See *Guanajuatite,* p. 53.

Freyalite. *Esmark; Damour,* Bull. Soc. Min., i., 33, 1878.
Resembles some brown thorites. Scratches glass slightly. G. = 4·06–4·17. Color brown. Streak yellowish gray. Translucent in thin splinters. Lustre resinous. An approximate analysis gave:

SiO_2	Ce_3O_4	La_2O_3, Di_2O_3	ThO_2	$Al_2O_3(ZrO_2?)$	Fe_2O_3	Mn_3O_4	K_2O, Na_2O	H_2O	ign.
20·02	28·80	2·47	28·39	6·31	2·47	1·78	2·33	7·40	0·82 = 100·79.

B. B. swells up but does not fuse. In the closed tube decrepitates, gives off water, and becomes white. With salt of phosphorus in R. F. dissolves, forming an opal-like glass, which in O. F. becomes brown, and on cooling is colorless and translucent. With borax in O. F. gives a transparent brown bead, becoming almost colorless on cooling, and showing in the spectroscope an absorption band on the border of the red and orange (Di). Dissolves readily in acid, giving gelatinous silica. With HCl chlorine is given off. From the neighborhood of Brevig, Norway.

Friedelite. *Bertrand,* C. R., lxxxii., 1167, 1876; Z. Kryst., i., 86.
Rhombohedral; *c* (vert.) = 0·5624. Crystals often tabular. Observed planes *O*, *R*, and *I*, the two last often striated parallel to their intersection-edge. $O \wedge R = 147°$, $R \wedge R = 123° 42'$. Double refraction strong, axis negative. Cleavage basal perfect. Massive, with saccharoidal structure and distinct cleavage, passing into close compact with indistinct cleavage. H. = 4–5. G. = 3·07. Color rose red. Powder pale rose. Transparent-translucent. Optically uniaxial, negative. Analysis (mean of several):

SiO_2	MnO (FeO tr.	MgO, CaO	H_2O
36·12	53·05	2·96	7·87 = 100.

Formula deduced: $Mn_4Si_3O_{10}$, $2H_2O$. B. B. fuses easily to a black glass. Gives off water in the closed tube. Reaction for manganese with the fluxes. In HCl dissolves, forming a jelly. Associated with rhodochrosite and alabandite at the manganese mine of Adervielle, vallée du Louron, Hautes Pyrénées. [The formula may be written $H_4Mn_4Si_3O_{12} = R_2SiO_4$, the composition then corresponds with that of dioptase H_2CuSiO_4, to which it seems to be related in form.]

Sternbergite, p. 115.

edrite, p. 115.

App. II., p. 22.—Microscopic examination of specimens from Geol. För. Förh., iii., 258, 1877.
röm, Geol. För. Förh., ii., 218, 1874. *Humpidge* and 9 (Z. Kryst., vi., 94).
ignac, Bibl. Univ. Gen., lxi., 283, 1878; (ytterbium), Œfv. Ak. Stockh., xxxvi., 7, p. 3, 1879.

al., Brazil, *Damour*, Bull. Soc. Min., i., 93, Trans., III., iii., 65, 1879.
e, from the alteration of the distillation vessels, ., 120.

II., p. 23.—**Cryst.**, Freiberg, etc., *Groth*, Min.-Samml. esselbach, Westphalia, *vom Rath*, Z. Kryst., iv., 428, 1880. S. G. Ges., xxix., 209, 1877.
$_2$S, 1·97 p. c., G. = 7.50). Octahedral cleavage very perfect, cubic ion cubic cleavage most readily obtained; with interposed twinning 3-3, *v. Zepharovich*, Z. Kryst., i., 155, 1877. A crystal (15 grams) with ral cleavage has been found by *Brun* on the glacier of Leschant, Mont . Soc. Min., iv., 260, 1881.
formation from Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 604, 1875; lxxxi.,
Containing selenium, Guanajuato, Mexico, *Navia*, Naturaleza, iv., 42, 1877.
Pseudomorph after staurolite, Brittany, *Firket*, Bull. Soc. Geol. Belg., vi., 152, 1879.
See also *Huascolite*, p. 60.

Galenobismutite. *H. Sjögren*, Geol. För. Förh., iv., 109, 1878.
Massive, compact, sometimes radiated. H. = 3–4. G. = 6·88. Lustre metallic, brilliant. Color tin white. Streak grayish black, shining. Composition $PbBiS_4$, or $PbS + Bi_2S_3$ = S 16·95, Bi 55·62, Pb 27·43 = 100. Analyses (l. c.):

	S	Bi	Pb	Fe		
1.	17·35	54·69	27·65	tr.	=	99·69.
2.	16·78	54·13	27·18	tr	=	98·09.

B. B. reacts for bismuth and lead, fusing easily on charcoal. Dissolves with difficulty in hydrochloric acid, readily in strong nitric acid. Occurs with bismutite at the Kogrufva, Nordmark, Wermland, Sweden. Sometimes carries gold. [The bismuth compound corresponding to zinkenite and sartorite.]

A related mineral, containing a little selenium, is described by *Atterberg* as occurring at Fahlun, Sweden (Geol. För. Förh., ii., 76, 1874), as follows:
Massive. H. = 2–3. Lustre metallic. Color steel gray, becoming slightly reddish. An analysis gave (⅔): Bi 68·40, S 10·39, Se 1·15, Pb 17·90, Fe 1·52, insol. (quartz) 1·60 = 100·96. The calculated formula is Bi_4PbS_3. The substance is regarded as an intimate mixture of native bismuth with a sulphobismutite of lead (PbS, Bi_2S_3). The author adds that such mixtures, containing metallic bismuth, are not uncommon (see *Silaonite*, p. 53).
Another related mineral, also from Fahlun, has been examined by *Nordström* (ib., iv., 268, 1879), containing 4·79–5·11 p. c. Se.

Ganomalite. *Nordenskiöld*, Geol. För. Förh., iii., 121, 1876; 382, 1877.
Massive, without distinct cleavage. Strongly doubly-refracting. Optically biaxial, with very small angle (Des Cloizeaux, Bull. Soc. Min., i., 8, 1878). H. = 4. G. = 4·98. Lustre greasy. Colorless or white, to whitish-gray. Transparent. Composition $(Pb, Mn)SiO_3$; approximate analysis, G. Lindström:

SiO_2	PbO	MnO	CaO	MgO	
34·55	34·89	20·01	4·89	3·68	alkalies, ign. 1·88 = 99·58.

B. B. fuses easily to a clear glass, which in R. F. is colored black by reduced lead. On charcoal with soda a lead globule, and a coating of lead oxide. Easily soluble in nitric acid, with the separation of gelatinous silica.

Occurs very sparingly with tephroite (which it closely resembles), native lead, calcite, and jacobsite, at Långban, Wermland, Sweden. Named from *γάνωμα, brightness.*

Nordenskiöld (p. 384) mentions the occurrence at Långban, of a second lead silicate, very similar in appearance and blowpipe reactions to the above, but with two distinct cleavages, at an angle of 104° 33′. The material available was too scanty for full examination, but he suggests that it may be a more distinctly crystallized variety of ganomalite. [Compare the other lead silicates, *Kentrolite*, *Hyalotekite*, *Melanotekite.*]

GARNET, Min., p. 265; App. II., p. 23.—**Cryst.**, Geyer, Saxony, *v. Lasaulx*, J. Min., 1875, 149. As a secondary mineral on trap rock, New Haven, Conn., also anal., *E. S. Dana*, Am. J. Sc., III., xiv., 215, 1877. Pfitschthal, Tyrol, *vom Rath*, Z. Kryst., ii., 173, 1878; Piz Alpetta, Dissentis, Switzerland, *vom Rath*, Z. Kryst., v., 495, 1881.

(Colophonite) possessing double-refraction, and in part, at least, to be referred to vesuvianite, *Wichmann*, Pogg., clvii., 282, 1876; *v. Lasaulx*, J. Min., 1876, 630. Specific gravity determinations, *Church*, Geol. Mag., II., ii., 321, 1875.

Anal., in lava of Santorin (melanite), *Fouqué*, C. R., lxxx., 631, 1875. Yancey Co., N. C. (spessartite), *König*, Proc. Ac. Nat. Sc. Philad., 1876, 53. St. Marcel (spessartite), *Pisani*, C. R., lxxxiii., 167, 1876. Fichtelgebirge, *v. Gerichten*, Ann. Ch. Pharm., clxxxv., 209. Kaiserstuhl (melanite, 3–7 p. c. TiO_2), *Knop*, Z. Kryst., i., 62, 1877. Scotland, several localities (11–15 p. c. MnO), *Heddle*, Min. Mag., ii., 85, 1878 (Trans. Roy. Soc. Ed., xxviii., 299 et seq., 1878). Leiperville, Delaware Co., Penn. (grossularite), *König*, Proc. Ac. Nat. Sc. Phil., 1878, 81. Ural (green var.), *Church*, Min. Mag., ii., 191, 1879 (but see Z. Kryst., v., 614). Pic Posets, near La Maladetta, Pyrenees (chrome) *Damour*, Bull. Soc. Min., ii., 165, 1879. Syssersk, Ural (demantoid), *Rammelsberg*, ZS. G. Ges., xxix., 819, 1877; *Waller*, Geol. För. Förh., iv., 184, 1878; *Lösch*, J. Min., 1879, 785 (see Church, above); *v. Kokscharof*, Min. Russl., viii., 310, 1881. Wakefield, Quebec (4·95 p. c. Cr_2O_3), *Harrington*, Can. Nat., II., ix., 305, 1880. New South Wales, *Liversidge*, Proc. Roy. Soc. N. S. W., Sept. 1, Nov. 3, 1880.

Absorption spectrum, *Vogel*, Ber. Chem. Ges., Berlin, x., 373, 1877.

Altered to chlorite, Lake Superior, *Pumpelly*, Am. J. Sc., III., x., 17, 1875.

Occurrence in Hungarian trachytes, *Szabó*, J. Min., Beil.-Bd., i., 302, 1881.

Referred by *Mallard* (Ann. Min., VII., x., 100, 1876) to the triclinic system (pseudo-isometric). His conclusions are supported by *Bertrand* (Bull. Soc. Min., iv., 12, 13, 1881), who describes more fully the supposed method of grouping of the biaxial elements. For example, a dodecahedral crystal of aplome, according to this view, is made up of 48 biaxial crystals in the form of triangular pyramids meeting at the centre of the dodecahedron; the bases of four of these pyramids together form a dodecahedral plane. The acute negative bisectrix is sensibly normal to the base of the pyramid, and the plane of the axes sensibly parallel to the longer diameter of the rhombic face; the axial angle is about 90°. Bertrand adds that such a crystal can be mechanically divided into the 48 individuals corresponding to the optical division [but see also p. viii, analcite, p. 5, boracite, p. 17].

GARNIERITE, App. II., p. 23.—It has been shown that, as previously suggested, the substance called garnierite is not a definite mineral, but consists of a hydrous magnesian silicate more or less impregnated with nickel oxide; the amounts of magnesia and nickel vary widely. Some writers, however, prefer to regard the Ni as chemically replacing the Mg (in $RSiO_3 + n\,aq$), but this seems very doubtful.—See *Ulrich*, Am. J. Sc., III., xi., 235, 1876; *Typke* found in two samples, 55·90 and 66·97 SiO_2, Ch. News, xxxiv., 193, 1876; *Garnier*, C. R., lxxxii., 1454, 1876; lxxxvi., 684, 1878; *Des Cloizeaux*, anal. by Damour, Bull. Soc. Min., i., 29, 1878; *vom Rath*, Ber. nied. Ges. Bonn, Jan. and July, 1878 (analyses by Ulrich and Kiepenheuer); *Liversidge*, Proc. Roy. Soc. N. S. W., Dec. 9, 1874, and Sept. 1, 1880. Liversidge calls the commonly occurring dark green unctuous mineral, *noumeaite*, and the rarer pale green adhesive mineral, *garnierite;* the latter he characterizes as a green-colored halloysite; in the former the NiO varies between 32·52 and 0·24 p. c., and the MgO between 10·61 and 24·82 p. c.

Similar deposits have been found in Spain, *Meissonier*, C. R., lxxxiii., 229, 1876.

Gastaldite.—See *Glaucophane*, p. 52.

Gay-Lussite, Min., p. 706.—According to Des Cloizeaux, the so-called pseudomorphs of calcium carbonate after gay-lussite, from Sangerhausen, have nothing to do with the latter mineral, but are probably pseudomorphs after celestite; Groth regards them as pseudomorphs after anhydrite (Min.-Samml. Strassburg, p. 142, 1878). Clarence King, however, describes large tufa-like deposits of calcium carbonate in Nevada, forming beds 20 60 feet thick, and at a height of 470 feet above the present level of Pyramid Lake. These deposits are regarded as the shore formation of an enormous lake, called Lake Lahontan, believed to have existed in quaternary times. This calcium carbonate shows occasionally crystalline forms resembling true gay-lussite, and the whole deposit is believed to have existed originally as this mineral. This view is supported by the fact that gay-lussite is now found well crystallized in a lake near Ragtown, Nevada, which is also a remnant of Lake Lahontan. For this pseudomorphous shore deposit King proposes the name of thinolite (from θίς, *shore*), Geology of the 40th Parallel, vol. i., 508, 1879.

Gay-lussite has been made artificially by *Favre* and *Soret*, Bull. Soc. Min., iv., 168, 1881. Crystallographic and optical examination of natural and artificial crystals, *Arzruni*, Z. Kryst., vi., 24, 1881.

Gedanite. *Otto Helm*, Arch. Pharm., III., xiii., 503, 1878 (Bull. Soc. Min., i., 133). A resin resembling amber, but not containing succinic acid, and less rich in oxygen. H. = 1·5–2. G. = 1·058–1·068. Color wine yellow, more or less clear. Transparent. Fragile. Fracture conchoidal. Analysis: C 81·01, H 11·41, O 7·33, S 0·25 = 100 (ash 0·06). Fuses to a clear odorless liquid at 180°, and sometimes at 140°. Found with amber on the shores of the Baltic. Named from *Gedanum*, Latin name of Danzig.

Gehlenite.—Min., p. 370; App. II., p. 23.

Genthite.—Min., p. 471; App. II., p. 24.

Geocronite, Min., p. 105.—**Anal.** (6 p. c. Cu), Björkskognäs, Sweden, *Nauckhoff*, Geol. För. Förh., i., 88, 1872.

Gersdorffite, Min., p. 72; App. II., p. 24.—**Anal.** (12·54 p. c. Co), Benahanis, prov. of Malaga, Spain, *Genth*, Am. Ch. J., i., 324, 1879.

An auriferous gersdorffite, from Rezbanya, Hungary, has been called **sommarugaite** (Bull. Soc. Min, i., 143).

Geyserite.—App. II., p. 24.

Gibbsite, Min., p. 177.—**Anal.**, French Guiana, *Jannettaz*, Bull. Soc. Min., i., 70, 1878.

Gieseckite.—Min., p. 479; App. II., p. 24.

Ginilsite. (Fischer, Mitth.), *Rammelsberg*, Min. Chem., 2d ed., ii., 704; ZS. G. Ges., xxviii., 236, 1876.

Massive. Color grayish yellow. G. = 3·404. Analyses: 1, made in Rammelberg's laboratory; 2, Rammelsberg, ZS. G. Ges., xxviii., 236, 1876.

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	H_2O	
1.	38·75	4·83	16·32	9·48	26·52	3·73	= 99·63.
2.	37·83	7·77	15·63	9·73	26·67	3·30	= 100·93.

Formula $R_6[R_2]_2Si_7O_{28}$ + 2aq. This requires: SiO_2 37·10, Al_2O_3 7·85, Fe_2O_3 16·07, MgO 4·42, CaO 26·38, H_2O 3·18 = 100. Earlier analyses by Fellenberg and others, giving very different results, are discarded by Rammelsberg. B. B. fuses on the edges to a dark glass. From Ginilsalp, Graubünden, Switzerland. [Needs further examination.]

Gismondite, Min., p. 418; App. II., p. 24.—**Cryst.**, Salesel, Bohemia, *Seligmann*, Z. Kryst., i., 336, 1877. *Schrauf*, Z. Kryst., i., 596, 1877. Schlauroth, near Görlitz, *A. v. Lasaulx*, Z. Kryst., iv., 172, 1879. The crystalline system of gismondite was first given as tetragonal, afterward as orthorhombic. Later, Schrauf (l. c.) was led by the observed variations in angle to suggest that the crystals were twins, perhaps of triclinic individuals; von Lasaulx (l. c.) has carried on a more extended series of observations, both optical and crystallographic, and has established the truth of Schrauf's suggestion, showing the methods of twinning, and the way in which the pseudo-tetragonal forms result through it.

Giufite (or GIUFFITE).—See *Milarite*, p. 81.

GLANCESPAR.—App. II., p. 24.

GLASBACHITE.—App. II., p. 24.

GLAUBERITE, Min., p. 627; App. II., p. 24.—**Cryst.**, Pendschab, India, *Schimper*, Z. Kryst., i., 70, 1877.
Aranjuez, Tajo-Valley, optical investigation, *Laspeyres*, Z. Kryst., i., 529, 1877.
Anal., Atacama, *Domeyko*, 6th App., Min. Chili, p. 45, 1878.

GLAUCODOT, Min., p. 80; App. II., p. 25.—**Cryst.**, *W. J. Lewis*, Phil. Mag., V., iii., 354, 1877; *Becke*, Min. Mitth., 1877, 101. *Sadebeck*, Min. Mitth., 1877, 353. *Groth*, Min.-Samml. Strassburg, p. 42, 1878.

GLAUCONITE, Min., p. 462; App. II., p. 25.—**Anal.**, Is. Gozzo, *v. Bamberger*, Min. Mitth., 1877, 271. Ashgrove, near Elgin, Scotland, *Heddle*, Trans. Soc. Edinb., xxix., 79, 1879.

GLAUCOPHANE, Min., p. 244.—Near amphibole in form and composition, from Zermatt, *Bodewig*, Pogg. Ann., clviii, 224, 1876. Syra, anal., *Lüdecke*, ZS. G. Ges., xxviii., 249, 1876. With garnet and mica from Balade mine, Ouegoa, New Caledonia, anal., *Liversidge*, Proc. R. Soc. N. S. W., Sept. 1, 1880. Discussion of composition, *Dölter*, Z. Kryst., iv., 38, 1879. Analyses: 1, Bodewig (l. c.); 2, Lüdecke (l. c.); 3, Liversidge (l. c.).

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	
1. Zermatt, G. = 3·091	$(\frac{2}{2})$ 57·81	12·03	2·17	5·78	....	13·07	2·20	7·33	= 100·45.
2. Syra,	55·64	15·11	3·08	6·85	0·56	7·80	2·40	9·34	= 100·78.
3. New Caledonia, G. = 3·12	$(\frac{2}{2})$ 52·79	14·44	....	9·82	tr.	11·02	4·29	5·26,	K_2O 0·88, H_2O 1·38 = 99·88.

A mineral closely related to glaucophane, is called GASTALDITE by *G. Strüver*, Mem. Accad. Lincei, II., ii., 333, 1875. Description as follows;

Monoclinic. In prismatic crystals with *I* and *i*–*ì*, but not distinctly terminated. In fibrous or columnar masses. Cleavage prismatic, 124° 25′ (like amphibole). H. = 6–7. G. = 3·044. Lustre vitreous to pearly. Color azure blue to blackish blue. Streak grayish blue. Fracture conchoidal. Optic-axial plane clinodiagonal. Double refraction negative. Dispersion inclined; strongly pleochroic.

Composition: $3RSiO_3 + 2[Al_2]Si_3O_9$, with R = Fe, Mg, Ca, Na_2. Analysis, Cossa:

	SiO_2	Al_2O_3	FeO	MgO	CaO	Na_2O	K_2O	
$(\frac{2}{2})$	58·55	21·40	9·04	3·92	2·03	4·77	tr.	= 99·71.

Occurs in the western Alps in chlorite slate in the valley of Aosta, at Brosso, near Ivrea, and in the valley of Locana, Italy, accompanied by pyrite, chalcopyrite, garnet, and apatite. Named after Prof. Bartolomeo Gastaldi.

GLAUCOPYRITE.—App. I., p. 6.

GMELINITE, Min., p. 436; App. II., p. 25.—**Analyses**, Nova Scotia and Bergen Hill, *Howe*, Am. J. Sc., III., xii., 270, 1876.

GOLD, Min., p. 3; App. II., p. 25.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 321, 1874. Syssertsk, Ural, *Helmhacker*, Min. Mitth., 1877, 1. *Vom Rath*, Z. Kryst., i., 1, 1877.

W. J. Lewis, Phil. Mag., V., iii., 456, 1877. Vöröspatak, *Werner*, J. Min., 1881, i., 1 (occurrence, *Posepny*, Verh. Geol. Reichs., 1875, 97).

Gold and silver alloy (electrum) with 42·9 p. c. Ag, Comstock Lode, Nevada, *Attwood*, Am. J. Sc., III., ix., 229, 1875. From the Bodie mines, California; G. = 15·15; Ag = 36·4 p. c., *Hanks* and *Attwood*, Rep. State Min. Cal., p. 25, 1880.

Occurrence of gold and scheelite, Charity mine, Warren's, Idaho, and Golden Queen mine, Lake Co., Col., *Silliman*, Am. J. Sc., III., xiii., 451, 1877. Gold in Australia, *Wolff*, ZS. G. Ges., xxix., 82, 1877.

GOSLARITE, Min., p. 647.—Freiberg, cryst., (Schrauf), anal., *Frenzel*, J. Min., 1875, 675. Anal., Capanne Vechie, Elba, *Grattarola*, Boll. Com. Geol., 1876, 342.

GÖTHITE, Min., p. 169; App. II., p. 25.—**Cryst.**, Cornwall, *Groth*, Min.-Samml. Strassburg, p. 91, 1878.

Occurrence in Adair Co., Mo., *G. C. Broadhead*, Am. J. Sc., III., xiii., 420, 1877.

GRAHAMITE, Min., p. 753.—Huasteca, Mexico, occurrence, *Kimball*, Am. J. Sc., xii., 277, 1876.

GRAPHITE, Min., p. 24; App. II., p. 25.—Mexico, *Castillo*, Naturaleza, iii., 275, 1875. Siberia, anal., *Kern*, Chem. News, xxxii., 229, 1875.

GREENOCKITE, Min., p. 59; App. II., p. 25.—**Cryst.**, *von Kokscharof*, Min. Russl., viii., 125, 1881.

GROCHAUITE.—App. II., p. 25.

GRÜNAUITE, Min., p. 47.—See *Polydymite*, p. 95.

GUADALCAZARITE.—See *Onofrite*, p. 86, and App. II., p. 25.

GUANAJUATITE, App. II., p. 22.—The sulphoselenide of bismuth, from Guanajuato, Mexico, first mentioned by Castillo (1873), and fully described by Frenzel (J. Min., 1874, 679), was called *Frenzelite* in Append. II. (q. v.). It appears, however, that the same mineral was described in 1873 by V. Fernandez, and named *Guanajuatite* (La República: Periódico oficial del Gobierno del Estado de Guanajuato, July 13); the latter name has, consequently, the priority. Fernandez concludes that the mineral contains only Bi_2S_3, the sulphur being due, in his opinion, to pyrite. He obtained: Se 35·18; Bi 61·00, gangue 3·70, Fe, S, loss 0·12 = 100. He also gives, H. = 3·5, G. = 6·62; the locality is the Santa Catarina mine, Sierra de Santa Rosa, near Guanajuato. The same mineral is called castillite by Domeyko, Min. Chili, 3d ed., p. 310, 1879.

Mallet has re-examined the mineral, and obtained (Am. J. Sc., III., xv., 294, 1878):

Se	S	Bi	Al_2O_3	Fe_2O_3	SiO_2	H_2O		
31·64	0·61	59·92	2·53	tr.	3·47	1·46	=	99·63.

After deducting 6·72 p. c. halloysite, and 0·56 SiO_2, present as impurities, the result obtained is: Se 34·33, S 0·66, Bi 65·01 = 100. The formula is then Bi_2Se_3, with a little of the selenium replaced by sulphur; the pure mineral contains no zinc.

The SILAONITE of *V. Fernandez* and *S. Navia* (La República, Guanajuato, Mexico, Dec. 25, 1873), is a massive, bluish-gray mineral. H. = 2·75. G. = 6·43–6·45. Described as having the composition Bi_3Se. Shown subsequently by Fernandez, and also by H. D. Bruns (Chem. News, xxxviii., 109, 1878), to be a mixture of guanajuatite and native bismuth, and not a homogeneous mineral.

GUANO, App. I., p. 6.—Domeyko (C. R., xc., 544, 1880), gives the following analyses of minerals occurring in the guano of Mejillones. (1) Of imperfect crystals in the form of rectangular prisms, implanted on walls of natural fractures in the rock; colorless, with vitreous lustre. (2) Fibrous and in very elongated crystals, pyramidal in form, grouped in diverging bundles; grayish, lustre vitreous. (3) In small concretions in the earthy mass of the guano; soft on exterior, within compact and homogeneous; amorphous; color yellowish.

	P_2O_5	MgO	CaO	H_2O (and organic matter).	
1.	64·89	35 11 = 100.			
2.	40·13	18·53	5·80	36·00 = 100·46.	
3.	27·60	24·38	0·14	38·30	B_2O_3 6·80 (Al_2O_3) Fe_2O_3 2·30 = 99·52.

Guanipite.—See *Oxammite*, p. 88.

GUANOVULITE.—App. II., p. 64.

GUARINITE, Min., p. 383; App. II., p. 26.—**Cryst.**, *Guiscardi*, Rend. Acc. Nap., Jan., 1876.

Guejarite. *Cumenge*, Bull. Soc. Min., ii., 201, 1879; *Friedel*, ib., ii., 203.

Orthorhombic; in prismatic (20 mm. long) crystals flattened parallel to the brachypinacoid, with the planes $i\text{-}\bar{2}$, $i\text{-}\frac{\bar{3}}{2}$, $i\text{-}\frac{\breve{3}}{2}$ in the prismatic zone, also $1\text{-}\breve{\imath}$ and $\frac{1}{3}\text{-}\breve{\imath}$, and several others less certain. $I \wedge I = 101° 9'$, $i\text{-}\breve{\imath} \wedge 1\text{-}\breve{\imath} = 128° 6'$. Cleavage $i\text{-}\breve{\imath}$ neatly perfect (Friedel). H. = 3·5. G. = 5 03. Color steel gray, with a tinge of blue. Analysis, Cumenge (l. c.):

S	Sb	Cu	Fe	Pb
25·0	58·5	15·5	0·5	tr. = 99·5.

The calculated formula is $Cu_2Sb_4S_7$, or $Cu_2S + 2Sb_2S_3$. Related to chalcostibite (Min., p. 85), the formula for which is $Cu_2S + Sb_2S_3$, and which has $I \wedge I = 101°$. B. B. on charcoal gives off antimonial fumes, and yields when treated with soda metallic copper. Occurs with siderite at the copper mines at the foot of Muley-Haceu, in the district of Guejar, Sierra Nevada, Andalusia.

GÜMBELITE, App. I., p. 6.—*Gümbel* (Min. Petr. Mitth., ii., 189, 1879), has analyzed a mineral occurring as the petrifying material of coal plants in the Tarentaise, with the following results: SiO_2 49·71, TiO_2 1·04, Al_2O_3 28·62, Fe_2O_3 2·69, MnO tr., MgO 1·60, CaO tr., K_2O 6·80, Na_2O 2·21, H_2O 7·38 (and coal) = 100·05. It occurs in fine white pearly scales, somewhat greasy to the feel. G. = 2·8. Exfoliates like pyrophyllite. These results show that the mineral is essentially the same as that called gümbelite by von Kobell, or a sort of pinite. *Genth* (Am. Phil. Soc. Philad., xviii., 259, 1879), describes a mineral occurring in a similar manner to the above in coal shales, and as a petrifying material; but it is a true pyrophyllite.

GUMMITE, Min., p. 179.—Occurrence at the Flat Rock mine, Mitchell Co., N. C., *Kerr*, Am. J. Sc., III., xiv., 496, 1877; *Hidden*, ib., xxii., 22, 1881. *Genth* (Am. Chem. J., i., 89, 1879), has analyzed this gummite from North Carolina, and concludes that it is a mechanical mixture of uranium hydrate, uranotil, lead uranate, and barium uranate.

GYPSUM, Min., p. 637; App. II., p. 26.—**Cryst.**, *Laspeyres*, Min. Mitth., 1875, 113 (*Reusch*, ib., 1876, 67). *Klien*, Pogg. Ann., clvii., 611, 1876.

Elasticity in different directions, *Coromilas*, Z. Kryst., i., 407, 1877. Magnitude and position of optical axes of elasticity, *von Lang*, Ber. Ak. Wien, lxxvi., 793, 1877. Etching figures, *Weiss*, ZS. G. Ges., xxix., 211, 1877. Thermo-electrical properties, *Hankel*, Wied. Ann., i., 277, 1877. Influence of heat on double refraction, *Dufet*, Bull. Soc. Min., iv., 113, 191, 1881.

Occurrence at Vesuvius, *Scacchi*, Att. Acc. Napoli, vi. (Contr. Min., ii., 57).

GYROLITE, Min., p. 398. See *Tobermorite*, p. 123.

Haddamite.—See *Microlite*, p. 80.

HALITE, Min., p. 112.—Vesuvius, *Scacchi*, Att. Acc. Nap., vi., 1873 (Contr. Min., ii., 23).
Elasticity in different directions determined, *Voigt*, Pogg. Ann., Erg.-Bd., vii., 1, 177, 1875; *Groth*, Pogg. Ann., clvii., 115, 1876.
Figures produced by etching, *Sohncke*, Pogg. Ann., clvii., 329, 1876; *Exner*, ib., clviii., 319, 1876.

An argentiferous variety of halite is called HUANTAJAYITE by *Raimondi* (in Domeyko, 5th Appendix Min. Chili, 1876; also Min. Pérou, p. 64, 1878).
Isometric; occurs in cubes, also in incrustations made up of minute cubic crystals, also fibrous. H. = 2. Color white, not altered by exposure. Transparent. Fragile not sectile like cerargyrite. Composition: $20NaCl + AgCl$; an analysis (⅔) gave: NaCl 89, AgCl 11 = 100. B. B. decrepitates and fuses easily; on charcoal yields silver with soda. Occurs in a calcareous gangue with cerargyrite, embolite, etc., at the mine of San Simon, Huantajaya, Tarapaca, Peru. Called *lechedor* by the miners. First described by Raimondi in the Annales de la Société de Pharmacie de Lima, 1873. See also Domeyko, Ann. Min., VII., xix., 329, 1881.

HALLITE.—App. II., p. 26.

HALLOYSITE, Min., p. 475; App. II., p. 26.—**Anal.**, Steinbrück, *Gamper*, Verh. G. Reichs., 1876, 354. Tüffer, Styria, *John*, Jahrb. G. Reichs., 1878, 386. Drenkova, Banat, *Helmhacker*, Min. Petr. Mitth., ii., 231, 1879. Distr. San Mateo, Peru, *Raimondi*, Min. Pérou, p. 304, 1878.

A white porcelain clay, valuable in the arts, from Lawrence Co., Indiana, is called INDIANAITE by *Cox* (Rep. Geol. Indiana, 1874, 15; 1878, 154). It occurs with allophane in beds four to ten feet thick. H. = 2–2·5. G. = 2·31–2·53. Analyses, 1, 2, 3, by Pemberton:

SiO_2	Al_2O_3	H_2O	H_2O at 100° C.	CaO, MgO	Alkalies.
39·00	36·00	14·00	9·50	0·63	0·54 = 99·67.
39·35	36·35	22·90		0·40	.... = 99·00.
38·90	37·40	23·60		undet.	.... = 99·90.

HALOTRICHITE, Min., p. 654.—**Anal.**, Idria, *v. Zepharovich*, Ber. Ak. Wien, lxxxix., 183, 1879.

HAMARTITE.—See *Bastnäsite*, App. I., p. 2 and 7; also *Tysonite* in this App., p. 126.

Hannayite. *vom Rath*, Ber. nied. Ges. Bonn, Jan. 13, 1878; Bull. Soc. Min., ii., 79, 1879.
Triclinic; in prismatic crystals, $I \wedge I' = 114° 34'$, $I \wedge i\text{-}\bar{\imath} = 140° 28'$. Cleavage basal perfect, less so, parallel *I* and *I'*. Prismatic planes vertically striated. G. = 1·893. Analysis by MacIvor:

	P_2O_5	MgO	H_3N	H_2O
(½)	45·70	18·90	8·09	28·20 = 100·89.

Heated 36 hours at 100° undergoes no change; between 100° and 110° or 115° loses 21·08 p. c., becoming opaque; heated over a Bunsen flame loses the remainder of the water and the ammonia (36·48 = total loss). The remainder fuses, but dissolves only in part in concentrated HCl. Taking the loss between 100° and 120° as water of crystallization, the formula is $H_4(NH_4)Mg_3P_4O_{16} + 8aq$, which requires: P_2O_5 44·38, MgO 18·75, H_3N 8·75, H_2O 28·12 = 100.
Discovered by MacIvor of Melbourne in the guano of the Skipton caves, Victoria, and recognized as new by Ulrich, as stated in a letter to vom Rath; occurs with struvite and newberyite. Named after Prof. J. B. Hannay, of Manchester.

HARMOTOME, Min., p. 439; App. II., p. 26.—*Mallard* (Ann. Min., VII., x., 153, 1876), following Des Cloizeaux, classes harmotome among pseudo-orthorhombic species, and calls attention to its relation in form to analcite and also phillipsite. *Baumhauer* (Z. Kryst., ii., 113, 1878) describes the results of a careful optical examination, and doubts the correctness of referring it to the monoclinic system, but *Fresenius* (ib., iii., 42) supports the conclusion of Des Cloizeaux.

HATCHETTITE, Min., p. 731; App. II., p. 26. Monte Falo, near Savigno, Italy, *Casali, Bombicci*, Mem. Ac. Bologna, III., viii., 1877 (Z. Kryst., ii., 506).

Hatchettolite. *J. L. Smith*, Am. J. Sci., III., xiii., 365, May, 1877. *O. D. Allen*, ibid., xiv., 128, Aug., 1877.

Isometric; in octahedrons with planes of the cube, and 3–3. H. = 5. G. = 4·77–4·90. Lustre resinous. Color yellowish brown. Translucent. Fracture subconchoidal.

Analyses: 1, 2, 3, Smith (l. c.); 4, 5, Allen (l. c.):

	Ta_2O_5	Cb_2O_5	TiO_2	WO_3	SnO_2	UO_3	CaO	Y_2O_3*	FeO	MgO	K_2O	Na_2O	H_2O	
1.	66·01		....	0·75		15·20	7·72	2·00	2·08	....	0·50	....	5·16	Pb tr. = 99·42, Smith.
2.	67·86		....	0·60		15·63	7·09	0·86	2·51	....	1·21	....	4·42	= 100·18, Smith.
3.	67·25		....	0·91		16·01	7·11	0·64	2·12	....	undet.	....	5·02	= 99·06, Smith.
4.	29·83	34·24	1·61	0·30		15·50	8·87	....	2·19	0·15	tr.	1·37	4·49	Pb tr. = 98·55, Allen.
5.	29·60	35·94		....		....	8·89	....	2·33	....	....	....	....	Allen.

* With cerium oxide.

From analysis 4 Allen deduces the formula $\overset{I}{R}_2\overset{V}{R}_2O_7 + 2\overset{II}{R}\overset{V}{R}_2O_6 + 4aq$, with $R = UO_2$, Ca, Fe, Mg, Na_2, and $\overset{V}{R}$ = Ta, Cb. Allen calls attention to the close relation to pyrochlore, and suggests that the original mineral in this case may have been anhydrous and hence analogous to it in composition. The pyrognostic characters are near those of pyrochlore.

Occurs with samarskite, sometimes implanted on the former mineral, in the mica mines of Mitchell Co., North Carolina. Named after the English chemist Hatchett.

Haughtonite.—See *Mica Group*, p. 77.

HAÜYNITE, Min., p. 332; App. II., p. 26.—**Cryst.**, Albani Mts., *Sella*, Z. Kryst., i., 235, 1877.

HAYESINE, Min., p. 599.—**Anal.**, Atacama, Chili, *Domeyko*, Ann. Min., VII., x., 26, 1876.

HEDYPHANE, Min., p. 537.—Långban, Sweden, *Lindström* (Geol. För. Förh., iv., 266, 1879). G. = 5·82. Color white or yellowish white. Analysis after deducting a little $CaCO_3$: As_2O_5 29·01, P_2O_5 0·55, PbO 41·01, BaO 8·27, CaO 7·85, MgO 0·25, Pb 9·17, Cl 3·14, Fe_2O_3 0·08, Na_2O 0·15, K_2O 0·09 = 99·57; this corresponds to the usual formula $3R_3As_2O_8 + PbCl_2$, but the variety is remarkable as containing so much barium. The hedyphane of Paisberg contains no barium or at most only a trace.

According to *Des Cloizeaux* (Bull. Soc. Min., iv., 93, 1881), the Långban hedyphane is monoclinic and perhaps isomorphous with caryinite, p. 20.

See also *Mimetite*, p. 81.

HEBRONITE.—See *Amblygonite*, p. 5.

Heldburgite. *Luedecke*, Zeitsch. gesammt. Nat., III., iv., 291, 884, 1879.

Tetragonal, *c* (vert.) = 0·7500. In minute (3 mm. long, ½ to ⅓ mm. thick), prismatic crystals. Planes *i–i*, *I*, 1; angle $I \wedge 1 = 136° 41'$ (near zircon). In habit resembles guarinite. H. less than that of steel. Lustre adamantine. Color yellow. Streak white. Transparent. B. B. infusible. Composition unknown (TiO_2 absent). Occurs in the feldspar of the phonolyte of the Heldburg near Coburg. [Needs further examination.]

HELVITE, Min., 264; App. II., p. 27.

HEMATITE, Min., p. 140; App. II., p. 27.—**Cryst.**, Vesuvius, *Scacchi*, Att. Accad. Napoli, vi., 1873 (Contr. Min., ii., 1). *Sadebeck*, Pogg. Ann., clvi., 557. Binnenthal, *Bücking*, Z. Kryst., i., 562; ii. 416. *Groth*, Min.-Samml. Strassburg, p. 73, 1878. Biancaville, Etna, *v. Lasaulx*, Z. Kryst., iii., 294, 1879. Reichenstein, Silesia, *Hare*, Z. Kryst., iv., 297, 1879. Ascension Island, *vom Rath*, Z. Kryst., vi., 192, 1881.

Crystallogenetic observations, *Scharff*, Jahresb. Senck. Nat. Ges., 1879–80.
With magnoferrite, octahedral crystals, Vesuvius, *vom Rath*, J. Min., 1876, 386. With magnetite in parallel position, *Bücking*, Z. Kryst., i., 575; do. with marcasite, *Sadebeck*, Pogg. Ann. Erg.-Bd., viii., 625

HENRYITE.—App. II., p. 27.

Henwoodite. *J. H. Collins*, Min. Mag., i., 11, 1876; *C. Le Neve Foster*, ibid., p. 8.
In botryoidal globular masses having a crystalline structure. H. = 4–4·5. G. = 2·67. Color turquoise blue. Streak white with bluish green tinge. Fracture conchoidal. Analyses, Collins (l. c.):

	P_2O_5	Al_2O_3	Fe_2O_3	CuO	CaO	H_2O	SiO_2	
1.	48·94	18·24	2·74	7·10	0·54	17·10	1·37	loss 3·97 = 100.
2.	48·20	....	....	7·00	....	19·50	....	

The iron, lime, and silica are regarded as due to impurities; but aside from this the analyses are so obviously imperfect, that it is useless to attempt to give a formula; the mineral, however, seems to be related most closely to turquoise. In the closed tube decrepitates slightly, gives off water, and turns brown. B. B. infusible, colors the flame green. Copper reactions with borax. Occurs on limonite at the West Phenix mine, Cornwall. Named from Mr. Wm. Jory Henwood.

Hermannolite. See *Columbite*, p. 29.

Herrengrundite. *Brezina*, Z. Kryst., iii., 359, March 25, 1879. URVÖLGYITE. *Szabó*, Min. Mitth., ii., 311, 1879 (Lit. Ber. Ungarn, iii., 510, 1879).
Monoclinic (triclinic?) : c (vert.) : b : $\grave{a}$ = 2·8004 : 1 : 1·8161. β = 91° 9′. Observed planes: O, $-\frac{1}{2}\text{-}i$, $-\frac{5}{7}\text{-}i$, $\frac{1}{2}\text{-}i$, $\frac{5}{7}\text{-}i$, 1, I, $i\text{-}\frac{9}{8}$, i-$\frac{5}{4}$, $i\text{-}\grave{\frac{5}{4}}$, $i\text{-}\grave{\frac{5}{3}}$, $i\text{-}\grave{2}$, $i\text{-}\grave{\frac{5}{2}}$. $I \wedge I$ = 57° 42′, $O \wedge 1$ = 106° 52′, $O \wedge I$ = 90° 34′. Cleavage basal perfect. I less so, also i-2 or $i\text{-}\grave{2}$ (?). Occurs in spherical groups of thin six-sided plates. The basal plane striated parallel $i\text{-}i$. Twinning plane generally O. Optic axes in plane parallel to the direction of striation. $2E_a$ = 59° 2′ (Li), 65° 18′ to 66° 53′ (Na), 68° 39′ (Tl). Double refraction negative. (Brezina.) Dichroism weak, bluish green and greenish yellow. H. = 2·5. G. = 3·132. (Winkler.) Lustre vitreous, on cleavage face sometimes pearly. Color emerald green, verdigris green, and bluish green. Streak light green. Transparent. Analyses; 1, Berwerth, Z. Kryst., iii., 373; 2, Schenek, Min. Mitth., ii., 315, 1879.

	SO_3	CuO	CaO	H_2O
1.	24·62	54·16	2·05	19·61 = 100.
2.	24·62	49·52	8·59	16·73, S_2O_2 0·33, FeO 0·14, MnO, MgO tr. = 99·93.

Brezina regards the CaO as present in the form of gypsum as an impurity; deducting this the result obtained is : SO_3 23·04, CuO 57·52, H_2O 19·44 = 100. Szabó, on the contrary, regards the CaO as essential, and writes the formula: $(CuSO_4 + aq) + 3H_2CuO_2 + (CaSO_4 + 2aq)$. [The view of Szabó seems very improbable, and is not established by his experiments made to decide the point; the mineral needs further examination on the chemical side.]
Occurs with malachite and calcite in a quartz conglomerate at Herrengrund in Hungary. Related to langite, brochantite, etc. Named from the locality Herrengrund = Urvölgy in Hungarian.

HERSCHELITE, Min., p. 437; App. II., p. 27.—The herschelite of Richmond, Victoria (called seebachite by Bauer, App. II., p. 50), is referred to phacolite (chabazite) by *vom Rath* (Ber. Ak. Berlin, 1875, 523); Becke, however, shows (Min. Petr. Mitth., ii., 416, 1879), that it differs from chabazite; he regards the form as monoclinic united by twinning in a manner analogous to, but not identical with, chabazite. A similar result is reached by *von Lasaulx* (Z. Kryst., v., 338, 1881) for the herschelite from Aci Castello, Sicily; an analysis yielded : SiO_2 47·15, Al_2O_3 21·42 (with Fe_2O_3), CaO 5·34 (with MgO), Na_2O, K_2O [6·69], H_2O 19·40 = 100, leading to the formula $(Na, K)_2\,Ca\,[Al_2]_2Si_8O_{24} + 12aq$.

Huantajayite.—See *Halite*, p. 55.

HUASCOLITE, Min., p. 42.—A massive mineral having a bluish gray color is referred to huascolite by *Raimondi* (Min. Pérou, p. 202, 1878). He obtained after deducting 14·50 p. c. gangue: S 27·76, Pb 26·86, Zn 44·50, Fe 0·88 = 100, from the Poderosa mine, Province of Dos de Mayo, Peru. *Domeyko* describes a mineral from Morochocha, Peru, corresponding in composition to PbS + (Zn, Fe) S, with Zn = 16·59; another from Coro-Coro, Bolivia, afforded 5 p. c. ZnS (6th App. Min. Chili, p. 17, 1878).

HÜBNERITE, Min., p. 603; App. II., p. 28.—Nevada, containing thallium, *Sandberger*, J. Min., 1877, 508. From Morochocha, Peru, *Raimondi*, Min. Pérou, p. 241, 1878. Occurs at Rabenstein, *Sandberger*, J. Min., 1879, 369. Found by W. P. Jenney, in the Black Hills, Dakota, at the Comstock mine, near Deadwood.

Hullite. *E. T. Hardman*, Proc. Roy. Ir. Acad., II., iii., 161, 1878.
Massive. H. = 2. Color velvet black. Lustre waxy but dull. Analysis, Hardman: SiO_2 39·44, Al_2O_3 10·35, Fe_2O_3 20·72, FeO 3·70, MgO 7·47, CaO 4·48, H_2O 13·62, MnO tr., CO_2 tr. = 99·78. Occurs filling and coating vesicular cavities in the basalt of Carnmoney Hill, near Belfast, Ireland.

Heddle remarks that hullite may be considered as a desiccated chlorophæite, but he also gives the following analysis of a similar mineral from the basalt at Kinkell, in Fifeshire, Scotland: SiO_2 38·59, Al_2O_3 17·34, Fe_2O_3 (FeO undet.) 15·97, MnO 1·56, CaO 3·94, MgO 8·65, K_2O 0·67, H_2O 13·48 (at 100° 8·04) = 100·20. This he regards as a homogeneous mineral, and believes it to somewhat support the claim of hullite to be considered as an independent species, Trans. Roy. Soc. Edinb., xxix., 89, 1879. [Near delessite; compare also diabantite.]

Huminite. A hydrocarbon from Östmark, in Wermland, Sweden, which, according to Ekman (Œfv. Ak. Stockh., 1868, 138), has the composition (ash free): C 67·15, O 29·83, H 2·55, N 0·47, S [0·40] = 100. A similar coal from Gryhytte, Finberget, Sweden, has, according to Helland (Geol. För. Förh., ii., 521, 1875), the composition (ash free): C 67·67 O 28·11, H 3·89, N tr., S 0·33 = 100.

HUMITE, Min., p. 363.—See *Chondrodite*, p. 26; and App. II., p. 28.

Huntilite.—See *Macfarlanite*, p. 71.

HYALITE.—Min., p. 199; App. II., p. 28.

HYALOSIDERITE.—Min., p. 256; App. II., p. 28.

Hyalotekite. *Nordenskiöld*, Geol. För. Förh., iii., 382, 1877.
Massive. Coarsely crystalline. Cleavage easy in two directions, at an angle of approximately 90°; also less easy in a third direction, in the same zone (Des Cloizeaux). H. = 5–5·5. G. = 3·81. Lustre vitreous to greasy. Color white to pearly gray. Transparent in very thin plates. Brittle. Optically biaxial, axes in a plane parallel to the axis of the zone of three cleavages: 2H = 98°–99° (red), bisectrix positive (Des Cloizeaux, Bull. Soc. Min., i., 9, 1878). An incomplete analysis gave:

SiO_2	PbO	BaO	CaO	ign.	
39·62	25·30	20·66	7·00	0·82	Al_2O_3, K_2O, etc., tr.

B. B. fuses to a clear glass, which in R. F. becomes blackened with reduced lead. On charcoal with soda in small amount fuses to a clear glass; with more soda in R. F. gives a lead globule and a coating of lead oxide. In salt of phosphorus dissolves, leaving a skeleton of silica. Insoluble in hydrochloric or sulphuric acids. Occurs sparingly in a grayish-white feldspar, with hedyphane and schefferite, at Långban, Wermland, Sweden. Named from ὕαλος, *glass*, and τήκειν, *to melt*.

HYDRARGILLITE.—See *Gibbsite*, p. 51

HYDRARGYRITE.—App. II., p. 28 (8).

Hydrocastorite.—See *Petalite*, p. 91.

Hydrocerussite. *Nordenskiöld*, Geol. För. Förh., iii., 381, 1877.
A hydrous lead carbonate (perhaps $2PbCO_3 + H_2O$), occurring sparingly as a coating on native lead, at Långban, Wermland, Sweden. It consists of white, colorless, crystalline plates, showing one perfect cleavage; soft. Soluble in acid with evolution of carbon dioxide. According to Bertrand (Bull. Soc. Min., iv., 87, 1881), the mineral occurs in hexagonal plates, and optically is uniaxial, negative. [Needs further examination.]

HYDROCUPRITE.—App. II., p. 28.

HYDROCYANITE.—App. II., p. 29.

Hydrofluorite. *Scacchi*, Att. Acc. Napoli, vi., 1873 (Contrib. Min., ii., 65). Hydrofluoric acid gas observed at Vesuvius, especially after the eruptions of 1870 and 1872.

Hydrofranklinite. According to the late *W. T. Rœpper*, a new hydrous oxide of zinc, manganese, and iron. Occurs in small, very brilliant iron-black regular octahedrons; with octahedral cleavage highly perfect. H. = 4–4·5. G. = 4·06–4·09. From Sterling Hill, N. J. [The original investigation was, unfortunately, never completed.]

HYDROHALITE.—App. II., p. 29.

Hydroilmenite.—See *Menaccanite*, p. 76.

HYDROMAGNESITE.—App. II., p. 29.

Hydroniccite. A name suggested for a doubtful substance conjectured to be a hydrated oxide of nickel, Texas, Penn., *C. U. Shepard*, Min. Contr., 1877.

Hydrophilite.—See *Chlorocalcite*, p. 25.

Hydrorhodonite. *N. Engström*, Geol. För. Förh., ii., 468, 1875.
Massive; crystalline. Cleavage easy in one direction. H. = 5–6. G. = 2·70. Lustre vitreous. Color red-brown. Streak brownish white. Translucent, in thin splinters transparent. Fracture splintery. Analyses:

	SiO_2	MnO	FeO	MgO	CaO	Li_2O	Na_2O	H_2O		
1.	44·07	30·83	1·04	6·98	3·60	1·23	0·39	11·84	=	99·98.
2.	44·06	31·15	1·00	7·24	3·54	(LiCl, NaCl ≐ 4·80)		11·96.		

Formula $RSiO_3 + H_2O$, or rhodonite plus a molecule of water. Soluble in HCl, with the separation of silica. B. B. fuses easily to an opaque, brownish red bead; reacts for manganese. The powdered mineral becomes black on heating. From Långban, in Wermland, Sweden. [Perhaps simply a hydrated rhodonite.]

Hydrotitanite.—See *Perofskite*, p. 91.

HYGROPHILITE, App. II., p. 29.—Related mineral from Reuschbach, Palatinate, *Gümbel*, J. Min., 1878, 385.

HYPERSTHENE, Min., p. 209; App. II., p. 29.—**Anal.**, Adirondacks, N. Y., *Leeds*, Amer. Chem., March, 1877. Finland, Œfv. Finsk., xvii., 72–3. Arvieu, Arveyron, *Pisani*, C. R. lxxxvi., 1419, 1878. Santorin, *Fouqué*, Bull. Soc. Min., i., 46, 1878. Romsås, Askim, *Meinich*, *Hjortdahl*, Z. Kryst., iv., 519, 1880.

Crystallographic and optical description with analyses, Bodenmais, *Becke*, Min. Petr. Mitth., iii., 60, 1880. From Demavend, Persia, in trachyte, *Blaas*, Min. Petr. Mitth., iii., 479, 1881.

HYPOCHLORITE.—Min., p. 392; App. II., p. 30.

ICE, Min., p. 135.—Optical structure, *Koch*, J. Min., 1877, 449. *Bertin*, Ann. Ch. Phys., V., xiii., 283, 1878. *Klocke*, J. Min., 1879, 272; 1881, i., 23.

IDOCRASE.—See *Vesuvianite*, p. 129.

Idrocastorite (Hydrocastorite).—See *Petalite*, p. 91.

Igelströmite.—See *Pyroaurite*, p. 99.

Ihlëite. *Schrauf*, J. Min., 1877, 252.

Amorphous. Forms an efflorescence on graphite, having a botryoidal or small reniform structure. G. = 1·812. Color orange yellow, becoming pale yellow in dry air. Analyses:

	SO_3	Al_2O_3, Fe_2O_3		FeO	CaO	H_2O		
1.	38·2	24·5		2·1	...	35·5	=	100·3.
2.	37·4	0·3	26·1		0·4	35·6	=	99·8.
3.	37·2	25·6		1·4	0·3	35·3	=	99·8.

Formula perhaps $[Fe_2]S_3O_{12} + 12aq. = SO_3$ 38·96, Fe_2O_3 25·96, H_2O 35·07. Soluble in cold water. Occurs at the graphite deposits at Mugrau, Bohemia, owing its origin to the decomposition of imbedded crystals of pyrite. Named for Mr. Ihle, superintendent of mines in Mugrau. [Near coquimbite.]

Ilesite. *A. F. Wuensch*, Mining Index, Leadville, Colorado, Nov. 5, 1881. In loosely adherent crystalline aggregates, prismatic. Color white. Taste bitter, astringent. Friable. Analysis by M. W. Iles :

SO_3	MnO	ZnO	FeO	H_2O		
35·85	23·18	5·63	4·55	30·18	=	99·39.

This corresponds approximately to $RSO_4 + 4aq.$, which, with R = Mn : Zn : Fe = 5 : 1 : 1, requires : SO_3 35·63, MnO 22·58, ZnO 5·15, FeO 4·58, H_2O 32·06 = 100. Readily soluble in water. Occurs in a siliceous gangue with the sulphides of iron and zinc (from which it has been formed), in veins 2 to 8 inches wide. Locality in Hall Valley, Park Co., Colorado. Named after Dr. M. W. Iles, of Leadville.

ILMENITE.—See *Menaccanite*, p. 76.

ILMENORUTILE.—See *Rutile*, p. 105.

ILSEMANNITE.—App. I., p. 7.

ILVAITE. Min., p. 296 ; App. II., p. 30.—**Analyses**, (1), Elba, *Sipöcz* (Min. Mitth., 1875, 72), an unaltered crystal; (2), *Early*, quoted by Reynolds (Chem. News, xxxvi., 85, 1877), Proc. Roy. Ir. Acad., II., iii., 52, 1877.

		SiO_2	Fe_2O_3	FeO	MnO	CaO	H_2O	
1.	G. = 4·037 (¼)	29·67	21·26	33·09	0·74	13·33	2·32	= 100·41.
2.		29·93	20·16	31·83	3·02	13·71	0·42	Al_2O_3 0·36, MgO 0·30, K_2O 0·20, Na_2O 0·29 = 100·22.

Sipöcz makes the water essential, and adopts the formula of Städeler : $R_7[R_2]\,Si_4O_{18}$, or $H_2Ca_2Fe_4\,[Fe_2]Si_4O_{18}$; Reynolds neglects the water, and writes: $R_6[R_2]Si_4O_{17}$, or $Ca_2(Fe, Mn)_4[Fe_2]Si_4O_{17}$.

According to Websky, isomorphous with humite, Ber. Ak. Berlin, 1876, 201.

Indianaite.—See *Halloysite*, p. 55.

Iodobromite. *A. von Lasaulx*, J. Min., 1878, 619.

Isometric, in octahedrons with cubic planes. Cleavage octahedral indistinct. G. = 5·713. Color sulphur yellow, sometimes greenish. Sectile. Composition: 2 Ag (Cl,Br) + Ag I = Cl 7·79, Br 17·18, I 14·15, Ag 60·88 = 100. Analysis, Lasaulx (l. c.):

Cl	Br	I	Ag		
7·09	17·30	15·05	59·96	=	99·40.

B. B. gives off bromine vapors and leaves a silver globule. Found in small cavities in ferruginous quartz at the mine "Schöne Aussicht," near Dernbach, Nassau, associated with beudantite, carminite, and probably greenockite.

IODYRITE, Min., p. 117.—Artificial crystals, hemimorphic, *v. Zepharovich*, Z. Kryst., iv., 119, 1879.

Cryst., Dernbach, Nassau, *Seligmann*, Corr. Bl. Nat. Ver. Bonn, xxxvii., 130, 1880.

Occurrence at Caracoles, Chili, *Domeyko*, 6th App. Min. Chili, p. 29, 1878.

IOLITE, Min., p. 299; App. II., p. 30.—Elba, *D'Achiardi*, Att. Acc. Tosc., ii., July 4, 1875 (ZS. G. Ges., xxvi., 462). Pseudomorphs, *Wichmann*, ZS. G. Ges., xxvi., 675, 1874. In Hungarian trachytes, *Szabó*, J. Min., Beil-Bd., i., 302, 1881.

Ionite. *S. Purnell*, Am. J. Sc., III., xvi., 153, August, 1878.

A fossil hydrocarbon found in a more or less impure condition in the lignite of Ione Valley, Amador County, California. Structure firm, earthy. Color brownish yellow. Partially soluble in cold alcohol, largely soluble in ether, completely so in chloroform. A brown tarry oil containing a small quantity of paraffine is separated by dry distillation. Exact chemical nature unknown.

IRIDIUM, Min., p. 12.—**Cryst.**, Ural, *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xiv., 155, 1879 (Z. Kryst., iii., 437).

IRIDOSMINE, Min., p. 12.—(Nefdanskite), *v. Kokscharof*, Min. Russl., vi., 237, 239, 1874.

IRON, Min., p. 15; App. II., p. 30.—The native iron of Ovifak, Disco Bay, Greenland, discovered by *Nordenskiöld* in 1870 (Œfv. Ak. Stockh., 1870, 1058, and 1871, 1, or Geol. Mag., ix., 1872), and by him regarded as of meteoric origin, has been exhaustively studied both in its geognostic and chemical relations:—See *Nordström*, Œfv. Ak. Stockh., 1871, 453; *Nauckhoff*, ib., Bihang, i., April, 1872 (or Min. Mitth., 1874, 109); *Daubrée*, C. R., lxxiv., 1546, 1872, and lxxv., 240, 1872, and lxxxiv., 66, 1877; *Wöhler*, Gött. Gelehrt. Anzeig., 1872, 197, and J. Min., 1879, 832; *Tschermak*, Min. Mitth., 1874, 165; *Steenstrup*, Ved. Medd. Copenhagen, 1875, Nos. 16–19 (or ZS. G. Ges., xxviii., 225, 1876); *Törnebohm*, Œfv. Ak. Stockh., Bihang, 1878; *Meunier*, C. R., lxxxix., 215, 1879; *J. Lawrence Smith*, Ann. Ch. Phys., V., xvi., 452, 1879. The observations of Steenstrup, and later more particularly those of Törnebohm and Smith make it very certain that the iron is not meteoric but of terrestrial origin.

Iserite.—See *Rutile*, p. 105.

ISOCLASITE.—App. I., p. 7.

ITTNERITE, Min., p. 333.—It is concluded by *van Werwerke* on the basis of a microscopical and chemical examination that ittnerite and skolopsite belong together, and that both

are results of the partial alteration of haüynite (J. Min., 1880, ii., 264). This confirms the conclusion of Rammelsberg (Syst. Min., p. 333, and Min. Chem., 2d ed., p. 459).

IVIGTITE.—App. I., p. 7.

JACOBSITE, App. I., p. 8.—Långban, Wermland, Sweden, anal. by Lindström: Fe_2O_3 58·39, Mn_2O_3 6·96, MnO 29·93, MgO 1·68, CaO 0·40, PbO 1·22, P_2O_5 0·06, insol. 2·17 = 100·81. This corresponds to $Mn\,[Fe_2, Mn_2]\,O_4$; quoted by *Nordenskiöld*, Geol. För. Förh., iii., 384, 1877.

JADEITE, Min., p. 292.—Analyses of related minerals, *Damour*, Bull. Soc. Min., iv., 157, 1881.
See also *Neprite*, p. 84.

JAIPURITE, Min., p. 47 (Syepoorite, Jeypoorite, wrong orthog., Mallet).—According to a recent investigation, by *F. R. Mallet*, of the cobalt minerals of the Khetri mines, Rajputana, India, the simple cobalt sulphide, originally called syepoorite, probably has no existence; the cobalt minerals identified were cobaltite and danaite. Records Geol. Surv. India, xiv., pt. 2, 190, 1881.

JALPAITE.—Min., p. 39; App. II., p. 30.

JAMESONITE, Min., p. 90; App. II., p. 30.—Related mineral (heteromorphite) from Arnsberg, Westphalia, anal. corresponding to $7PbS + 4Sb_2S_3$, *Pisani*, C. R., lxxxiii., 747, 1876.
Anal. (Sarlay) Wiltau, *Pichler*, Min. Mitth., 1877, 355. Sevier Co., Arkansas, *Dunnington*, Amer. Assoc., 1877, 184. Spain, Province of Huelva, *Genth*, Am. Ch. Journ., i., 325, 1879. Arkansas, *C. E. Wait*, Trans. Amer. Inst. Min. Eng., viii., 51, 1880.

JAROSITE, Min., p. 660.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 227, 1874.
Occurrence at the Vulture mine, Arizona, *Silliman*, Am. J. Sc., III., xviii., 73, 1879; anal. (1), *Penfield*, ib., xxi., 160, 1881. Occurrence at the Arrow mine, Chaffee Co., Colorado, and anal. (2), *König*, Am. Chem. Journ., ii., 375, 1881. Occurrence in the province of Cajamarca, Peru, *Ramondi*, Min. Pérou, p. 234, 1878.

		SO_3	Fe_2O_3	K_2O	Na_2O	H_2O	SiO_2
1.	G. = 3·09	30·42	48·27	8·53	0·28	[11·42]	1·08 = 100.
2.	G. = 3·144	29·33	52·36	7·30	0·90	10·55	.... = 100·44.

The water determined in (1), viz., 12·91, was too high, the result obtained by difference is nearer correct. In (2), the silica has been deducted, and 8·8 p. c. of turgite remains to be rejected. The formula is then $K_2\,[Fe_2]_3S_4O_{22}, 6H_2O = K_2SO_4 + [Fe_2]\,S_3O_{12} + 2[Fe_2]\,H_6O_6$.

JAULINGITE, Min., p. 800.—A related resin ($C_{29}H_{43}O_2$), from Köflach, Styria, for which the name KÖFLACHITE is provisionally suggested by *Dölter*, J. Min., 1880, ii., 152 (ref.).

JEFFERISITE.—Min., p. 494; App. II., p. 30; see also *Vermiculite*, p. 129.

JEFFERSONITE.—Min., p. 215; App. II., p. 30.

Jogynaite.—See *Scorodite*, p. 108.

JORDANITE.—Min., p. 88; App. II., p. 31.—**Cryst.**, Binnenthal, *W. J. Lewis*, Z. Kryst., ii., 191, 1878.

JULIANITE.—App. I., p. 8.

KAKOCHLOR.—See *Psilomelane*, p. 98.

Kaluszite.—App. II., p. 31 (54).

Kaolinite, Min., p. 473; App. II. p. 31.—**Anal.**, Quenast, Belgium, *de Koninck*, Bull. Ac. Belg., II., xliv., 733, 1877.
Chemical and microscopical discussion of kaolin from the "Bunt Sandstein" of Thuringia, *Herold*, Inaug. Diss. Jena, 1875. Schmid, in an extended discussion on the same subject, names two kinds of crystallites observed by him *mikrovermiculit*, and *mikroschörlit*, the latter he regards as probably tourmaline, ZS. G. Ges., xxviii., 87, 1876.

Kårarfveite.—App. II., p. 32.

Karstenite.—Min., p. 621; App. II., p. 31.

Karyinite.—See *Caryinite*, p. 20.

Keatingine.—See *Rhodônite*, p. 104.

Keilhauite, Min., p. 387.—Contains scandium, *Cleve*, Œfv. Ak. Stockh., xxxvi., No. 7, p. 3, 1879.

Kelyphite. *Schrauf*, Verh. G. Reichs., 1879, 244. Gray serpentinous coating of pyrope crystals from Kremze, near Budweis, Bohemia. The pyrope has been analyzed by *Scharizer*.

Kenngottite.—See *Miargyrite*, p. 77.

Kentrolite. *Damour* and *vom Rath*, Z. Kryst., v., 32, 1880.
Orthorhombic; axes, c (vert.) : $\breve{b} : \breve{a} = 0{\cdot}784, 1 : 0{\cdot}633$. Observed planes: *I*, 1, and *i*-*ĭ* small. $I \wedge I = 115° 18'$, $1 \wedge 1$ (terminal) $= 87° 29'$ and $125° 32'$. Cleavage: prismatic, distinct. Crystals minute, often grouped in sheaf-like forms resembling stilbite, planes rough, and the prismatic horizontally striated. Also massive. H. = 5. G. = 6·19 Color dark reddish brown, on the surface blackish (vom Rath). Analysis, Damour:

SiO_2	MnO_2	PbO	
15·95	24·50 (or Mn_2O_3 22·26)	59·79	= 100·24.

The state of oxidation of the manganese, and hence the true composition of the mineral, is left in doubt; on the first supposition it is expressed $Pb\overset{iv}{M}nSiO_5$, which requires: SiO_2 16·21, MnO_2 23·52, PbO 60·27 = 100; on the second it is $Pb_2[Mn_2]Si_2O_9$, which requires: SiO_2 16·58, Mn_2O_3 21·83, PbO 61·59 = 100. [The latter formula is the more probable one; see *Melanotekite*, p. 75.] B. B. on charcoal gives a lead coating and with soda a globule of lead. In a salt of phosphorus bead dissolves and gives in R. F. a slight yellowish color, after the addition of saltpeter becomes bright violet. Dissolves in part in dilute sulphuric acid with the separation of manganese oxide and silica. With HCl chlorine is disengaged. From southern Chili, exact locality unknown. Occurs with quartz, barite, apatite. Named from *κέντρον*, *spike*. Websky calls attention to the fact that the angles of kentrolite agree very closely with those of descloizite (Z. Kryst., v., 552).

Kerrite.—App., p. 31.

Kieserite.—Min., p. 641; App. II., p. 31.

Killinite.—See *Spodumene*, p. 112.

Kjerulfine, App. II., p. 31.—See *Wagnerite*, p. 130.

Klaprotholite.—App. I., p. 8.

KLINOCROCITE.—See *Clinocrocite*, p. 28.

KLINOPHÆITE.—See *Clinophæite*, p. 28.

KOCHELITE.—App. I., p. 8.

Köflachite.—See *Jaulingite*, p. 64.

KÖHLERITE.—App. II., p. 31.

KOLLOPHAN.—App. I., p. 9.

KONGSBERGITE, App. II., p. 32.—See *Amalgam*, p. 4.

KOPPITE.—App. II., p. 32.

KORARFVEITE.—App. II., p. 32.

KÖTTIGITE, Min., p. 561.—**Cryst.**, isomorphous with vivianite, *Groth*, Min.-Samml. Strassburg, p. 166, 1878.

KRAURITE.—See *Dufrenite*, p. 39.

Krennerite. BUNSENIN, *Krenner*, Termesz. Füzetek, 1877 (Wied. Ann., i., 637). KRENNERITE, *vom Rath*, Ber. Ak. Berlin, 1877, 292 (Z. Kryst., i., 614, 1877). *Schrauf*, ib., ii., 235, 1878.

· Orthorhombic (monoclinic? Schrauf). Axes: c (vert.) : b : $\breve{a}$ = ·50415 : 1 : ·94071. Observed planes : O, $i\text{-}\bar{\imath}$, $i\text{-}\breve{\imath}$, I, $i\text{-}2$, $i\text{-}\frac{3}{2}$, $i\text{-}\bar{2}$, $i\text{-}\breve{3}$, 1, $2\text{-}\bar{\imath}$, $3\text{-}\bar{\imath}$, $1\text{-}\bar{\imath}$, $\frac{1}{2}\text{-}\bar{\imath}$, $1\text{-}\breve{\imath}$, 1, $1\text{-}\breve{2}$, $\frac{3}{2}\text{-}\frac{3}{2}$. $I \wedge I = 93° \ 30'$; $O \wedge 1\text{-}\bar{\imath} = 151° \ 48'$; $O \wedge 1\text{-}\breve{\imath} = 153° \ 14'$: $O \wedge 1 = 143° \ 39'$. In vertically striated prismatic crystals. Cleavage: basal perfect (v. Rath). Lustre metallic, brilliant. Color silver white to brass yellow. Opaque. Brittle.

Contains gold and tellurium, with a little silver and copper, but exact composition not yet determined; Schrauf obtained from an approximate blowpipe analysis, Au + Ag (Pb?) 52, or Au 31. B. B. decrepitates violently. Found at Nagyag, Transylvania, associated with quartz and pyrite. Related to sylvanite in the angles of two zones, but different in others. Also related in composition to calaverite.

This is the mineral, according to Krenner and Schrauf, which has formerly gone by the names gelberz, weisstellur, müllerine, etc., see Min., p 81.

As the name bunsenite has been accepted for the nickel protoxide from Johanngeorgenstadt, vom Rath has given this mineral the name krennerite from the original discoverer.

Krönnkite. *I. Domeyko*, 5th Appendix Min. Chili, 1876; also 3d ed. Min. Chili, p. 250, 1879.

Triclinic (?). In irregular prismatic crystalline masses with coarsely fibrous structure. Cleavage distinct parallel to an edge of the prism. G. = 2·5. Lustre vitreous. Color azure blue, changing somewhat on exposure to the air. Composition: $CuSO_4 + Na_2SO_4 + 2aq$ = copper sulphate 47·23, sodium sulphate 42·09, water 10·68 = 100. Analysis by Krönnke : $CuSO_4$ 46·28, Na_2SO_4 42·95, H_2O 10·77 = 100. Perfectly soluble in water. Found in the copper mines near Calama, on the road from Cabija to Potosi, Bolivia.

Krugite.—See *Polyhalite*, p. 96.

LABRADORITE, Min., p. 341; App. II., p. 32.—**Anal.**, Adirondacks, N. Y., *Leeds*, Amer. Ch., March, 1877. Arvieu, Arveyron, *Pisani*, C. R., lxxxvi., 1420, 1878. *Klement*, Min. Petr. Mitth., i, 366, 1878; *Schuster*, ib., p. 367.

See also *Feldspar Group*, p. 45.

LANARKITE, Min., p. 628 ; App. II., p. 33.—**Cryst.** description, with correction of previously accepted angles, *Schrauf*, Z. Kryst., i., 31, 1877.

LANGITE.—Min., p. 665; App. II., p. 33.

LAPIS LAZULI.—Min., p. 334; App. II., p. 33.

LAUMONTITE, Min., p. 399; App. II., p. 33.—**Anal.**, New South Wales, *Liversidge*, Min. Mag., i., 54, 1876. Monte Catini, *Bechi*, Accad. Linc. Trans., III., iii., 114, 1879.
Analysis by *A. Smita* (Min. Mitth., 1877, 268), of LEONHARDITE from the Floitenthal (see Brezina, ib., 1877, 98) gave: SiO_2 52 92, Al_2O_3 22·44, CaO 12·23, H_2O 12·38 = 99 97, for material dried over sulphuric acid, and SiO_2 60·15, Al_2O_3 25·91, CaO 14·19 = 100·25 for ignited material. The first corresponds with the previously accepted formula: $Si_4[Al_2]CaH_6O_{15}$, which, however, expresses the composition of the mineral only after it has lost in dry air, or at 100°, a part of its water. Smita confirms the conclusion that leonhardite is to be referred to laumontite, differing from it only in having lost a part of the water which goes off at 100°.

LAURITE, Min., p. 74; App. II., p. 33.—Artificially prepared, *St. Claire Deville* and *Debray*, Bull. Soc. Min., ii., 185, 1879.

Lautite. *Frenzel*, Min. Petr. Mitth., iii., 515; iv., 97, 1881.
In small brilliant crystals, short prismatic, with *I*, *i-ĭ* and *O*; orthorhombic. Generally massive; compact. Columnar to fine fibrous, radiated, also fine granular. H. = 3–3·5. G. = 4·96. Lustre metallic. Color iron black. Streak black. Opaque. Not brittle.
Analyses, Frenzel:

	S	As	Sb	Ag	Cu	
1.	18·00	42·06	....	11·74	27·60	= 99·40.
2.	17·60	41·06	....	11·62	28·29	= 98·57.
3.	18·57	42·60	0·58	3 03	33·54,	Fe 0·44 = 98·76.

The iron in (3) is due to chalcopyrite; another determination of the silver gave 7·78 p. c. Formula deduced CuAsS [see below], with Ag replacing in part the Cu, this requires: S 18·78, As 44·01, Cu 37·21 = 100. B. B. decrepitates violently; fuses easily, giving off arsenical fumes. In the closed tube yields an arsenical mirror. Soluble in nitric acid; gives with hydrochloric acid a silver chloride precipitate. Found at Lauta, near Marienberg, Saxony; accompanied by metallic arsenic, ruby silver, tetrahedrite, chalcopyrite, galenite, and barite. [A homogeneous mineral? May it not contain metallic arsenic?]

LAVENDULAN, Min., p. 560.—**Anal.**, Chili, *Goldsmith*, Proc. Ac. Nat. Sc. Philad., p. 192, 1877.

LAVROFFITE.—Min., p. 216; App. II., p. 33.

Lawrencite. *Daubrée*, C. R., lxxxiv., 66, Jan., 1877.
Iron protochloride, shown by Daubrée to be present in the Greenland native iron. Named after Dr. J. Lawrence Smith, of Louisville, Ky., who detected the same substance in the meteoric iron of Tazewell. Daubrée also uses the name STAGMATITE (from στάγμα, *drop*).

LAXMANNITE.—App. I., p. 9.

LAZULITE, Min., p. 572; App. II., p. 33.—**Anal.**, discussion of formula, Zermatt, *Gamper*, Jahrb. G. Reichs., 1878, 611. Canada, *Hoffmann*, Geol. Canada, Rep., 1879–80 (Am. J. Sc., III., xxi., 410).

LEAD, Min., p. 17; App. II., p. 33.—Russia, occurrence, *v. Kokscharof*, Min. Russl., vi., 236. Huancavelica, Peru, *Raimondi*, Min. Pérou, p. 145, 1878.

LEADHILLITE, Min., p. 624; App. II., p. 33.—*Laspeyres* (Z. Kryst., i., 193, 1877) finally concludes that his supposed species, MAXITE (App. II., p. 38), is really identical with leadhillite. The crystalline form is monoclinic, according to him, with $\beta = 89° 48'$, and the composition is expressed by the empirical formula $H_{10}Pb_{18}C_9S_5O_{56}$, which requires SO_3 8·17, CO_2 8·08, PbO 81·91, H_2O 1·84 = 100 (see also J. pr. Ch., xi., 26, 1874; xii., 347, 1876; xiii., 370, 1876). The extremely complex character of the formula makes it somewhat improbable.

Bertrand (C. R., lxxxvi., 348, 1878) describes leadhillite from Matlock, Derbyshire, with 2E = 72° yellow (Sardinia and Scotch crystals have 2E = 21°); the angle diminishes with rise in temperature, and finally 2E = 66° at 250°; above this point the crystals fly to pieces. As bearing upon the question of the independent character of susannite, Bertrand describes crystals from Leadhills, in which he finds gray colored spots with 2E = 21°, and green colored spots which are uniaxial. The species leadhillite and susannite are probably identical.

Leidyite. *König*, Proc. Acad. Nat. Sc. Philad., 1878, 84.

In verruciform incrustations, consisting of fine scales with silky lustre; also stalactitic; crystalline (?). H. = 1–2. Lustre resinous. Color grass-, blue-, or olive-green. Streak white. Analysis:

SiO_2	Al_2O_3	FeO	MgO	CaO	H_2O	
51·41	16·82	8·50	3·07	3·15	17·08	= 100·03.

The formula calculated by the author is $R_2[Al_2]Si_5O_{15} + 5aq$, with R = Fe, Ca, Mg, H_2. B. B. fuses with intumescence to a light yellow green glass. In the closed tube gives off water and becomes brown. Soluble readily in HCl, with partial gelatinization; after ignition insoluble. Found with grossular garnet, zoisite, and quartz, at Leiperville, Delaware Co., Penn. Named after Dr. Joseph Leidy, of Philadelphia.

LEONHARDITE.—See *Laumontite*, p. 67.

LEPIDOLITE.—Min., p. 314; App. II., p. 33.—See *Mica Group*, p. 77.

Lepidophæite.—See *Wad*, p. 130.

LESLEYITE.—App. I., p. 18.

LETTSOMITE, Min., p. 666.—**Anal.**, La Garonne, Dept. du Var, *Pisani*, C. R., lxxxvi. 1418, 1878. Optical characters investigated, *Bertrand*, Bull. Soc. Min., iv., 11, 1881.

LEUCHTENBERGITE, Min., p. 500; App. II., p. 34.—Microscopic examination, *v. Leuchtenberg*, Bull. Ac. St. Pet., xxi., 509, 1876.

LEUCITE, Min., p. 334; App. II., p. 34.—The question as to the true crystalline system of leucite has been discussed, as follows: *Hirschwald*, Min. Mitth., 1875, 227; *Tschermak*, Min. Mitth., 1876, 66 (anal. by Berwerth); *vom Rath*, J. Min., 1876, 281, 403; *Hirschwald*, J. Min., 1876, 519, 733; *Baumhauer*, Z. Kryst., i., 257, 1877; *Hirschwald*, Min. Petr. Mitth., i., 85, 1878; *Bammhauer*, Min. Petr. Mitth., i., 287, 1878; *Groth*, Z. Kryst., v., 264, 1880; *Weisbach*, J. Min., 1880, i., 143; also *Mallard*, Ann. Min., VII., x., 79, 1876. Hirschwald maintains that the species is, in fact, isometric, with polysynthetic structure. This view is opposed by Bammhauer, vom Rath, and Groth, and the results of a series of experiments on the etching of the crystalline faces seem to prove its tetragonal nature. Mallard regards leucite as pseudo-isometric, referring it to the orthorhombic system, and later, Weisbach, on the basis of a series of measurements by Treptow, has reached a similar conclusion.

Fouqué and *Lévy* have succeeded in obtaining artificial crystals of leucite (C. R., lxxxvii., 961, 1878, and Bull. Soc. Min., iii., 118, 1880); and *Hautefeuille* (C. R., xc., 313, 378, 1880) has formed an iron leucite, containing iron in place of the alumina. In both cases the same twinning is observed, and the same optical characters as in natural crystals.

Analyses by *Berwerth*, Acquacetosa, near Rome (Min. Mitth., 1876, 66); *Schulze*, Albani Mts., J. Min., 1880, ii., 114. Occurrence on the island of Bawean, Dutch East Indies, Vogelsang-Zirkel, J. Min., 1875, 175.

Leucochalcite. *Sandberger; Petersen*, J. Min., 1881, i., 263.
In very slender, needle-like crystals. Nearly white, with tinge of green. Lustre silky. Analysis: As_2O_5[37·89], P_2O_5 1·60, CuO 47·10, CaO 1·56, MgO 2·28, ign. 9·57 = 100; corresponding to $Cu_4As_2O_9 + 3H_2O$, or $Cu_3As_2O_8 + CuH_2O_2 + 2aq$, which requires: As_2O_5 42·75, CuO 47·21, H_2O 10·04 = 100. Becomes first green on ignition, and finally fuses to a black glass. Occurs as a delicate coating with malachite and calcite. Wilhemine mine in the Spessart. [A more complete description is to be desired; the mineral is apparently an arsenical tagilite.]

Leucomanganite. *Sandberger*, J. Min., 1879, 370. Announced as a snow-white mineral, in broad foliated-radiated aggregates. B. B. becomes brownish black, and fuses easily. Contains MnO, FeO, alkalies and water. From Rabenstein, near Zwiesel. [Needs further examination. Is it related to fairfieldite?]

Leucophanite, Min., p. 260; App. II., p. 34.—*Bertrand* (Phil. Mag., V., iii., 357, 1877) concludes on optical grounds that leucophanite is to be considered either as monoclinic or hemihedral orthorhombic. *Groth* (Z. Kryst., ii., 199, 1878) proves that the crystals are really monoclinic, and deduces the axial relations, c (vert.) : b : $\breve{a}$ = 1·054 : 1 : 1·061; β = 90° approx. Groth describes twins and fourlings analogous to harmotome.
Rammelsberg (ZS. G. Ges., xxviii., 57, 1876) publishes some new analyses, and deduces the formula: $R_{15}Si_{14}O_{43} + 6NaF$ with R = Be : Ca = 1:1; this requires: SiO_2 49·35, BeO 11·16, CaO 24·68, Na_2O 10·93, F 6·69 = 102·81.

Leucopyrite.—Min., p. 77; App. II., p. 34.

Leucoxene.—See *Titanomorphite*, p. 122.

Leucotile. *Hare*, Inaug. Diss. Breslau, 1879 (Z. Kryst., iv., 295).
In fibres irregularly grouped on serpentine. Cleavable, parallel and perpendicular to the longitudinal direction; optically orthorhombic (?). Lustre silky. Color green. Analysis:

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	H_2O	
28·98	6·99	8·16	29·78	7·37	1·32	tr.	17·29	= 99·89.

This corresponds nearly to $R_8[R_2]Si_4O_{19}, 8H_2O$. Easily soluble in HCl and H_2SO_4. B. B. fuses and becomes slightly yellow, and yellowish brown. From Reichenstein, Silesia.

Leviglianite.—See *Onofrite*, p. 86.

Levynite.—Min., p. 431; App. II., p. 34. See also *Chabazite*, p. 22.

Libethenite, Min., p. 563.—**Cryst.**, pseudo-orthorhombic (monoclinic), according to *Schrauf*, Z. Kryst., iv., 19, 1879.
Made artificially, *Friedel* and *Sarasin*, Bull. Soc. Min., ii., 157, 1879.

Lievrite.—See *Ilvaite*, p. 62.

Limbachite.—App. II., p. 34.

Limbilite.—Min., p. 258; App. II., p. 34.

Limonite.—Min., p. 172; App. II., p. 34.

Linarite, Min., p. 663; App. II., p. 34.—**Cryst.**, Erzberg, *v. Zepharovich*, Lotos, Dec., 1874.
Argentine Republic, anal., *Frenzel*, J. Min., 1875, 675; cryst., *v. Rath*, Z. Kryst., iv., 426, 1880.
Anal., State of Jalisco, Mexico, *Barcena*, Naturaleza, iv., 55, 1877.

LINNÆITE, Min., p. 68.—Analyses, P. T. Cleve (Geol. För. Förh., i., 125, 1872), 1, Bastnäs, 2, Gladhammar:

	S	Co	Ni	Cu	Fe		
1. Bastnäs, G. = 4·755.	41·83	44·92	0·19	8·22	4·19	=	99·35.
2. Gladhammar, G. = 4·825.	42·19	39·33	12·33	2·28	4·29	=	100·42.

Both correspond closely to the formula $2RS + RS_2$, or RS, R_2S_3.

Lintonite.—See *Thomsonite*, p. 121.

Lionite.—See *Tellurium*, p. 119.

Liskeardite. *Maskelyne*, Nature, Aug. 15, 1878.
Massive; in thin incrusting layers, with uniform fibrous structure. Color white, with a slight blue or greenish-blue tint. Composition stated to be $[R_2]_3As_2O_{14}$, $16H_2O$, with $[R_2]$ = $[Al_2]$ and some $[Fe_2]$, according to an analysis by Dr. Flight (not published) Liskeard, Cornwall. An arsenical evansite, Min., p. 585. [A more complete description is to be desired.]

Lithiophilite.—See *Triphylite*, p. 124.

LITHIOPHORITE, App. I., p. 9.—See *Psilomelane*, p. 98.

Litidionite (Lithidionite). *E. Scacchi*, Rend. Accad. Napoli, Dec., 1880.
Blue lapilli, found at Vesuvius in 1873, 7 to 25 mm. in diameter, were found to consist of a white earthy substance, with a glassy blue crust. Of the latter, H. = 5–6, G. = 2·535. The mean of two analyses gave, after being washed: SiO_2 71·57, CuO 6·49, FeO 4·02, K_2O 10·92, Na_2O 6·78 = 99·78. Slightly attacked by HCl; fuses very easily (the white nucleus, consisting of augite, olivine, etc., is infusible). The author, on the ground of the fusibility, regards the substance as a mixture of quartz and the carbonates of potassium and sodium. [The name, obviously, does not belong to a definite species, why it was given does not appear.]

LIVINGSTONITE, App. II., p. 35.—Analysis by *F. P. Venable* (Chem. News, xl., 186, 1879), after deducting impurities: (⅔) S 23·73, Sb 53·75, Hg 22·52 = 100, for which the formula $HgS + 2Sb_2S_3$ is given (but Groth suggests $Hg_2S + 4Sb_2S_3$, Z. Kryst., vi., 97). Anal. by Barcena: S 22·97, Sb 53·12, Hg 20·00, gangue and loss 3·91 = 100, Naturaleza, iv., 268, 1879. From Guadalcazar, Mexico, anal. by *Page*, Ch. News, xlii., 195, 1880.
Made artificially, *Baker*, Ch. News, xlii., 196, 1880.

LÖLLINGITE, Min., p. 76; App. II., pp., 35, 34.—**Anal.** (sätersbergite, $FeAs_2$), Brevig, Norway, *Nordenskiöld*, Geol. För. Förh., ii., 242, 1875. Monte Challanches, Dauphiny, in crystals, *Frenzel*, J. Min., 1875, 677. In serpentine of Reichenstein, Silesia, *Hare*, Z. Kryst., iv., 295.

Louisite. *Honeymann*, Proc. Nova Scotia Inst. Nat. Sc., v., 15, 1878.
A transparent, glassy, leek green mineral; streak white; fracture splintery. H. = 6·5. G. = 2·41. Gelatinizes with HCl. An analysis by H. Louis gave: SiO_2 63·74, Al_2O_3 0·57, FeO 1·25, MnO tr., CaO 17·27, MgO 0·38, K_2O 3·38, Na_2O 0·08, H_2O 12·96 = 99·63. [Needs further examination; free silica is very probably present.]

Luckite.—See *Melanterite*, p. 76.

Ludlamite. *N. Story-Maskelyne* and *F. Field*, Phil. Mag., V., iii., 52, 135, 525, 1877.
Monoclinic. Axes, c (vert.) : $\bar{b}$: $\breve{a}$ = 1·9820 : 1 : 2·2527. β = 79° 27′. Observed planes: *O*, *i-ī*, *i-ĭ*, *I*, 1, − 1, − ½, 1-ĭ, − 2-ĭ, 1-ĭ, 2-ĭ. $O \wedge i\text{-}\bar{i}$ = 100° 33′, $O \wedge 1\text{-}\breve{i}$ = 117° 10′; $I \wedge I$ = 131° 23′; $O \wedge -1$ = 118° 35′. $O \wedge 1$ = 111° 29′. *O* and 1 striated parallel to intersection-edge. Cleavage: *O* highly perfect; *i-ī* distinct. Optic-axial plane, the clinodiagonal. Acute bisectrix positive, inclined 67° 5′ to the vertical axis in the acute angle of the

axes *cd*. Axial angles : $2H_a = 97° 50'$, $2H_o = 119°$, and hence $2V = 82° 22'$. Dispersion of the bisectrices almost zero, of the axes small $\rho > v$.

H. = 3–4. G. = 3·12. Lustre brilliant. Color bright green. Streak greenish white. Transparent. Analysis (mean of several) :

P_2O_5	FeO	H_2O		
30·11	52·76	16·98	=	99·85.

This corresponds to $Fe_7P_4O_{17}, 9H_2O$ (or $H_2Fe_7P_4O_{18} + 8aq$) = P_2O_5 29·89, FeO 53·06, H_2O 17·05 = 100. B. B. colors the flame pale green, and leaves a black residue. In the closed tube decrepitates violently, becomes dark blue, and gives off water. Soluble in dilute hydrochloric and sulphuric acids.

Occurs with siderite, vivianite, pyrite, at the Wheal Jane mine, near Truro, Cornwall. Named after Mr. Ludlam, of London.

Ludwigite.—App. II., p. 35.

Lüneburgite.—App. I., p. 10.

Lunnite.—See *Pseudomalachite*, p. 97.

Luzonite, App. II., p. 35.—See *Clarite*, p. 27.

Macfarlanite. The occurrence at Silver Islet, Lake Superior, with the metallic silver, of thin plates and grains of a reddish-brown sectile mineral, containing As, Ag, Co, Ni, and supposed to be new, was described by *T. Macfarlane* in 1870 (Can. Nat., Feb. 1). To the granular ore, or mixture of reddish-colored grains with other minerals, the name Macfarlanite was given, later, by Major Sibley (quoted by *Macfarlane*, Trans. Amer. Inst. Min. Eng., viii., 236, 1880; see also *Courtis*, Eng. Min. J., xxvii., March 29, 1879). In 1879 *Wurtz* described two supposed new minerals from Silver Islet, Huntilite (Eng. Min. J., xxvii., 55, 1879) and Animikite (ib., p. 124). His descriptions are as follows :

Huntilite.—In two varieties : (*A*) Of a dark gray or more commonly black color; dull, amorphous, porous, and fragmentary; (*B*) apparently crystalline; one cleavage direction; bright slate color, and occurs imbedded in calcite. (*A*) is the more common. Semi-malleable. H. less than 2·5. G. = 7·47 (*A*), 6·27 (*B*), after deduction of impurities. Analyses :

	As	Sb	S	Ag	Hg	Co	Ni	Fe	Zn	H_2O	gangue.		
A	21·10	3·33	0·78	59·00	1·04	3·92	1·96	3·06	2·42	0·19	3·23*	=	100·03.
B	23·99	4·25	1·81	44·67	1·11	7·33	2·11	8·53	3·05	0·33	1·65*	=	98·83.

* (*A*) Silicate 0·88, calcite 2·35; (*B*) do. 0·55 and 1·10.

The author proposes to subtract the Hg as amalgam, and S as pyrite, and then calculating the remaining metals as Ag ($\overset{\text{ii}}{R} = 2\overset{\text{i}}{R}$), he obtains the ratio of $\overset{\text{i}}{R}$: As (+ Sb) = 2·90 : 1 for *A*, and 2·99 : 1 for *B*. On the basis of this, the formula Ag_3As is assumed as representing the composition. Named after Dr. T. Sterry Hunt. [No value can be attached to the formula deduced (see below), for most of the metals thus taken together are present only as impurities. Compare Arsenargentite, p. 9.]

Animikite.—Occurs as an incrustation on huntilite, also in isolated slabs or plates. Structure fine-granular, crypto-crystalline. G. = 9·45. Color white to grayish white. Fracture semi-conchoidal or granular. Somewhat sectile. An analysis yielded :

Sb	As	S	Ag	Hg	Co	Ni	Fe	Zn	gangue.		
11·18	0·35	1·49	77·58	0·99	2·10	1·90	1·68	0·36	1·68	=	99·31.

From the Silver Islet mine, Lake Superior. Named from "animikie," *thunder*, whence Thunder Bay. The formula Ag_9Sb is proposed.

The complex relations of the above minerals and mineral mixtures has been well investigated by *Macfarlane* (l. c.). The granular ore was found to be made up of reddish-brown metallic grains, when polished looking like burnished nickel, with an undetermined black mineral, niccolite, galena, calcite, and quartz. The ore, pulverized and freed from all brittle materials by washing, yielded 75 to 84 p. c. silver; the grains finally obtained by repeated trituration and sifting had a dark gray color, and gave 92 p. c. silver; on solution in dilute nitric acid these grains yielded: Ag 93·54, Ni 1·58, As 2·15, Sb 0·36, insol. 2·37 = 100. The insoluble portion (2·37 p. c.) assayed 17·46 p. c. silver.

A quantity of the original metallic grains were acted upon by three successive portions of very dilute nitric acid. The results were:

	Ag	Hg	Ni	As	Sb		
1.	37·64	0·65	4·66	6·40	0·17	=	49·52.
2.	33·69	0·10	1·22	....	0·06	=	35·07.
3.	5·40	....	tr.	....	tr.	=	5·40.

There remained 6·20 p. c. insol. (quartz, etc.), and 3·77 p. c. of a black mineral washed from the quartz, containing 24·8 p. c. Ag, also Sb, S, Pb, Co, Ni. The author closes by stating very justly, that further investigation is needed to determine the character of the various minerals present.

König (Proc. Acad. Nat. Sc. Philad., 1877, 276) has analyzed a similar mineral mixture from Silver Islet: As 10·56, Sb tr., S 1·81, PbS 38·18, Ag 32·68, Ni, Co 8·96, Fe 0·35, quartz 6·00, $CaCO_3$ 1·20 = 99·74. He regards the nickel and arsenic as combined and forming niccolite, which exists mixed with galenite, argentite, and probably a basic silver arsenide.

[It would appear from the above, that the true nature of the individual minerals present in the Silver Islet ores is still to be determined, but that there is probably present a silver arsenide (*huntilite*), and perhaps also a silver antimonide (*animikite*) allied to dyscrasite.]

MACONITE.—App. II., p. 36.

MAGNESITE, Min., p. 685; App. II., p. 36.—Massive var. from Elmen, Eastern Alps (anal. by Lehmayer), *Gümbel*, Verh. G. Reichs., 1880, 276.

MAGNETITE, Min., p. 149; App. II., p. 36.—**Cryst.**, Vesuvius, *Scacchi*, Contrib. Min., ii., 3. Albani Mts., Latium, *Sella*, Z. Kryst., i., 230, 1877. Binnenthal, with implanted rutile crystals in parallel position, *Seligmann*, Z. Kryst., i., 340; do. with hematite, same locality, *Bücking*, ib., i., 575. Jerofeief (Verh. Min. Ges. St. Pet., II., xvii., 24), Min. Russl., viii., 226, 1881.

Coercive force, *Holz*, Wied. Ann., v., 169, 1878.

Anal., Kaiserstuhl (4·08 p. c. TiO_2), *Knop*, Z. Kryst., i., 64, 1877. Magnet Cove (3·25 p. c. TiO_2), *König*, Pr. Am. Ac. Nat. Sc. Philad., 1877, 293. Kristianstad, Sweden (by Nordström, 6·01 p. c. TiO_2), *Karlsson*, Geol. För. Förh., i., 14, 1872.

With melanite on trap, East Rock, New Haven, *E. S. Dana*, Am. J. Sc., III., xiv., 217, 1877.

MAGNOCHROMITE.—App. II., p. 36.

Magnolite. *F. A. Genth*, Amer. Phil. Soc. Phil., xvii., 118, 1877.

In radiating tufts of very minute acicular or capillary crystals. Color white. Lustre silky. Contains mercury and tellurium, and composition inferred to be Hg_2TeO_4. Blackened by ammonia. A decomposition product of coloradoite, found in the upper part of the Keystone mine, Magnolia District, Colorado. [Needs further examination.]

MALACHITE.—Min., p. 715; App. II., p. 37.

MALDONITE.—App. I., p. 10.

Malinofskite.—See *Tetrahedrite*, p. 120.

Mallardite. *Carnot*, Bull. Soc. Min., ii., 117, 1879.

In crystalline masses with fine fibrous structure; probably monoclinic (*Mallard*, ib., p. 119). Colorless. Analyses, 1, Rioult; 2, Carnot:

	SO_3	MnO	FeO	MgO	CaO	H_2O	Insol.		
1.	26·0	20·9	0·3	1·2	0·8	36·8	14·0	=	100·2.
2.	29·0	23·6	...	0·6	0·7	44·5	1·6	=	99·8.

This corresponds closely to the formula: $MnSO_4 + 7aq$, which brings it into the same group with melanterite, Min., p. 646. Easily soluble in water. Changes rapidly on exposure; effloresces, becomes opaque, and finally pulverulent. Is decomposed by strong heating, losing the sulphuric acid and water, and leaving a reddish-brown residue. Carnot obtained from a solution of manganese sulphate at 15° C. the salt, $MnSO_4 + 5aq$ in triclinic crystals; but at a temperature of 6° C. he obtained monoclinic crystals with the composition, $MnSO_4 + 7aq$.

Occurs in a gray clay-like gang stone, with quartz sand and barite. From the silver mine "Lucky Boy," south of Salt Lake, near Butterfield Cañon, Utah.

MANCINITE.—According to Uzielli (Trans. Accad. Linc., III., i., 108, 1877), the mineral called mancinite is not, as supposed, from the hill Manciuo, near Leghorn, nor is it a zinc trisilicate, *Jacquot* (Ann. Min. III., xix., 703, 1841).

MANGANITE, Min., p. 170.—**Cryst.**, monograph (Ilefeld), showing 4 types of forms with new planes, twins, etc., the crystals holohedrally developed, *Groth*, Min.-Samml. Strassburg, p. 79, 1878. *Sadebeck*, ZS. G. Ges., xxxi., 206, 1879.

Anal., Långban, Sweden, *Blomstrand*, Geol. För. Förh., ii., 183, 1874.

MANGANOPHYLLITE, App. II., p. 37.—Found at Jacobsberg and Långban, Wermland, Sweden, *Sjögren*, Geol. För. Förh., i., 64, 1872.

Manganosiderite.—See *Rhodochrosite*, p. 103.

Manganosite. *Blomstrand*, Geol. För. Förh., ii., 179, 1874; iii., 123, 1876. *Sjögren*, ii., 531; iii., 181, 1876; iv., 158, 1878.

Isometric. In minute crystals, showing the octahedron and dodecahedron, rarely the cube. Cleavage cubic. Isotropic. H. = 5–6. G. = 5·18. Lustre vitreous. Color emerald green on the fresh fracture, becoming black on exposure to the air. Analysis, Blomstrand, ib., ii., 182:

	MnO	FeO	MgO	CaO		
(⅔)	98·04	0·42	1·71	0·16	=	100·33.

Formula: MnO, and hence isomorphous with periclasite. Dissolves with difficulty in strong nitric acid, forming a colorless solution. Occurs with pyrochroite and manganite, in a manganiferous dolomite (anal.: $CaCO_3$ 56·47, $MnCO_3$ 30·10, $MgCO_3$ 13·56, $FeCO_3$ 0·18 = 100·31, Blomstrand) at Långban, Wermland; also in calcite, brucite, or dolomite, with hausmannite, pyrochroite, garnet, etc., at the Mossgrufva, Nordmark, Sweden.

Mangantantalite.—See *Tantalite*, p. 118.

MARCASITE, Min., p. 75; App. II., p. 37.—**Cryst.**, twins described, etc., *Groth*, Min.-Samml. Strassburg, p. 38, 1878. Cryst. association with hematite, *Sadebeck*, Pogg. Ann., Erg.-Bd., viii., 625.

MARCYLITE, Min., p. 137.—*Raimondi* describes a mineral from the Cerro Verde, between Islay and Arequipa, Peru, which he concludes to be a mixture of a hydrated oxysulphide of copper, marcylite, with cuprite and atacamite. From the hacienda d'Ocucaje, province of Ica, he mentions another consisting of marcylite, atacamite, melaconite, and limonite, Min. Pérou, pp. 98, 101, 1878. [It has never been shown that the original marcylite was really a distinct species; and the Peruvian mineral seems to be no less uncertain.]

MARGARITE, Min., p. 506; App. II., p. 37.—See also App. III., *Mica Group*, p. 77, and *Clintonite Group*, p. 28.

MARIPOSITE.—App. II., p. 37.

Marmairolite. *N. O. Holst,* Geol. För. Förh., ii., 530, 1875.
In very fine crystalline needles, monoclinic (?). H. = 5. G. = 3·07. Color pale yellow. Powder white. Transparent. Analysis (mean of several):

SiO_2	FeO	MnO	MgO	CaO	K_2O	Na_2O	ign.	
56·27	2·03	4·86	21·36	6·33	1·89	5·94	0·90	= 99·58.

Formula approximately $RSiO_3$ (Q. ratio for R : Si = 13·75 : 30·02). B. B. fuses with some difficulty to an opaque bead. Not attacked by acids. Occurs with schefferite in a brownish manganesian limestone (containing 6·56 MnO, and 1·35 PbO), at Långban, in Wermland, Sweden. Named from *μαρμαίρω, to glisten.* [Very near enstatite, except that it contains alkalies.]

MASCAGNITE, Min., p. 635.—In guano from the Guañape Iles, *Raimondi,* Min. Pérou, p. 32, 1878.

MASKELYNITE.—App. II., p. 37.

MASSICOT, Min., p. 136.—Occurrence, Cerro de Caracoles, Bolivia, *Domeyko,* 6th App. Min. Chili, p. 15, 1878.

MATLOCKITE, Min., p. 119.—**Anal.,** Montagne de Challacollo, Tarapaca, Peru, *Raimondi,* Min. Pérou, p. 170, 1878.

Matricite. *N. O. Holst,* Geol. För. Förh., ii., 528, 1875.
In crystalline masses with concentric, fine fibrous structure. H. = 3–4. G. = 2·53. Lustre pearly. Color gray, often with a greenish tinge. Streak white; subtranslucent to opaque. Fracture splintery to uneven. Feel greasy. Analysis (after the deduction of 28·36 p. c. $CaCO_3$ mechanically mixed):

SiO_2	MgO	CaO	Al_2O_3	FeO	MnO	Na_2O	H_2O	
33·99	37·96	5·64	1·33	1·82	0·47	0·98	17·81	= 100.

Formula $Mg_2SiO_4 + H_2O$. B. B. infusible. Yields water in the closed tube. Decomposed by acids with separation of silica, but does not gelatinize. Occurs intimately mixed with calcite and associated with spodiosite, at the Krangrufva in Wermland, Sweden. [Compare villarsite, Min., p. 409.]

MAXITE.—App. II., p. 38; see also *Leadhillite,* App. III., p. 67.

MEERSCHALUMINITE.—App. II., p. 38 (44).

MEIONITE, Min., p. 318; App. II., p. 38.—**Anal.,** by Neminar (Min. Mitth., 1875, 51; 1877, 61), gave: SiO_2 43·36, Al_2O_3 32·09, CaO 21·45, MgO 0·31, Na_2O 1·35, K_2O 0·76, H_2O 0·27, Cl 0·14, CO_2 0.72 = 100·45. See also *Scapolite,* p. 106.

MELACONITE, Min., p. 136; App. II., p. 38.—Vesuvius, *Scacchi,* Att. Accad. Napoli, vi., 1873 (Contrib. Min., ii., 12).

Melanophlogite. *A. v. Lasaulx,* J. Min., 1876, 250, 627; 1879, 513.
SULFURICIN, *Guyard,* Bull. Soc. Chim., II., xxii., 61, 1874. *Brezina,* Min. Mitth., 1876, 243.
Occurs in minute cubes, sometimes showing twinning striations. Cleavage cubic, nearly perfect (?) H. = 6·5–7. G. = 2·04. Color light brown or colorless. Lustre vitreous. Transparent. According to Bertrand the apparent cubic crystals are made up of six pyramids having a common vertex and with their bases coinciding with the cubic planes (Bull.

Soc. Min., iii., 160, 1880). Analyses: 1, v. Lasaulx (l. c.); 2, sulfuricin (see below), Guyard (l. c.):

	SiO_2	SO_3	H_2O	Al_2O_3	Fe_2O_3	SrO	MgO	CaO	
1. *Melanophlogite.*	86·29	7·2	2·86	0 7		2·8	....	....	= 99·85, Lasaulx.
2. *Sulfuricin.*	80·38	6·80	6·10	0·43	8·57*	....	0·37	1·25,	S 4·10 = (108).

* Brezina suggests that it probably should be 0·57.

Melanophlogite turns finally black when heated B. B. (hence name from μέλας, *black*, and φλέγεσθαι, *to be burned*). Occurs forming a drusy coating on sulphur, calcite, and celestite, from Girgenti, Sicily.

SULFURICIN, from Greece, is described as a white porous silica, having a sour taste and impregnated with sulphur; the analysis is given above. Melanophlogite does not give an acid reaction. [The possible relation of the two substances mentioned is remarked by Brezina (l. c.). In any case melanophlogite can hardly be regarded as an original mineral, but more probably as an impure form of silica owing its origin to some method of pseudomorphism. v. Lasaulx thinks it cannot be pseudomorphous after fluorite. The observations of Bertrand would not separate it from the so-called *pseudo-isometric* species.]

Melanosiderite. *J. P. Cooke*, Amer. Acad. Sci., x., 451, 1875.

Amorphous; compact. H. = 4·5. G. = 3·391. Lustre vitreous, inclining to resinous. Color black, with a tinge of red. Streak brownish to brick red. Subtranslucent. In the closed tube decrepitates and gives off water. Gelatinizes with hydrochloric acid. B. B. fuses at 4½ to a magnetic mass. Analysis, by W. H. Melville afforded: SiO_2 $(\frac{2}{2})$ 7·42, Fe_2O_3 75·13, Al_2O_3 4·34, H_2O (at 100°) 6·17, H_2O (above 100°) 7·68 = 100·74. Cooke writes the formula $[Fe_2]_4SiO_{14}$, $6H_2O$, which requires: Fe_2O_3 79·21, SiO_2 7·42, H_2O 13·37 = 100. If the silica is an impurity the composition is exactly that of limonite, as the author remarks; this seems more probable than that it is a true silicate. Locality, Mineral Hill, Delaware Co., Penn. Named from μελας and σίδηρος, in allusion to the black color.

Genth (Second Rep. Min. Pennsylvania, p. 216, 1876), suggests that melanosiderite is only a variety of an iron hydrate, probably a limonite; Cooke, however, regards it as a basic silicate on the ground of its vitreous lustre, fusibility, definite composition, and the fact that it gelatinizes with acids.

Melanotekite. *G. Lindström*, Œfv. Ak. Förh. Stockh., xxxv., 6, p. 53, 1880.

Massive. Cleavage in two directions, in one of these most distinct. H. = 6·5. G. = 5·73. Lustre metallic to resinous. Color black to blackish gray. Streak greenish gray. Opaque to translucent under the microscope. Dichroic, bottle green and red brown. Analyses: 1, after deducting 2·56 p. c. impurities; 2, after deducting 3·30 p. c.:

	SiO_2	Fe_2O_3	PbO	CuO	FeO	MnO	CaO	MgO	K_2O	Na_2O	
1.	17·32	23·18	55·26	0·20	0·75	0·69	0·02	0·59	0·24	0·54	BaO 0·11 (?) Cl 0 14, P_2O_5 0·07, ign. 0·93 = 100:04.
2.	17·22	22·81	58·42	....	....	0·57	....	0·33	0·18	0·33.	

The atomic ratio for R : $[R_2]$: Si = 2 : 1 : 2, and the empirical formula is $Pb_2[Fe_2]Si_2O_9$. B. B. fuses with intumescence to a black bead; with soda on charcoal gives a globule of lead and a lead coating. With borax reacts for iron, but on strong heating in R. F. becomes on cooling black and opaque (reduced lead), with salt of phosphorus gives a skeleton of silica. Decomposed by nitric acid.

Occurs with native lead, intimately mixed with magnetite and yellow garnet at Långban in Wermland, Sweden. This locality has furnished two other lead silicates, hyalotekite and ganomalite (q. v.). Named in allusion to the related hyalotekite, from μέλας, *black*, and τήκειν, *to melt*. Lindström calls attention to the fact that of the two possible formulas for kentrolite proposed by Damour and vom Rath (see p. 65), the second corresponds exactly to the above composition of melanotekite, viz.: $Pb_2[Mn_2]Si_2O_9$, which establishes an interesting relation between the two minerals.

Melanothallite. *A. Scacchi*, copper chloride from the eruption of Vesuvius in 1870. Att. Accad. Napoli. (Bull. Soc. Min., i., 138).

MELANTERITE, Min., p. 646.—Cryst., and anal., Idria, *v. Zepharovich*, Ber. Ak. Wien, lxxix., 183, 1879.

A variety of melanterite containing a little manganese is called LUCKITE by *Carnot* (Bull. Soc. Min., ii., 168, 1879). In irregular striated prisms. Colorless or slightly bluish. Analysis: SO_3 26·3, FeO 21·7, MnO 1·9, MgO 0·2, CaO 0·5, H_2O [42·2], insol. 7·2 = 100. For this the formula is calculated $(Fe,Mn)SO_4 + 7aq$, with Fe : Mn = 11 : 1. From the silver mine "Lucky Boy," south of Salt Lake, near Butterfield Cañon, Utah.

MELINOPHANE (**MELIPHANITE**), Min., p. 263 ; App. II., p. 38.—In tetragonal crystals with *I* and 1; *c* (vert.) = 0·6584, 1 ∧ 1 (terminal) = 122° 23′, Brevig, *Bertrand*, C. R., lxxxiii., 711, 1876.

The composition is discussed by *Rammelsberg* (ZS. G. Ges., xxviii., 61, 1876), who makes the formula $7R_3Si_2O_7 + 6NaF$, with R = Be : Ca = 1 : 1, and Na : K = 9 : 1; this requires: SiO_2 42·95, BeO 13·60, CaO 30·07, Na_2O 8·56, K_2O 1·44, F 5·83 = 102·45. It is undoubtedly distinct from leucophanite (q. v.).

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MENACCANITE, Min., p. 143, App. II., p. 38.—Cryst., tetartohedral, *v. Kokscharof*, Min. Russl., vi., 350, 1874. Binnenthal, tetartohedral, *Bücking*, Z. Kryst., i., 576, 1877; ii., 416, 1878. *Sadebeck*, Pogg. Ann., clvi., 557, 1875; J. Min., 1878, 287. *Groth*, Min.-Samml. Strassburg, p. 76, 1878.

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From diamond fields, So. Africa, anal. containing 12 p. c. MgO (compare anal. 24, Min., p. 144), *Cohen*, J. Min., 1877, 695. Egersund, Norway, *Tamm*, Geol. För. Förh., ii., 46, 1874.

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		TiO_2	SiO_2	Fe_2O_3	FeO	MnO	CaO	MgO	H_2O	
1.	($\frac{2}{2}$)	60·80*	undet.	18·83†	15.75†	3·28	0·42	....	1·75.	
2.	($\frac{3}{3}$)	54·23	1·40	14·99	21·91	6·34	0·45	0·19	1·33	= 100·84.

* With SiO_2 ? † The correctness of this separation is questioned.

The mineral decomposes readily, and finally becomes coated with a yellowish white crust consisting essentially of TiO_2. Probably altered from normal menaccanite by the assumption of water. From Småland, Sweden.

MENDOZITE, Min., p. 653.—Anal., Punta de Belen, Argentine Repub. (Schickendantz), *Brackebusch*, Min. Argentin., 75, 1879.

MENEGHINITE, Min., p. 105; App. II., p. 38.—Anal. (by Martini and Funaro), Bottino, Italy, *D'Achiardi*, Att. Soc. Tosc., ii., 116, 1876.

Meroxene.—See *Mica Group*, p. 77.

MESOLITE, Min., p. 430; App. II., p. 38.—Lüdecke (J. Min., 1881, ii., 1), makes the crystals from Iceland monoclinic. An analysis by Schmid (Pogg. Ann., cxlii., 118), gave : SiO_2 46·58, Al_2O_3 27·57, CaO 9·11, MgO 0·08, Na_2O 3·64, H_2O 12·94, which corresponds very closely to the formula accepted by Rammelsberg, $\left\{\begin{matrix} Na_2Al_2Si_3O_{10} + 2aq. \\ 2(CaAl_2Si_3O_{10} + 3aq. \end{matrix}\right\}$ Lüdecke also refers here the monoclinic mesolite of Credner from the Pflasterkaute, which gave him: SiO_2 43·83, Al_2O_3 29·04, CaO 7·84, Na_2O 7·80, H_2O 11·75. See also *Scolecite*, p. 107.

METACINNABARITE, App. I., p. 10.—See *Onofrite*, p. 86.

Metaxoite (Chonicrite) Min., p. 494.—*Wiik* (J. Min., 1876, 204, *Kenngott*, ib., p. 517).

Meymacite.—App. II., p. 38.

Miargyrite, Min., p. 88.—**Cryst.**, Bräunsdorf, *Weisbach*, Z. Kryst., ii., 55, 1877; *Groth*, Min.-Samml. Strassburg, p. 59, 1878.

Analyses by L. Sipöcz (Min. Mitth., 1877, 213), 1, miargyrite from Felsöbanya; 2, kenngottite from Felsöbanya; 3, by Jenkins (J. Min., 1880, ii., 109), hypargyrite from Andreasberg.

		S	Sb	Ag	Pb	Cu	Fe	
1.	G. = 5·298 (½)	21·80	40·68	32·77	4·01	0·51	0·19	= 99·96.
2. Kenngottite,	G. = 5·337	20·66	39·46	35·28	1·76	0·50	0·25	= 97·91.
3. Hypargyrite,	(½)	21·35	41·07	37·40	....	....	....	As 0·79 = 100·61.

These correspond to the accepted formula $AgSbS_2 = Ag_2S, Sb_2S_3$, and prove that kenngottite and hypargyrite are, as supposed, identical with miargyrite, the former containing a little lead. Weisbach had previously shown that hypargyrite agreed in form and physical characters with miargyrite (Z. Kryst., ii., 63, 1877). An analysis by *Andreasch* of miargyrite from Przibram gave S 21·68, Sb 41·15, Ag 36·71, Fe tr. = 99·54, both lead and copper being absent (Min. Petr. Mitth., iv., 185, 1881).

See also *Alaskaite*, p. 3.

Mica Group, Min., p. 301, et seq.; App. II., p. 39.—The optical investigations of Tschermak (Ber. Ak. Wien, lxxvi., 97, 1877; or Z. Kryst., ii., 14), have shown that all the micas are to be referred to the *monoclinic system*, the axis of elasticity being inclined a few degrees to the normal to the plane of cleavage. The exhaustive morphological study of *von Kokscharof* (Mem. Acad. St. Pet., VII., xxiv.; see also Min. Russl., vii., 167, 177, 222, 225; viii., 1) finally led him to a conclusion not at variance with this, although he shows that the angles alone do not require the assumption of any obliquity. The results of *Bauer* (Ber. Ak. Berlin, 1877, 684; or Min. Petr. Mitth., i., 14, 1878) confirm those of Tschermak; he has also determined the indices of refraction of muscovite, by a method based upon relations (established by Neumann) between the optical axes of elasticity and the distances, measured in the axial plane, between the dark rings of the interference figures.

Measurements of elasticity, *Coromilas*, Inaug. Diss. Tübingen, 1877 (Z. Kryst., i., 411). On the figures produced by etching, *Baumhauer*, Z. Kryst., iii., 113, 1878. *Wiik*, Œfv. Finsk. Vet. Soc., xxii., 1880.

Association of muscovite and biotite (meroxene) in parallel position, from Middletown, Conn., *Hawés* (anal. of the biotite ½: SiO_2 35·61, Al_2O_3 20·03, Fe_2O_3 0·13, FeO 21·85, MnO 1·19, MgO 5·23, K_2O 9·69, Na_2O 0·52, Li_2O 0·93, TiO_2 1·46, F 0·76, Cl tr., H_2O 1·87 = 99·27, cf. haughtonite below), Am. J. Sc., III., xi., 431, 1876; *v. Lasaulx*, J. Min., 1878, 630.

Tschermak (l. c. and Ber. Ak. Wien, lxxviii., 5, 1878, or Z. Kryst., iii., 122) divides the species of the mica group as follows:

	I.	II.
Biotites:	Anomite;	Meroxene, Lepidomelane.
Phlogopites:		Phlogopite, Zinnwaldite.
Muscovites:	Lepidolite. Muscovite. Paragonite.	
Margarites:	Margarite.	

In the first group (I) are included all the micas in which the optic-axial plane is perpendicular to the plane of symmetry; the second group (II) includes those in which it is parallel to the plane of symmetry. For the crystallographic relations of the different species reference must be made to the original paper. The chemical relations reached by Tschermak are based for the most part on a series of new analyses, very carefully made, to avoid errors fallen into by earlier analysts; these are quoted beyond.

Tschermak, on optical grounds (see above), divides biotite into **anomite** (from ἀνομός, *contrary to law*) and **meroxene** (Breithaupt's name for the Vesuvian biotite, see Min., p. 307). *Anomite* is represented by the mica occurring with diopside in granular calcite, at

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Miargyrite, Min., p. 88.—**Cryst.**, Bräunsdorf, *Weisbach*, Z. Kryst., ii., 55, 1877; *Groth*, Min.-Samml. Strassburg, p. 59, 1878.

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		S	Sb	Ag	Pb	Cu	Fe		
1.	G. = 5·298 (½)	21·80	40·68	32·77	4·01	0·51	0·19		= 99·96.
2. Kenngottite,	G. = 5·337	20·66	39·46	35·28	1·76	0·50	0·25		= 97·91.
3. Hypargyrite,	(½)	21·35	41·07	37·40	....	....	....	As 0·79	= 100·61.

These correspond to the accepted formula $AgSbS_2 = Ag_2S, Sb_2S_3$, and prove that kenngottite and hypargyrite are, as supposed, identical with miargyrite, the former containing a little lead. Weisbach had previously shown that hypargyrite agreed in form and physical characters with miargyrite (Z. Kryst., ii., 63, 1877). An analysis by *Andreasch* of miargyrite from Przibram gave S 21·68, Sb 41·15, Ag 36·71, Fe tr. = 99·54, both lead and copper being absent (Min. Petr. Mitth., iv., 185, 1881).

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Tschermak (l. c. and Ber. Ak. Wien, lxxviii., 5, 1878, or Z. Kryst., iii., 122) divides the species of the mica group as follows:

	I.	II.
Biotites:	Anomite;	Meroxene, Lepidomelane.
Phlogopites:		Phlogopite, Zinnwaldite.
Muscovites:	Lepidolite. Muscovite. Paragonite.	
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In the first group (I) are included all the micas in which the optic-axial plane is perpendicular to the plane of symmetry; the second group (II) includes those in which it is parallel to the plane of symmetry. For the crystallographic relations of the different species reference must be made to the original paper. The chemical relations reached by Tschermak are based for the most part on a series of new analyses, very carefully made, to avoid errors fallen into by earlier analysts; these are quoted beyond.

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MELINOPHANE (MELIPHANITE), Min., p. 263 ; App. II., p. 38.—In tetragonal crystals with *I* and 1; *c* (vert.) = 0·6584, 1 ∧ 1 (terminal) = 122° 23′, Brevig, *Bertrand*, C. R., lxxxiii., 711, 1876.

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		TiO_2	SiO_2	Fe_2O_3	FeO	MnO	CaO	MgO	H_2O	
1.	$(\frac{2}{2})$	60·80*	undet.	18·83†	15.75†	3·28	0·42	....	1·75.	
2.	$(\frac{3}{3})$	54·23	1·40	14·99	21·91	6·34	0·45	0·19	1·33	= 100·84.

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The mineral decomposes readily, and finally becomes coated with a yellowish white crust consisting essentially of TiO_2. Probably altered from normal menaccanite by the assumption of water. From Småland, Sweden.

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2.	($\frac{3}{3}$)	54·23	1·40	14·99	21·91	6·34	0·45	0·19	1·33	= 100·84.

* With SiO_2? † The correctness of this separation is questioned.

The mineral decomposes readily, and finally becomes coated with a yellowish white crust consisting essentially of TiO_2. Probably altered from normal menaccanite by the assumption of water. From Småland, Sweden.

Mendozite, Min., p. 653.—**Anal.**, Punta de Belen, Argentine Repub. (Schickendantz), *Brackebusch*, Min. Argentin., 75, 1879.

Meneghinite, Min., p. 105; App. II., p. 38.—**Anal.** (by Martini and Funaro), Bottino, Italy, *D'Achiardi*, Att. Soc. Tosc., ii., 116, 1876.

Meroxene.—See *Mica Group*, p. 77.

Mesolite, Min., p. 430; App. II., p. 38.—Lüdecke (J. Min., 1881, ii., 1), makes the crystals from Iceland monoclinic. An analysis by Schmid (Pogg. Ann., cxlii., 118), gave: SiO_2 46·58, Al_2O_3 27·57, CaO 9·11, MgO 0·08, Na_2O 3·64, H_2O 12·94, which corresponds very closely to the formula accepted by Rammelsberg, $\left\{\begin{matrix} Na_2Al_2Si_3O_{10} + 2aq. \\ 2(CaAl_2Si_3O_{10} + 3aq. \end{matrix}\right\}$ Lüdecke also refers here the monoclinic mesolite of Credner from the Pflasterkaute, which gave him: SiO_2 43·83, Al_2O_3 29·04, CaO 7·84, Na_2O 7·80, H_2O 11·75. See also *Scolecite*, p. 107.

Metacinnabarite, App. I., p. 10.—See *Onofrite*, p. 86.

Metaxoite (Chonicrite) Min., p. 494.—*Wiik* (J. Min., 1876, 204, *Kenngott*, ib., p. 517).

Meymacite.—App. II., p. 38.

Miargyrite, Min., p. 88.—**Cryst.**, Bräunsdorf, *Weisbach*, Z. Kryst., ii., 55, 1877; *Groth*, Min.-Samml. Strassburg, p. 59, 1878.

Analyses by L. Sipöcz (Min. Mitth., 1877, 213), 1, miargyrite from Felsöbanya; 2, kenngottite from Felsöbanya; 3, by Jenkins (J. Min., 1880, ii., 109), hypargyrite from Andreasberg.

		S	Sb	Ag	Pb	Cu	Fe		
1.	G. = 5·298 (½)	21·80	40·68	32·77	4·01	0·51	0·19		= 99·96.
2. Kenngottite,	G. = 5·337	20·66	39·46	35·28	1·76	0·50	0·25		= 97·91.
3. Hypargyrite,	(½)	21·35	41·07	37·40	....	....	....	As 0·79	= 100·61.

These correspond to the accepted formula $AgSbS_2 = Ag_2S, Sb_2S_3$, and prove that kenngottite and hypargyrite are, as supposed, identical with miargyrite, the former containing a little lead. Weisbach had previously shown that hypargyrite agreed in form and physical characters with miargyrite (Z. Kryst., ii., 63, 1877). An analysis by *Andreasch* of miargyrite from Przibram gave S 21·68, Sb 41·15, Ag 36·71, Fe tr. = 99·54, both lead and copper being absent (Min. Petr. Mitth., iv., 185, 1881).

See also *Alaskaite*, p. 3.

Mica Group, Min., p. 301, et seq.; App. II., p. 39.—The optical investigations of Tschermak (Ber. Ak. Wien, lxxvi., 97, 1877; or Z. Kryst., ii., 14), have shown that all the micas are to be referred to the *monoclinic system*, the axis of elasticity being inclined a few degrees to the normal to the plane of cleavage. The exhaustive morphological study of *von Kokscharof* (Mem. Acad. St. Pet., VII., xxiv.; see also Min. Russl., vii., 167, 177, 222, 225; viii., 1) finally led him to a conclusion not at variance with this, although he shows that the angles alone do not require the assumption of any obliquity. The results of *Bauer* (Ber. Ak. Berlin, 1877, 684; or Min. Petr. Mitth., i., 14, 1878) confirm those of Tschermak; he has also determined the indices of refraction of muscovite, by a method based upon relations (established by Neumann) between the optical axes of elasticity and the distances, measured in the axial plane, between the dark rings of the interference figures.

Measurements of elasticity, *Coromilas*, Inaug. Diss. Tübingen, 1877 (Z. Kryst., i., 411). On the figures produced by etching, *Baumhauer*, Z. Kryst., iii., 113, 1878. *Wiik*, Œfv. Finsk. Vet. Soc., xxii., 1880.

Association of muscovite and biotite (meroxene) in parallel position, from Middletown, Conn., *Hawes* (anal. of the biotite $\frac{2}{2}$: SiO_2 35·61, Al_2O_3 20·03, Fe_2O_3 0·13, FeO 21·85, MnO 1·19, MgO 5·23, K_2O 9·69, Na_2O 0·52, Li_2O 0·93, TiO_2 1·46, F 0·76, Cl tr., H_2O 1·87 = 99·27, cf. haughtonite below), Am. J. Sc., III., xi., 431, 1876; *v. Lasaulx*, J. Min., 1878, 630.

Tschermak (l. c. and Ber. Ak. Wien, lxxviii., 5, 1878, or Z. Kryst., iii., 122) divides the species of the mica group as follows:

	I.	II.
Biotites:	Anomite;	Meroxene, Lepidomelane.
Phlogopites:		Phlogopite, Zinnwaldite.
Muscovites:	Lepidolite. Muscovite. Paragonite.	
Margarites:	Margarite.	

In the first group (I) are included all the micas in which the optic-axial plane is perpendicular to the plane of symmetry; the second group (II) includes those in which it is parallel to the plane of symmetry. For the crystallographic relations of the different species reference must be made to the original paper. The chemical relations reached by Tschermak are based for the most part on a series of new analyses, very carefully made, to avoid errors fallen into by earlier analysts; these are quoted beyond.

Tschermak, on optical grounds (see above), divides biotite into **anomite** (from ἀνομός, *contrary to law*) and **meroxene** (Breithaupt's name for the Vesuvian biotite, see Min., p. 307). *Anomite* is represented by the mica occurring with diopside in granular calcite, at

Lake Baikal, and that from Greenwood Furnace, N. Y. Its composition, according to Tschermak's view, is expressed by isomorphous mixtures of $H_2K_4Al_6Si_6O_{24}$ (see muscovite, below), and $Mg_{12}Si_6O_{12}$ (a hypothetical polymere of chrysolite), in the relation of 1 : 1, or 2 : 1, or intermediate ratios. *Meroxene* is represented by the Vesuvian magnesian mica; composition $H_3K_3Al_6Si_6O_{24}$, and $Mg_{12}Si_6O_{12}$ in the ratio of 1 : 1, of 2 : 1, or intermediate ratios. *Lepidomelane* has the composition $H_4K_2Al_6Si_6O_{24}$, and $Mg_{12}Si_6O_{12}$, with, however, varying amounts of the iron compound $H_4K_2Fe_6Si_6O_{24}$. [In this group would belong the haughtonite of Heddle, and siderophyllite of Lewis (see below), varieties characterized by the replacement to large extent, of Mg by Fe.]

Phlogopite has the composition: $K_6Al_6Si_6O_{24}$, $H_6Si_{10}O_{24}$, and $Mg_{12}Si_6O_{24}$, often in the relation 3 : 1 : 4; generally also with $F_{24}Si_{10}O_8$ in the place of the second compound. *Zinnwaldite* has the composition: $K_6Al_6Si_6O_{24}$ (or $Li_6Al_6Si_6O_{24}$), $Fe_{12}Si_6O_{24}$, and $F_{24}O_8Si_{10}$ (or the corresponding hydrogen compound), in the relation of 10 : 2 : 3.

The muscovites include lepidolite, muscovite, and paragonite. *Lepidolite* has the composition: $3K_6Al_6Si_6O_{24} + Si_{10}O_8F_{24}$, with the first replaced one-half or more by the corresponding lithium compound, and the second by the corresponding hydrogen compound (see also Min. Petr. Mitth., ii., 94, 1879). *Muscovite* (including margarodite): $K_6Al_6Si_6O_{24}$, with the potassium compound replaced in part by the corresponding hydrogen compound, $H_6Al_6Si_6O_{24}$; the commonest formula is $H_4K_2Al_6Si_6O_{24}$. In certain muscovites, for which the name PHENGITE is proposed, the composition is explained as a combination of $H_4K_2Al_6Si_6O_{24}$, and $H_8Si_{10}O_{24}$, in the ratio of 3 : 1; these varieties approach to lepidolite. *Paragonite* (incl. cossaite), composition: $H_4Na_2Al_6Si_6O_{24}$.

Margarite, composition: $H_4Ca_2Al_8Si_4O_{24}$; related to the clintonite group, see p. 28.

[For the many important details of the crystallographic relations, and, too, the discussion upon which the above conclusions as to the composition are based, reference must be made to the original articles.]

Analyses employed in the above discussion: 1, by John, Lake Baikal; 2, by P. v. Hamm, Greenwood Furnace, G. = 2·846; 3, by A. Zellner, Tschebarkul, Siberia, G. = 3·004; 4, by J. Rumpf, Morawitza; 5, by Berwerth, Vesuvius, G. = 2·86; 6, E. Ludwig, with pargasite in granular limestone, G. = 2·867; 7, by E. Neminar, Penneville, G. = 2·779; 8, by A. Poppovits, Ratnapura, Ceylon, G. = 2·742; 9, by Berwerth, Edwards, N. Y.; 10, by Berwerth, Zinnwald; 11, by Berwerth, Paris, Me., G. = 2·855; 12, by Berwerth, Rozena, G. = 2·839; 13, by S. Blau, Bengal, G. = 2·831; 14, by L. Sipöcz, East Indies, G. = 2·830; 15, by L. Sipöcz, Rothenkopf in the Zillerthal, G. = 2·892; 16, by Löbisch, Soboth in Steiermark.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	K_2O	Na_2O	Li_2O	H_2O	F	
1. *Anomite*,	40·00	17·28	0·72	4·88	....	23·91	....	8·57	1·47	....	1·37	1·57	= 99·77.
2. "	40·81	16·47	2·16	5·92	....	21·08	....	9·01	1·55	....	2·19	tr.	= 99·19.
3. *Meroxene*,	38·49	14·43	5·54	14·75	tr.	16·34	....	8·12	0·53	....	0·89	tr.	= 99·00.
4. "	40·16	15·79	2·53	4·12	tr.	26·15	tr.	7·64	0·37	....	3·58	....	= 100·34.
5. "	39·30	16·95	0·48	7·86	0·59	21·89	0·82	7·79	0·49	....	4·02	0·89	= 101·08.
6. *Phlogopite*,	43·48	13·76	0·16	1·35	....	27·20	....	8·06	1·30	....	0·92	4·21	= 100·39.
7. "	44·29	12·12	1·40	1·44	....	27·86	....	7·06	2·16	....	2·09	1·94	= 100·36.
8. "	42·26	15·64	0·28	1·52	....	27·23	....	8·68	..	....	2·91	2·19	= 100·66.
9. "	40·64	14·11	2·28	0·69	....	27·97	2·54 BaO	8·16	1·16	....	3·21	0·82	= 101·55.
10. *Zinnwaldite*,	45·87	22·50	0·66	11·61	1·75	.....	....	10·46	0·42	3·28	0·91	7·94, P_2O_5 0·08	= 105·48.
11. *Lepidolite*,	50·39	28·19	....	....	....	.....	....	12·34	....	5·08	2·36	5·15	= 103·51.
12. "	50·98	27·80	....	0·05	....	.....	....	10·78	....	5·88	0·96	7·88, P_2O_6 0·05	= 104·38.
13. *Muscovite*,	45·57	36·72	0·95	1·28	....	0·38	0·21	8·81	0·62	0·19	5·05	0·15	= 99·93.
14. "	45·71	36·57	1·19	1·07	....	0·71	0·46	9·22	0·79	....	4·83	0·12	= 100·67.
15. *Phengite*,	45·87	30·86	5·70	1·69	....	1·56	0·23	9·07	0·54	....	4·60	....	= 100·12.
16. "	48·76	29·91	4·24	0·41	....	2·63	0·33	6·83	2·31	...	4·60	....	= 100·02.

Rammelsberg has also published (Wied. Ann., ix., 113, 302, 1880; also vii., 136, 1879) a recent investigation of the chemical composition of the species of the mica group, including a considerable number of new analyses. He concludes that the micas are in part unisilicates, in part compounds of unisilicates and bisilicates; he also assumes the isomorphism between these, as well as between similar silicates of metals of the $\overset{I}{R}$, $\overset{II}{R}$, $[\overset{VI}{R}_2]$ series respectively. He adopts a chemical classification, as follows:

1. ALKALI micas: A. *Sodium* mica (paragonite) formula $R_2[Al_2]Si_2O_8$ (unisilicate). B. *Potassium* mica (muscovite), including (1) unisilicates, $R_2[Al_2]Si_2O_8$, with sometimes (Mg,Fe) SiO_4; (2) compounds of unisilicates and bisilicates in the ratio of 1 : 3, thus $R_{10}R[R_2]_3Si_{12}O_{45}$ (anal. 1, 2, 3), or in the ratio of 1 : 1, thus: $\overset{I}{R}_6Si_2O_7 = \overset{I}{R}_2SiO_3 + \overset{I}{R}_4SiO_4$, or more

specially in part, $R_{14}R_2[R_2]_6Si_{18}O_{63}$. C. *Lithium* mica (lepidolite, anal. 4, 5, 6a, 6b): compounds of unisilicates and bisilicates in the ratio of 1: 3, thus: $R_{10}Si_4O_{13} = 3R_2SiO_3 + R_4SiO_4$; or more specially $R_{10}[R_2]_5Si_{16}O_{52}$ (Rozena and Paris), and $R_{14}[R_2]_6Si_{20}O_{65}$ (Juschakowa).

2. The MAGNESIUM mica (biotite pt., anal. 7, 8, 9) is a compound of bisilicates and unisilicates in the ratio of 1: 3, thus: $R_{14}R_{35}[R_2]_7Si_{36}O_{135}$.

3. The IRON-MAGNESIUM mica (biotite pt.) and IRON mica (lepidomelane), includes five series, having the following formulas: (1) $R_2R_4[R_2]Si_4O_{16} = R_4SiO_4 + 4R_2SiO_4 + [R_2]_2Si_3O_{12}$ (anal. 10, 11). (2) $R_4R_6[R_2]_2Si_7O_{28} = R_4SiO_4 + 3R_2SiO_4 + [R_2]_2Si_3O_{12}$ (anal. 12, 13, 14, 15). (3) $R_2R_2[R_2]Si_3O_{12} = R_4SiO_4 + 2R_2SiO_4 + [R_2]_2Si_3O_{12}$ (anal. 16, 17). (4) $R_2R_3[R_2]_2Si_5O_{20} = R_4SiO_4 + 3R_2SiO_4 + 2[R_2]_2Si_3O_{12}$ (anal. 18, 19). (5) $R_6R_3[R_2]_4Si_9O_{36} = 3R_4SiO_4 + 2R_2SiO_4 + 4[R_2]_2Si_3O_{12}$. To this group are appended several which do not admit of being classified.

4. The LITHIUM-IRON mica of Zinnwald (zinnwaldite, anal. 20) is regarded as a compound of bisilicate and unisilicate in the ratio of 2 : 1, thus: $R_8Si_3O_{10} = 2R_2SiO_3 + R_4SiO_4$; more specially $R_{10}R_4[R_2]_5Si_{18}O_{60}$, or $R_{12}R_4[R_2]_6Si_{21}O_{70}$, according to the ratio of the different elements.

5. The BARIUM mica (œllacherite, anal. 21) is a unisilicate, with the special formula: $R_8R_2[R_2]_4Si_9O_{36} = 2R_4SiO_4 + R_2SiO_4 + 2[R_2]_2Si_3O_{12}$.

Analyses by Rammelsberg (see also Ber. Ak. Berlin, 1878, 616; 1879, 248, 833; ZS. G. Ges., xxxi., 676, 1879):

	SiO_2	Al_2O_3	Fe_2O_3	Mn_2O_3	FeO	MnO	MgO	K_2O	Na_2O	Li_2O	H_2O*	F	
1. So. Royalston, Mass.	45·97	30·40	5·11	....	1·05	....	2·03	9·92	0·59	....	4·50	0·74	= 100·31.
2. Ytterby	45·21	33·40	2·78	....	2·00	....	1·58	10·71	0·42	...	4·28	0·94	= 101·32.
3. Broddbo	47·13	30·60	4·81	....	0·61	....	1·30	10·26	0·74	....	4·78	0·64	= 100·87.
4. Rozena	51·32	26·00	....	1·30†	....	....	....	9·98	0·96	3·87	0·57	7·18	= 101·18.
5. Paris	52·61	28·43‡	....	....	....	....	....	10·89	0·79	4·09	0·22	5·19	= 102·22.
6a. Juschakowa (?)	50·26	21·47	....	5·36†	....	....	....	11·08	0·54	4·88	0·66	8·71, Cl 1·16	= 104·12.
6b. "	50·96	22·20	....	5·38	....	....	....	11·39	0·32	5·65	....	8·58	= 104·48.
7. Rossie, N. Y.	43·17	13·43	....	....	1·51	....	27·47	8·73	0·92	....	0·40	5·11	= 101·04.
8. Gouverneur, N. Y.	43·00	13·27	1·71	....	....	...	27·70	10·32	0·30	....	0·38	5·67	= 102·35.
9. Pargas	42·55	12·74	1·31	....	0·49	....	27·62	8·92	1·18	....	1·50	4·59	= 100·90.
10. Monzoni	41·70	16·86	2·23	....	1·88	0·86	24·70	8·93	0·28	....	1·14	0·53	= 99·11.
11. Arendal	38·89	14·53	4·58	....	7·85	1·06	20·28	10·08	0·40	....	0·94	1·49	= 100·10.
12. Miask	32·49	12·34	6·56	....	23·60	1·53	5·29	9·59	0·88	....	3·73	1·61, TiO_2 4·08	= 101·65.
13. Filipstad	38·20	15·45	8·63	....	8·69	0·90	18·08§	9·17	0·18	....	2·94	1·15	= 103·39.
14. Sterzing	39·82	19·25	2·62	....	4·62	1·11	21·41‖	8·33	0·66	....	1·87	tr.	= 99·69.
15. Persberg	37·77	15·96	6·63	....	14·43	....	12·26	8·23	0·27	....	2·67	0·44, TiO_2 2·12	= 100·78.
16. Hitterö	39·01	15·44	9·37	....	13·67	....	11·30	8·62	0·14	....	2·05	1·29	= 101·39.
17. Renchthal	37·79	18·79	6·48	....	15·28	....	9·72	8·93	1·92	....	2·33	tr.	= 101·12.
18. Brevig	32·97	11·88	16·48	....	20·72	3·64	1·08	8·03	0·30	....	3·35	1·29, TiO_2 2·42	= 102·16.
19. St. Dennis	37·93	24·89	7·85	....	14·87	....	0·28	8·64	0·40	....	1·54	4·23	= 100·63.
20. Zinnwald	46·44	21·84	1·27	....	10·19	1·57	0·18	10·58	0·54	3·36	1·04	7·62	= 104·63.
21. Sterzig	42·90	32·40	tr.	....	2·40		3·10	7·47	1·73	....	3·02, BaO 5·82, CaO 0·80		= 99·64.

* Hygroscopic water here included: in anal. (1) 0·50; in (2) 0·33; in (3) 0·76; in (9) 0·32; in (12) 1·31; in (14) 0·18; in (16) 0·12. † With MgO included. ‡ With tr. Mn_2O_3 included. § With 1·5 CaO included. ‖ With 1·41 BaO included.

HAUGHTONITE of *Heddle* (Min. Mag., iii., 72, 1879) is a variety of biotite, in which the magnesium is largely replaced by iron. G. = 2·96–3·13. Fuses with difficulty to a black magnetic globule. Color dark brown to jet black. Small axial angle. Occurs mostly in granitic and gneissoid rocks, also in diorite, at various Scottish localities, as below. Analyses by Heddle: 1, from hornblendic gneiss of Roneval; 2, from the hill of Capval; 3, Nishibost; 4, from the shore of Loch-na-Muilne; 5, Fionaven in Sutherland; 6, Ben Stack; 7, Rispond; 8, Clach-an-Eoin; 9, Kinnaird's Head, Aberdeenshire; 10, Cove near Aberdeen; 11, Lairg, in Sutherland; 12, Portsoy in Banffshire.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	H_2O	
1. G. 3·08	37·16	15·00	7·69	17·35	1·04	1·30	8·88	1·60	8·18	2·12	= 100·17.
2. G. 3·07	36·81	15·22	7·61	17·35	0·96	1·54	8·78	1·34	8·31	2·47	= 100·40.
3. G. 3·05	35·15	16·70	5·96	19·06	1·02	0·82	7·46	1·26	9·24	3·13	= 99·81.
4.	36·46	17·25	4·18	15·33	0·54	0·69	12·23	0·66	9·20	3·39	= 99·92.
5. G. 3·08	36·75	7·86	2·78	15·18	0·42	0·98	11·17	1·25	9·44	4·28	= 99·99.
6. G. 3·05	25·69	20·09	2·23	14·01	1·00	1·89	14·77	0·53	7·38	2·47	= 100·86.
7. G. 2·99	36·54	22·28	2·43	16·01	0·78	1·25	10·00	0·79	8·26	1·51	= 99·86.
8. G. 2·96	35·85	21·54	4·48	18·31	0·31	1·25	8·08	0·79	7·76	1·96	= 100·33.
9. G. 3·13	35·67	17·95	7·19	18·06	2·00	1·40	1·50	3·81	9·27	3·20	= 100·05.
10.	35·47	18·80	4·61	19·19	0·64	0·90	7·01	0·24	8·19	4·97	= 100·02.
11.	35·56	16·69	1·88	18·04	0·69	2·72	8·47	0·11	9·90	5·71	= 99·77.
12. G. 3·07	34·08	17·34	3·61	18·70	0·38	3·23	10·54	1·19	6·78	4·05	= 99·90.

Other analyses by Heddle are given in Min. Mag., iv., 221 et seq., 1881; and the same variety has been repeatedly analyzed previously (see above).

A mica closely related to the above (a biotite containing only Fe) has been called SIDEROPHYLLITE by *H. C. Lewis* (Proc. Ac. Nat. Sc. Philad., 1880, 254). H. = 3·2. G. = 3·1. Color black; by transmitted light chrome green. Brittle. Axial angle about 10°. An analysis gave ($\frac{3}{2}$): SiO_2 36·68, Al_2O_3 20·41, Fe_2O_3 1·55, FeO 25·50, MnO 2·10, MgO 1·14, CaO 0·81, Na_2O 1·09, Li_2O 0·37, K_2O 9 20, H_2O 1·01 = 99·86. This corresponds to $R_3[R_2]Si_3O_{12}$. Fuses with intumescence at 2·5 to a black glass. Soluble in HCl and H_2SO_4 with separation of silica. From near Pike's Peak, Colorado.

EUCHLORITE of *C. U. Shepard* is shown by *Pisani* (C. R., lxxxiii., 167, 1876) to be ordinary biotite. From Chester, Mass. H. = 2·5. G. = 2·84. Color dark green. Lustre on the cleavage face pearly. Axis negative. B. B. fusible with difficulty to a black enamel. Slowly soluble in concentrated HCl. An analysis gave Pisani: SiO_2 39·55, Al_2O_3 15·95, Fe_2O_3 7·80, MgO 22·25, K_2O,Na_2O 10·35, ign. 4·10 = 100.

MICARELL. *Wichmann* (ZS. G. Ges., xxvi., 701, 1874) uses this name (of Freiesleben) to designate the original mineral from which the so-called pinite from Stolpen, near Neustadt, has been derived. It is regarded as certain that it is not iolite nor tourmaline, but its true nature is doubtful.

Microcline. *Des Cloizeaux* (Ann. Ch. Phys., V., ix., 433, 1876) uses Breithaupt's name (see Min., p. 355) to designate a new feldspar species established by him: a triclinic potash feldspar.

Triclinic and near orthoclase in form, and in habit, twinning, etc., but $O \wedge i\text{-}\grave{\imath}$ = 90° 16′. Extinction direction makes an angle of 15° to 16° (orthoclase = 0°), with the edge $O \,/\, i\text{-}\grave{\imath}$. Polysynthetic twinning, giving rise to striations on *O*, sometimes observed. A basal section shows in polarized light a characteristic grating-like structure, due to the regular intergrowth of twin lamellæ; in these, orthoclase is often enclosed; irregular lines and bands of albite also often observed.

Composition $K_2[Al_2]Si_6O_{16}$, or that of orthoclase; an analysis of pure white microcline from Magnet Cove, Arkansas, gave Pisani: SiO_2 64·30, Al_2O_3 19·70, Fe_2O_3 0·74, K_2O 15·60, Na_2O 0·48, ign. 0·35 = 101·17. G. = 2·54.

A large part of the potash feldspar, previously called orthoclase, is in fact microcline. Here belong the *chesterlite* from Chester, Penn., the beautiful amazonstone of Pike's Peak, Colorado (the color due to an organic salt of iron, according to König, Proc. Ac. Nat. Sc. Philad., 1876, 156), as also that of other localities; also feldspar from Mineral Hill, Penn., Leverett (not Everett), Mass., and many foreign localities. It is obtained in large quantities at Branchville, Conn., some single cleavage surfaces having a length of 10 feet; also observed at the same locality pseudomorph after spodumene. The perthite of Canada is in part microcline (J. Min., 1879, 389).

MICROLITE, Min., p. 513; App. II., p. 39.—Described by *Nordenskiöld* (Geol. För. Förh., iii., 282, 1877). In small brilliant isometric octahedrons with dodecahedral planes. Color light grayish yellow to blackish brown. Translucent to semi-translucent. H. = 5·5–6. G. = 5·25. An approximate analysis gave: Ta_2O_5,Cb_2O_5 77·3, SnO_2 0·8, CaO 11·7, MnO (FeO tr.) 7·7, MgO 1·8 = 99·3. Formula $(Ca,Mn,Mg)_2Ta_2O_7$, which requires: Ta_2O_5 78·82, MnO 7·69, CaO 11·69, MgO 1·80 = 100. B. B. infusible. Occurs with red and green tourmaline, petalite, spodumene, etc., in pegmatite, at Utö, Sweden.

Occurs at Branchville, Conn., *Brush* and *Dana*, Am. J. Sc., III., xvi., 34, 1878.

Described by *F. P. Dunnington* (Am. Chem. Journ., iii., 130, 1881) as occurring at the mica mines in Amelia Co., Virginia. In single crystals from $\frac{1}{16}$ in. to $\frac{3}{4}$ in., with *O*, *i*, and 3–3; also in large (up to 4 lbs.) imperfect crystals. H. = 6. G. = 5·656. Lustre glistening resinous. Color wax yellow to brown. Streak pale ochreous yellow. Subtranslucent. Fracture conchoidal. Brittle. An analysis gave: Ta_2O_5 68·43, Cb_2O_5 7·74, WO_3 0·30, SnO_2 1·05, CaO 11·80, MgO 1·01, BeO 0·34, U_2O_3 1·59, Y_2O_3 0·23, Ca_2O_3 (Di_2O_3) 0·17, Al O_3 0·13, Fe_2O_3 0·29, Na O 2·83, K_2O 0·29, F 2·85, H_2O 1·17 = 100·25, deduct O replaced by F 1·20 = 99·05. The probable formula deduced is $8(Ca_2Ta_2O_7) + CbOF_3$. In the closed tube decrepitates and gives off water. B. B. infusible, glows momentarily, colors the flame reddish yellow, and on cooling is dull pale yellow. Not attacked by strong HCl, slowly decomposed by H_2SO_4 and by fusion with caustic potash; readily decomposed by fusion with acid potassium sulphate. Associated with the true microlite is monazite in large masses (up to 8 lbs.). It was at first called altered microlite (priv. contrib., W. M. Fontaine).

A mineral related to microlite, from Haddam, Conn., is called HADDAMITE by *C. U. Shepard* (Am. J. Sc., II., l., 93, 1870; Min. Contr., 1877). What its true character is, if it be a distinct species, has not been determined.

MICROLITES.—App. II., p. 39.

MICROSOMMITE, App. II., p. 39.—Analyses 1, 2 by *Scacchi* (Rend. Accad. Sc. Napoli, April, 1876); 3, 4 by *Rauff* (Z. Kryst., ii., 468, 1878). 1, large crystals, Monte Somma, 2, microscopic crystals from bombs thrown out in April, 1872; 3, 4, crystals from Mt. Somma; 3, colorless; 4, yellow.

		SiO_2	Al_2O_3	CaO	Na_2O	K_2O	Cl	SO_3	CO_2	
1.	($\frac{2}{2}$)	32·21	29·22	12·60	10·14	6·79	6·71	4·43	....	= 102·15, deduct O replaced by Cl 1·51 = 100·59.
2.	($\frac{3}{3}$)	31·42	30·34	10·93	9·37	7·90	7·82	5·26	....	= 103·04, deduct O 1·76 = 101·28.
3.	($\frac{3}{3}$)	32·21	28·37	10·59	11·30	7·14	7·09	3·86	1·55	S tr. = 102·11, deduct O 1·60 = 100·51.
4.		32·23	28·98*	10·36	11·01	7·11	6·25	4·11	1·26	S tr. = 102·01, deduct O 1·56 = 100·45.

* (Fe_2O_3 tr.)

The crystals examined by Rauff were large as compared with the original mineral. Scacchi describes prismatic crystals with *I*, *i*-2, *i*-$\frac{3}{2}$, 1, *O*; *c* (vert.) = 0·41834; 1 ∧ 1 (adj) = 124° 53½′, 1 ∧ *I* = 115° 47′; the form corresponds very closely to that of nephelite (*c* (vert.) = ·8390 = 2*c* (vert.) microsommite, Min., p. 327). Cleavage *I* perfect, *O* less distinct (as in nephelite). H. = 6. G. = 2·444 (Rauff), 2·42–2·53 (Scacchi). Lustre *I* brilliant silky. The formula calculated by Rauff is 2 [($CaSO_4$) + $3CaAl_2Si_2O_8$] + [4NaCl + $3Na_2Al_2Si_2O_8$] + [4NaCl + $3K_2Al_2Si_2O_8$], he also makes the rather improbable assumption that a portion of the Si is replaced by C (Si : C = 20 : 1), the formula then requires: SiO_2 32·68, CO_2 1·20, Al_2O_3 29·33, CaO 10·67, Na_2O 10·34, K_2O 6·72, SO_3 3·81, Cl 6·77 = 101·52, deduct O 1·52 = 100. Rauff also shows that the mineral from Mt. Somma called davyne is in part an altered microsommite. See also *Cancrinite*, p. 20.

Microschörlite, Microvermiculite.—See *Kaolinite*, p. 65.

MILARITE, App. I., p. 10; II., p. 39.—Crystals shown by *Des Cloizeaux* (J. Min., 1878, 42, 370), and also by *Tschermak* (Min. Mitth., 1877, 350), and *Bertrand* (Bull. Soc. Min., iv., 10, 1881), to be orthorhombic, the pseudo-hexagonal form being due to twinning similar to that of aragonite, witherite, etc. An analysis by *Ludwig* (Min. Mitth., 1877, 349), gave:

	SiO_2	Al_2O_3	CaO	MgO	K_2O	Na_2O	H_2O	
($\frac{2}{2}$)	71·81	10·67	11·65	tr.	4·86	tr.	1·36	= 100·35.

The formula given by Ludwig is $HKCa_2Al_2Si_{12}O_{30}$, which requires: SiO_2 72·66, Al_2O_3 10·39, CaO 11·30, K_2O 4·74, H_2O 0·91 ≐ 100.

Kuschel (J. Min., 1877, 926), repeats the statement of Frenzel (J. Min., 1873, 797; App. II., p. 39), that the mineral is found in Val Giuf, not Val Milar, and adds that it ought on this account to be called *giufite*.

MILLERITE, Min., p. 56; App. II., p. 40.—Found at Micheroux, Belgium, *Firket*, Bull. Soc. Geol. Belg., v., 120, 1878; vi., 152, 1879.

MIMETITE.—Min., p. 537; App. II., p. 40.—Etching experiments by *Baumhauer* show mimetite to be pyramidal-hemihedral like apatite (J. Min., 1876, 411).

Bertrand (Bull. Soc. Min., iv., 36, 1881), has made the interesting observation that crystals of pure lead arsenate are biaxial (2*E* = 64°) and that as the percentage of P_2O_5 increases, this angle diminishes, and the pure lead phosphate is uniaxial. *Jannettaz* has obtained similar results (ib., p. 39), and *Jannettaz* and *Michel* (ib., p. 196), have accompanied a more detailed optical study by a series of analyses which add much to the completeness of the investigation.

Anal., Långbån, Sweden, by Kiutaro Iwaya, quoted by *Lindgren*, Geol. För. Förh., v., 272, 1880. Mina Grande, Marqueza, Chili, *Domeyko*, 6th App., Min. Chili, p. 16, 1878.

Occurrence with vanadinite in Arizona, *Silliman*, Am. J. Sc., III., xxii., 202, 1881; *W. P. Blake*, Min. Sc. Press, Aug., 13, 1881.

See also *Hedyphane*, p. 56.

MIRABILITE, Min., p. 636.—**Cryst.**, Aussee, Upper Austria, *v. Zepharovich*, Lotos, 1877. **Anal.**, Province of Tarapaca, Peru, *Raimondi*, Min. Pérou, p. 288, 1878. Sicily, *Paterno*, Accad. Linc. Trans., III., iv., 22, 1879.

MIRIQUIDITE.—App. II., p. 40.

Mixite. *Schrauf*, Z. Kryst., iv., 277, 1879.

Crystalline to crypto-crystalline. As an incrustation on bismuth ochre, also in irregular particles, granular and rough or spherical, reniform, with partial concentric fibrous structure. The fibres are occasionally distinct six-sided prisms (125°), regarded as probably monoclinic or triclinic (extinction 6°–9° with prismatic edge). H. = 3–4. G. = 2·66. Color emerald to bluish green; streak somewhat lighter. Translucent to transparent (fine fibres). Analysis:

	$\underbrace{As_2O_5,(P_2O_5)}$	Bi_2O_3	CuO	H_2O	FeO	CaO
$(\frac{3}{3})$	30·45	13·07	43·21	11·07	1·52	0·83 = 100·15.

The formula calculated is $Cu_{20}Bi_2As_{10}H_{44}O_{70}$; this requires: As_2O_5 31·93, Bi_2O_3 12·99, CuO 44·08, H_2O 11·00 = 100. In dilute nitric acid the mineral is instantly covered with a layer of a brilliant white powder of bismuth arsenate, insoluble in the acid; the copper arsenate goes into solution. On ignition becomes blackish green. Occurs with bismuth ochre, bismutite, and torbernite in the Geistergang at Joachimsthal. Named in honor of Bergrath A. Mixa.

MOLYSITE, Min., p. 118.—Vesuvius, *Scacchi*, Att. Accad. Napoli, vi., 1873 (Contrib. Min., ii., 43).

MOLYBDENITE, Min., p. 32.—Biellese, Italy, *Cossa*, Accad. Linc. Trans., III., i., 206, 1877. Groth suggests that the species may be orthorhombic, Min.-Samml. Strassburg, p. 23, 1878.

MONAZITE, Min., p. 539; App. II., p. 40.—**Cryst.**, Tavetsch, Switzerland (turnerite), *vom Rath*, J. Min., 1876, 393. Binnenthal (turnerite), also optical investigation, *Trechmann*, J. Min., 1876, 593. *Von Kokscharof*, Min. Russl., vi., 387. Ilmen Mts., *von Jeremejef*, Verh. Min. Ges. St. Pet., II., xii., 287. *Seligmann*, Corr. Bl. Nat. Ver. Bonn, xxxvii., 131, 1880. Optical examination, *Des Cloizeaux*, Bull. Soc. Min., iv., 57, 1881.

Analysis, Arendal, G. = 5·174 : P_2O_5 29·92, Ce_2O_3 28·82, La_2O_3 + Di_2O_3 40·79 = 99·53, formula: $[R_2]P_2O_8$, with $[R_2] = Ce_2:(La_2Di_2) = 2:3$; this requires: P_2O_5 30·28, Ce_2O_3 27·72, La_2O_3, Di_2O_3 42·00 = 100 ; contains no thorium nor zirconium, *Rammelsberg*, ZS. G. Ges., xxix., 79, 1877. Analysis of turnerite (on ·013 gr.): P_2O_5 28·4, Ce_2O_3 (La_2O_3, Di_2O_3) 68·0 = 96·4, *Pisani*, C. R., lxxxiv., 462, 1877.

Absorption bands (Ce, La, Di) in spectrum (turnerite), *Cossa*, Accad. Linc. Mem., III., 30, 1878.

Occurrence with zircon in gold sands of Ivalo, Finnish Lapmark, *Nordenskiöld*, Geol. För. Förh., ii., 223, 1874. Occurrence in brilliant highly modified crystals, at Milholland's mill, Alexander Co., N. C., also at other localities in North Carolina, *Hidden*, Am. J. Sc., III., xxii., 21, 1881. From the pegmatite vein at Ånnerod, near Moss, Norway, *W. C. Brögger*, Geol. För. Förh., v., 350, 1881. From Nil-St.-Vincent, *Renard*, Bull. Soc. Geol. Belg., III., ii., 128, 1881. See *Microlite*, p. 80.

MONIMOLITE, p. 546; App. II., p. 40.—Occurs at Långban, Wermland, Sweden, *Nordenskiöld*, Geol. För. Förh., iii., 379, 1877.

MONTEBRASITE.—See *Amblygonite*, p. 5.

MONTICELLITE.—Min., p. 255; App. II., p. 40.

MONTMORILLONITE, Min., p. 459.—**Anal.**, Macskamező, near Podu ruoj, **Transylvania**, *Helmhacker*, Min. Petr. Mitth., ii., 251, 1879. Great Retallack mine, Cornwall, *Collins*, Min. Mag., ii., 92, 1878. Branchville, Conn., anal. by H. L. Wells, described by *Brush* and *Dana*, Am. J. Sc., III., xx., 283, 1880.

MONZONITE.—App. I., p. 11.

MORDENITE, Min., p. 446.—A partially altered mordenite is called STEELEITE, *How* (Min. Mag., ii., 134, Sept., 1878). Found as red or reddish pink, or chalk-white, balls, varying in size from one to two and a half inches in diameter, imbedded in a red clay in cavities in trap. Also in other forms, closely associated with stilbite. In part soft and chalk-like; in part hard and unaltered. Gelatinizes with acids. Locality Cape Split, 13 miles west of Cape Blomidon, N. S.

MOSANDRITE, Min., p. 295.—Shown to be in fact monoclinic, *Brögger*, Z. Kryst., ii., 275, 1878.

Mottramite. *H. E. Roscoe*, Proc. Roy. Soc., xxv., 111, 1876.

In thin crystalline incrustations, occasionally in distinct, minute crystals, also compact. H. = 3. G. = 5·894. Lustre resinous. Color velvety black; in thin sections yellow. Streak yellow. Translucent. Analyses, Roscoe (l. c.): 1; 2, after deducting impurities:

	V_2O_5	PbO	CuO	FeO, ZnO, MnO	MgO	CaO	H_2O
1. (⅔)	17·14	50·97	19·10	2·52	0·26	2·13	3·63, hygroscopic water 0·22, SiO_2 [1·06 = 97·03.
2.	18·87	56·12	21·02	....	....	....	3·99 = 100.

The formula suggested is $(Pb,Cu)_3V_2O_8 + 2(Cu,Pb)H_2O_2$, which requires: V_2O_5 18·74, PbO 57·18, CuO 20·39, H_2O 3·69 = 100. The composition is thus analogous to dihydrite and erinite [but doubtful, owing to the imperfect analysis; note the loss of 3 p. c.]. Occurs on the Keuper Sandstone, at Alderley Edge, and at Mottram St. Andrews, Cheshire, England.

Muckite. *J. von Schröckinger*, Verh. G. Reichs., 1878, 387.

A resin from the coal beds at Neudorf, Moravia, disseminated in minute particles, and in small bands. Color opaque yellow, or light brownish yellow, and transparent to translucent. H. = 1–2. G. = 1·0025. An analysis by Dietrich gave: (¼) C 79·22, H 9·57, O 11·21, corresponding to $C_{20}H_{28}O_2$. Fuses between 290° and 310°. In alcohol, 14 p. c., dissolves; in ether, 40 p. c., both leaving a yellowish-brown residue. Other similar experiments prove that the substance is a mechanical mixture of different resins.

MUSCOVITE.—See *Mica Group*, p. 77.

MYSORIN, Min., p. 715.—From the Nellore district, India. Examined by *F. R. Mallet*, and shown to be essentially an impure malachite, with 9·02 H_2O; it contained as impurities, calcite, chrysocolla, barite, chalcocite, iron sesquioxide, Rec. Geol. Surv. India, xii., 166, 1879.

NADORITE.—App. I., p. 11.

NÆSUMITE.—App. I., p. 11.

NAGYAGITE, Min., p. 82.—*Schrauf* (Z. Kryst., ii., 239, 1878) shows that the crystalline system is not tetragonal, but either orthorhombic or perhaps still lower in symmetry. Fletcher observes the development of the planes to be in accordance with orthorhombic symmetry (Phil. Mag., V., ix., 188, 1880).

NAMAQUALITE.—App. I., p. 11.

NANTOKITE.—App. I., p. 11; II., p. 40.

NATROLITE, Min., p. 426; App. II., p. 41.—**Cryst.**, Salesel, Bohemia, *Seligmann*, Z. Kryst., i., 338, 1877. Auvergne, *Lüdecke*, Z. gesammt. Nat., III., iv., 145, 1879. Aró, Norway, *Brögger*, Z. Kryst., iii., 478, 487, 1879.

According to *Lüdecke* (J. Min., 1881, ii., 7), the natrolite from Aussig and Salesel must, on optical grounds, be referred to the monoclinic system. See Lüdecke's memoir also, on the relation of natrolite to scolecite and mesolite.

Pyro-electrical characters, *Hankel*, Wied. Ann., vi., 55, 1879.

Analyses, Kuchelbad, near Prague, *Preis* and *Vrba*, Ber. Ges. Böhm., 1879, 469.

NATRON, Min., p. 705.—Analyses of related salts quoted by *Brackebusch*, Min. Argentina, p. 70, 1879.

NEFIEDIEFFITE.—App. II., p. 41.

Neochrysolite.—See *Chrysolite*, p. 27.

Neociano—NEOCYANITE. *Scacchi*, Rend. Accad. Napoli, Jan., 1881.

In extremely minute tabular monoclinic crystals. Color blue. Supposed to be an anhydrous copper silicate. B. B. fuses to a black glass. Easily decomposed by acids, with the separation of pulverulent silica. From fumaroles at Vesuvius, formed by sublimation, together with three other substances. One of these forms a white granular mass, G. = 2·287, probably silica. A second is a white asbestos-like material, containing lime; difficultly fusible, and decomposed only in boiling acid. The other forms yellowish-brown crystals in six-sided rhombic plates; insoluble in acid. [Needs further examination.]

NEPHELITE, Min., p. 327; App. II., p. 41.—**Cryst.** ($O \wedge 1 = 136° 9' 20''$), Albani Mts., near Rome, *Sella*, Z. Kryst., i., 240, 1877. Island of Laaven, Langesundfiord, Norway, (*elæolite* in elæolite-syenite, $O \wedge 1 = 136°$), *Klein*, J. Min., 1879, 534.

Made artificially, *Fouqué* and *Lévy*, C. R., lxxxvii., 961, 1878.

Alteration products in nephelite rocks, *v. Eckenbrecher*, Min. Petr. Mitth., iii., 1, 1880.

Analyses, Ditró, Transylvania (elæolite), *A. Koch*, Min. Mitth., 1877, 335. Vesuvius, G. = 2·600–2·609, *Rammelsberg*, ZS. G. Ges., xxix., 78, 1877. Vesuvius, *Rauff*, Z. Kryst., ii., 445 et seq., 1878. In foyaite of the Sierra de Monchique, Southern Portugal, *Scheibner*, Q. J. G. Soc., 1879, 46, quoted by van Wervecke, J. Min., 1880, ii., 143. Ditró, Transylvania (elæolite), *A. Koch* (anal. by Franz Koch), J. Min., Beil.-Bd., i., 143, 1880.

The chemical composition of nephelite is discussed by Rammelsberg (l. c.) and Rauff (l. c). The former deduces the formula: $\overset{\text{I}}{R}_6[Al_2]_3Si_7O_{26} = 5\,(Na_2[Al_2]Si_2O_8) + K_2Al_2Si_4O_{12}$; the latter obtains: $\overset{\text{I}}{R}_8[Al_2]_4Si_9O_{34} = 7R_2[Al_2]Si_2O_8 + R_2[Al_2]Si_4O_{12}$. Rauff seems to prove, contrary to Rammelsberg, that the pure mineral contains some CaO (1·32–1·76 p. c.), and perhaps also a little basic water (0·12–0·14 p. c.) and a trace of chlorine. Rauff also discusses the relation of nephelite (and elæolite) to cancrinite and microsommite.

NEPHRITE, Min., p. 233, et al.; App. II., p. 41.—**Analyses** of specimens from New Zealand, *Berwerth*, Ber. Ak. Wien, lxxx., 102, 1879 (see also J. Min., 1880, i., 170 (ref.), and 1881, i., 99). Several analyses quoted by Fischer, Z. Kryst., iii., 592, 1879. Siberia (= tremolite), *Jannettaz* and *Michel*, Bull. Soc. Min., iv., 178, 1881.

For a general and detailed discussion of nephrite and jadeite, in all their relations, but especially archæological, see the works of Fischer, whose titles are given in the Bibliography (see Introduction); noticed in J. Min., 1876, 218, and 1880, ii., 319 (ref.); also ib., 1880, ii., 113. See also Annual Rep. Smithsonian Inst., 1876, 402.

Neudorfite. *J. von Schröckinger*, Verh. G. Reichs., 1878, 387.

A resin occurring in a coal bed at Neudorf, Moravia. Color pale yellow. Lustre waxy. Fracture conchoidal. G. = 1·045–1·060. An analysis by Dietrich gave: C 78·04, H 9·84, O 11·98, N 0·14, corresponding to $C_{18}H_{28}O_2$ = C 78·26, H 10·14, O 11·60 = 100. Fuses at 280°. Dissolves in ether, leaving a whitish-yellow resinous powder.

Newberyite. *G. vom Rath*, Ber. nied. Ges. Bonn, Jan. 13, 1879; Bull. Soc. Min., ii., 81, 1879.

Orthorhombic; axes, c (vert.) : $\dot{b} : \breve{a} = 0·9300 : 1 : 0·9435$. Observed planes: i-$\bar{\imath}$, i-$\breve{\imath}$, O, $\tfrac{1}{2}$-$\breve{\imath}$, 2-$\bar{\imath}$, 1. Angles: $O \wedge \tfrac{1}{2}$-$\breve{\imath} = 153° 46'$, $O \wedge 1 = 126° 26'$, $1 \wedge 1 = 108° 22'$. In large (1 sq.

in.) tabular crystals. Cleavage *i-ĭ*, perfect; basal imperfect (v. Rath). Optic axes in the brachydiagonal section. Acute bisectrix (+) normal to the base. Dispersion considerable $\rho < \upsilon$. $2H_a = 44° 46'$ (red), $2H_o = 142° 8'$ (red), Des Cloizeaux.

Analysis, MacIvor:

P_2O_5	MgO (MnO tr.)	H_2O		
41·25	[23·02]	35·73	=	100.

Formula: $Mg_2H_2P_2O_8 + 6aq = P_2O_5$ 40·80, MgO 22·99, H_2O 36·21 = 100. Loses its water about 110° C. Easily soluble in acids. From the guano in the Skipton Caves, Victoria; first recognized as new by Ulrich (in a letter to vom Rath). Named after Mr. J. C. Newbery, of Melbourne.

Niccochromite. *C. U. Shepard*, Min. Contr., 1877. A canary-yellow substance, occurring as a coating on zaratite, rarely on chromite, at Texas, Pa. On the ground of a partial blowpipe examination, it is concluded to be a "dichromate of nickel" (?).

NICCOLITE, Min., p. 60; App. II., p. 41.—**Anal.**, Colorado de Chañarcillo, Chili, *Domeyko*, 3d ed. Min. Chili, p. 185, 1879.

NIGRESCITE.—App. I., p. 12.

NIOBITE.—See *Columbite*, p. 29.

Nitrobarite. *Groth* (Z. Kryst., vi., 195, 1881) has described crystals of barium nitrate (barytsalpeter), from Chili. They are in apparent octahedrons, formed of the + and − tetrahedrons; also in spinel-like twins. According to Wulff (ib., iv., 122), the species is tetartohedral. The crystals are colorless, in part covered with a thin brownish-black coating resembling wad. Exact locality unknown. H. C. Lewis (Amer. Naturalist, xvi., 78, 1882) has proposed the name NITROBARITE for the species.

NITROGLAUBERITE.—App. II., p. 41.

Nocerina—NOCERITE. Announced by *Scacchi* in a preliminary note (Accad. Linc. Trans., III., v. 270, 1881), as occurring in volcanic bombs in the tufa of Nocera. In white acicular crystals, referred to the rhombohedral system. In composition regarded as a double fluoride of calcium and magnesium. Associated with fluorite, some brown crystals referred to amphibole, and minute crystals in hexagonal prisms, perhaps a variety of microsommite. The exterior of the bombs is covered with mica.

NOHLITE.—App. II., p. 41.

NOSITE.—Min., p. 333; App. II., p. 42.

NOUMEAITE, NOUMEITE, NUMEITE.—See *Garnierite*, p. 50.

OCTAHEDRITE, Min., p. 161; App. II., p. 41.—**Cryst.**, Memoir, Lercheltini Alp, Binnenthal (wiserine), *Klein*, J. Min., 1875, 337. Cavradi, Tavetsch, *vom Rath*, Ber. Ak. Berlin, 1875, 536 (Pogg. Ann., clviii., 402, 1876). Wettin, *Lüdecke*, Z. gesammt. Nat., III., iii., 394, 1878. Tavetsch, Brazil, etc., *Groth*, Min.-Samml. Strassburg, p. 108, 1878. Binnenthal, *v. Zepharovich*, Lotos, 1880. *Seligmann*, J. Min., 1881, ii., 269. Rauris, Salzburg, *Vrba*, Z. Kryst., v., 417, 1881.

Occurrence in nearly colorless transparent crystals, Brindletown, Burke Co., N. C., *Hidden*, Am. J. Sc., xxi., 160, 1881. In quartz at Nil-St.-Vincent, *de Koninck*, Bull. Ac. Roy. Belg., II., xlvi., 245, 1878.

Mallard (Ann. Min., VII., x., 137, 1876) describes the optical peculiarities of crystals from Brazil, and decides upon the monoclinic character of the fundamental individuals. See also *Brookite*, p. 18.

ŒLLACHERITE, Min., p. 489.—Habachthal, Salzburg. Occurrence in mica schist (anal. by F. Bergmann), *Sandberger*, J. Min., 1875, 624; ib., 1879, 367. See also *Mica Group*, p. 77.

OKENITE.—Min., p. 398; App. II., p. 41.

OLDHAMITE.—App. II., p. 41.

OLIGOCLASE, Min., p. 346; App. II., p. 41.—**Cryst.**, Antisana, Andes, *vom Rath*, ZS. G. Ges., xxvii., 301, 1875 ; Bodenmais, Z. Kryst., iv., 431. Mt Gibele, Pantellaria, *Förstner*, Z. Kryst., i., 551, 1877. *Klein*, J. Min., 1879, 518. *Des Cloizeaux*, Bull. Soc. Min., iii., 157, 1880.
Anal., Dürrmorsbach, *Haushofer*, Z. Kryst., iii., 602.
See also *Feldspar Group*, p. 45.

OLIVINE.—See *Chrysolite*, p. 27.

OMPHACITE, Min., p. 223.—See *Pyroxene*, p. 10C.

ONOFRITE, Min., p. 56.—From Marysvale, Southern Utah. Observed by *Newberry*, and described by *Brush* (Am. J. Sc., III., xxi , 312, 1881), as follows : Massive, without cleavage. H. = 2·5. G. = 7·62. Lustre metallic, brilliant on the fresh fracture. Color and streak blackish gray. Fracture conchoidal. Analysis by Comstock :

	Se	S	Hg	Zn	Mn		
(⅔)	4·58	11·68	81 93	0 54	0·69	=	99·42.

Formula essentially Hg (S,Se), with S : Se = 6 : 1, corresponding nearly with the onofrite of Haidinger, which has, according to H. Rose, S : Se = 4 : 1; with which it also agrees in physical characters.
Brush gives an historical statement as to the occurrence of American mercuric sulphoselenides. He also calls attention to the essential identity of *guadalcazarite* of Petersen (App. II., p. 25, also Rammelsberg, Min. Chem., 1875, p. 79) with the *metacinnabarite* or black mercuric sulphide of Moore (App. I., p. 10), and shows that *metacinnabarite*, HgS, G. = 7·72, *onofrite* (Utah), 6HgS + HgSe, G. = 7 62 (calculated 7·64), *onofrite* (San Onofre), 4HgS + HgSe, and *tiemannite*, HgSe, G. = 7·27, undoubtedly form an isomorphous series. The specific gravity given in Dana's Min , p. 56, for onofrite (5·56) is incorrect; that number belongs to a gray mineral of doubtful character also mentioned by Del Rio (see Brush, l. c.).

A mineral partially described by *D'Achiardi* as a ferriferous variety of guadalcazarite, is provisionally called LEVIGLIANITE by him. A qualitative examination showed that it contained no selenium, and more zinc and iron than the original mineral. From the mercury mine of Levigliani, near Seravezza, in the Apuan Alps, Italy, Att. Soc. Tosc., ii., 112, 1876.

Ontariolite.—See *Scapolite*, p. 106.

OPACITE.—App. II., p. 41.

OPAL, Min., p. 198; App. II., p. 42.—Artificial opal, *Bertrand*, Bull. Soc. Min., iii., 57, 1880.
Formation of vein opal in the andesite of the Gleichenberg, Kispatic, Min. Petr. Mitth., iv., 122, 1881.

A variety of opal from Mt. Blackmore, Montana, has been called **BLACKMORITE** by Peale, Hayden's Report, 1872, p. 169.

ORILEYITE.—App. I., p. 12.

ORPIMENT, Min., p. 27.—Occurrence in the trachytic region of Tolfa, Rome, *Sella*, Trans. Accad. Linc., III., i., 66, 1877. In Iron Co., Utah, *W. P. Blake*, Am. J. Sc., III., xxi., 219, 1881.

ORTHITE, Min., p. 285 ; App. II., p. 42.—**Cryst.**, Auerbach, in granular limestone, *vom Rath*, Ber. nied. Ges. Bonn, Jan. 3, 1881.

Microscopic examination of specimens from different localities, *A. Sjögren*, Geol. För. Förh., iii., 258, 1877.

Discussion of composition with many analyses, *Engström*, Inaug. Diss. Upsala, 1877 (Z. Kryst., iii., 191, 1878). A much altered orthite (12 to 14 p. c. H_2O), blackish brown to red, is called VASITE by Engström.

Slättåkra, analysis by Cedervall and Jönsson, *Blomstrand*, Minnesskrift Fys. Sällsk, Lund, 1878, p. 3.

ORTHOCLASE, Min., p. 352; App. II., p. 42.—**Cryst.**, Bellingen, Westerwald (sanidine), *v. Rath*, Pogg. Ann., clviii., 400, 1876. Cornwall, penetration twins (tin oxide pseudomorph), *Laspeyres*, Z. Kryst., i., 204 ; i., 344, 1877. Albani Mts. (sanidine), *Sella*, Z. Kryst., i., 243, 1877. Fichtelgebirge, twins, *Haushofer*, Z. Kryst., iii., 601, 1879. Warmbrunn, Silesia, twins, *Klockmann*, ZS. G. Ges., xxxi., 421, 1879. Dissentis, *vom Rath*, Z. Kryst., v., 492, 1881.

Relation between orthoclase and microcline, *Mallard* (Ann. Min., VII., x., 1876); he regards them as essentially identical.

Thermo-electrical characters, *Hankel*, Wied. Ann., i., 279, 1877. Expansion on heating, *Beckenkamp*, Z. Kryst., v., 452, 1881.

Pseudomorphs after cassiterite, *Phillips*, J. Ch. Soc., Aug., 1875 (and see above).

Made artificially, *Hautefeuille*, C. R., lxxxv., 952, 1877, and xc., 830, 1880; *Fouqué* and *Lévy*, C. R., lxxxvii., 700, 830, 1878 ; *Meunier*, C. R., lxxxvii., 737, 864, 1878 ; *Friedel* and *Sarasin*, C. R., xciii., 1374, 1881 (Bull. Soc. Min., iv., 171).

See also *Feldspar Group*, p. 45, and *Microcline*, p. 80.

Oryzite (Orizite). *Grattarola*, Att. Soc. Tosc., iv., 226, Nov. 9, 1879.

In minute crystals, 1 to 3 mm. long, and 1 to 1·5 mm. thick. Prismatic with $I \wedge I = 134°$–$138°$: $1\text{-}\breve{\imath} \wedge 1\text{-}\breve{\imath} = 147°$. Triclinic, according to Grattarola, but the measurements are stated to be approximate only, and those given are not sufficient to determine the form. H. = 6. G. = 2·245. Lustre vitreous to pearly. Color and streak white. Analyses :

	SiO_2	Al_2O_3	CaO	H_2O		
1.	59·54	16·79*	8·67	14·84,	MgO, alkalies tr.	= 99·84.
2.	59·20	15·71	10·31	14·38,	" " "	= 99·60.

* With some CaO.

Soluble in warm HCl, with the separation of gelatinous silica. B. B. swells up "and fuses easily." Named from *ορυζα*, *rice*, in allusion to the similarity of the crystals to rice grains. [Groth (Z. Kryst., iv., 641) calls attention to the similarity to heulandite in form and composition (with which the author regards it as being dimorphous), and justly remarks that the description is not sufficiently complete to establish its independence.] From the granite blocks in the Foresi collection, which have popularly gone by the name of the "Four Evangelists," and which formed part of the granitic vein of the "Masso Foresi," or Fonte del Prete, Elba. The same source has yielded tourmaline, beryl, castorite, pollucite, apatite, etc.

OSBORNITE.—App. I., p. 12.

OTTRELITE, Min., p. 506; App. II., p. 43.—A variety of ottrelite is called VENASQUITE by Damour (see *Bourbée*, Bains et courses de Luchon, 1857, and *Damour*, Bull. Soc. Min., ii., 167, 1879). Occurs in masses having a lamellar and radiated crystalline structure. Cleavage in one direction. H. = 5·5. G. = 3·26. Color grayish black. Streak gray. Opaque. Analysis, Damour, l. c.:

SiO_2	Al_2O_3	FeO	MgO	H_2O	
44·79	29·71	20·75	0·62	4·93	= 100·80.

This corresponds closely with the formula (Fe,Mg) $[Al_2]Si_2O_{10}$ + aq. B. B. fusible with difficulty on thin edges; yields a magnetic slag on charcoal. Not attacked by acids. From Vénasque, in the Pyrenees.

OXAMMITE. A name given by Shepard (App. I., p. 6) for crystals supposed to be ammonium oxalate, from the guano of the Guanape Islands. *Raimondi,* under the name of GUANAPITE, has described (Min. Pérou, pp. 30, 33, 1878) what is apparently the same substance examined by Shepard. Occurs in small flattened (4 to 5 mm. long) grains, with lamellar structure. Sometimes in elongated prismatic (orthorhombic) crystals; also pulverulent. Color yellowish white. Lustre silky. Transparent. Inodorous. Volatilizes completely with heat. An oxalate of ammonia. Found with mascagnite, which it much resembles, in the guano of the Guanape Isles.

J. A. Tanner, Jr. (Chem. News, xxxii., 102, 1875), has analyzed the Guanape mineral, and obtained (after deducting 5·54 p. c. organic matter): NH_4 21·95, C_2O_4 53·30, H_2O 24·75, corresponding to $C_2(NH_4)_2O_4 + 2aq$, which requires: NH_4 22·50, C_2O_4 55·00, H_2O 22·50. [Raimondi's name is based on a partial description, Shepard's name on a mere statement in a single sentence; as, however, the name guanapite has been previously used (App. I., p. 6), the other, though not free from objection, may be accepted.]

OZOCERITE, Min., p. 732; App. II., p. 43.—Description of a related mineral wax from Utah, *Newberry,* Am. J. Sc., III., xvii., 340, 1879.

From Kinghorn-ness, Scotland, anal., *Macadam,* Rep. Brit. Assoc., 1879, 309, or Ch. News, xl., 48, 1879. Galicia, *Paul,* Verh. G. Reichs., 1881, 131.

PACHNOLITE, Min., p. 129.—According to *Groth* (Tab. Uebers. Min., 41, 1882), the true relation of the species pachnolite and thomsenolite has been recently established by Brandl. PACHNOLITE is monoclinic, with $\beta = 89° 40'$, and c (vert.) : $b : \grave{a}$ = 1·5320 : 1 : 1·1626, and has the composition $[Na,Ca] F_3 + Al_2F_6$. It is consequently a cryolite, with two sodium atoms replaced by one calcium atom.

THOMSENOLITE, on the same authority, is monoclinic, with $\beta = 89° 37\frac{1}{2}'$, and c (vert.): $b : \grave{a}$ = 1·0877 : 1 : 0·9959; and has the composition $[Na,Ca] F_3 + Al_2F_6 + H_2O$.

On earlier discussions of the relations of these species, see: *Knop,* Ann. Ch. Pharm., cxxvii., 61, 1866; *Wöhler,* J. Min., 1876, 58; *König,* Proc. Ac. Nat. Sc. Philad., 1876, 42; *Krenner,* J. Min., 1877, 504; *Klein,* J. Min., 1877, 808. PYROCONITE of *Wöhler* is the same as var. A pachnolite of Knop.

PALAGONITE, Min., p. 483; App. II., p. 43.—*Penck,* after an exhaustive study of many so-called palagonite rocks, concludes that no such mineral exists; that most of the material, which has received that name and been examined, is a mixture of different substances, consisting largely of the glassy ejected bombs from a basaltic magma, ZS. G. Ges., xxxi., 504, 1879.

Pandermite.—See *Priceite,* p. 97.

PARAGONITE.—Min., p. 487; App. II., pp. 43, 63.—See also *Cossaite,* App. II., p. 63.

Parailmenite. Same as the doubtful paracolumbite (Min., p. 143), from Taunton, Mass., *C. U. Shepard,* Am. J. Sc., III., xx., 56, 1880.

Parankerite.—See *Ankerite,* p. 6.

PARASTILBITE.—See *Epistilbite,* p. 42.

PARISITE, Min., p. 702.—Absorption bands in spectrum (Ce,La,Di), *Cossa,* Accad. Linc. Mem., III., iii., 29, 1878. See also *Bastnäsite,* under Tysonite, p. 126.

Paroligocalse. PAROLIGOKLAS. *E. E. Schmid,* Jenaer. Denksch., 1880 (J. Min., 1881, i., 78 ref.).

A problematical substance occurring in indistinct prisms, with calcite grains, imbedded in the ground-mass of a rock found between Ilmsenberg, Quäriberg, and Silberberg, in the Thüringerwald. The rock has a specific gravity of 2·666–2·677, and in thin sections shows an opaque ground-mass of ferrite, with the macroscopic prisms of a pale yellow color. Extinction parallel and perpendicular to the axis of prism.

Analyses : (1) of rock entire; (2) portion soluble in dilute HCl; (3) soluble in concentrated HCl; (4) insoluble remainder.

	SiO_2	Al_2O_3*	Fe_2O_3†	CaO	MgO	Na_2O	K_2O	CO_2	ign.	
1.	45·74	16·07	14·74	6·31	2·73	2·97	4·71	4·32	2·22	= 99·01.
2.	....	0·66	2·37	6·31	0·22	0·28		4·32	0·28	= 14·44.
3.	4·59	2·08	11·10	....	1·24	0·19	0·09	....	....	= 19·29.
4.	41·15	13·33	1·27	....	1·27	2·66	4·46	....	4·60	= 64·60.

* With P_2O_5. † With TiO_2 and Mn_2O_3.

The author gives for the ratio in the insoluble part of $RO : Al_2O_3 : SiO_2 = 0·94 : 3 : 8·90 = 1 : 3 : 9$, and calls the mineral *paroligoclase*, in allusion to the fact that this is the ratio of oligoclase. [Rosenbusch (J. Min., l. c.) suggests that the substance may belong to the scapolite group; in any case, on the basis of so imperfect an examination, it has no claim to a place as a mineral species, and should never have received a name.]

PARTZITE, Min., p. 188.—**Anal.**, Mine of San Lorenzo, province of Huaylas, and mine des Italiens, province of Cajatambo, Peru, *Raimondi*, Min. Pérou, pp. 83, 86, 87, 1878.

Passyite.—See *Quartz*, p. 101.

PATTERSONITE.—Min., p. 801; App. I., p. 18; II., p. 43.

PEALITE.—App. II., p. 43 (24).

Peckhamite. *J. L. Smith*, Am. J. Sc., III., xix., 462; xx., 136, 1880.

Occurs in rounded nodules in the meteorite of Emmet Co., Iowa. Shows a more or less distinct cleavage. G. = 3·23. Lustre greasy, opalescent. Color light greenish yellow. Two analyses (1) on 0·1 gr., (2) on 0·35 gr., gave :

	SiO_2	FeO	MgO	
1.	49·50	15·88	33·01	= 98·39.
2.	49·59	17·01	32·51	= 99·11.

These correspond to $R_4Si_3O_{10}$, which Smith resolves into $2(RSiO_3) + R_2SiO_4$, that is, 2 molecules of enstatite and 1 of chrysolite. Named after Prof. S. F. Peckham.

PECTOLITE, Min., p. 396 ; App. II., p. 43.—A mineral, very near pectolite, is called WALKERITE by *Heddle* (Min. Mag., iv., 121, 1880). In radiating and interlacing fibres, resembling ordinary pectolite. H. = 4·5. G. = 2·712. Cream-colored, slightly pinkish. Lustre brilliant, pearly. Phosphoresces on being broken, or on application of heat. Analyses : 1, Walker (anal. 10, Dana, Min., p. 397); 2, 3, Heddle :

	SiO_2	Al_2O_3	FeO	CaO	MgO	K_2O	Na_2O	H_2O	
1.	54·00	....	....	30·79	2·59	....	5·55	5·43	= 98·36.
2.	53·22	0·9	0·21	26·18	6·81	undet.		5·23.	
3.	52·20	....	1·33	28·64	5·12	0·85	6·50	5·28	= 99·92.

Calculated formula: $Na_2MgCa_4Si_7O_{20}, 2H_2O$ or $H_2Na_2MgCa_4Si_7O_{21}$ + aq, requiring: SiO_2 53·71, CaO 28·65, MgO 5·12, Na_2O 7·92, H_2O 4·60 = 100. Found in the diabase of Corstorphine Hill, near Edinburgh, Scotland. Described by the early English mineralogist, Dr. Walker, as pectolite, after whom it is named. [The difference from pectolite is so small as not to seem to require its separation.]

PEGANITE.—See *Variscite*, p. 128.

Pelagite. *A. H. Church,* Min. Mag., i., 50, 1876; *Gümbel,* Ber. Ak. München, 1878, p. 189.

A name given by Church (l. c.) to the manganese nodules obtained by the "Challenger" from the bottom of the Pacific, between Japan and the Sandwich Is., at a depth of 2740 fathoms. Characters, as follows: H. = 3·5. G. = 1·89. Color brownish black. Streak somewhat shining. Powder between blackish brown and clove brown. Fracture conchoidal; fragile. In the closed tube gives off water having a slight alkaline reaction. B. B. contracts, becomes black, and fuses on the edges. With HCl dissolves with the liberation of chlorine and separation of silica. The nodules have a concretionary structure, consisting of concentric layers, and having a core of indurated red clay, and, in one case, of pumice; the material was regarded as homogeneous. Gümbel (l. c.) describes nodules from the same source. Analyses: (1) Church; (2) Schwager (quoted by Gümbel).

	SiO_2	MnO_2	Al_2O_3	Fe_2O_3	H_2O	
1.	10·37	30·22	3·30	20·02	34·55*,	Cl 0·71, MgO, CaO, CuO, Na_2O, Cl, P_2O_5, etc., 0·83 [= 100.
2.	16·03	23·60	10·21	27·46	17·82,	MgO 0·18, CaO 0·92, CuO 0·02, CoO, NiO 0·01, [BaO 0·01, Na_2O 2·36, K_2O 0·40, TiO_2 0·66, Cl 0·94, P_2O_5 0·02, SO_3 0·48, CO_2 0·05 = 101·17.

* At a red heat 10·0 p. c.

Other analyses by J. Y. Buchanan (Proc. Roy. Soc. Ed., ix., 287, 1877; Ch. News, xliv., 253, 1881) of specimens from different localities, show a wide variation in composition (24·4–35·3 MnO_2 and 18–24·8 Fe_2O_3). [Although great interest attaches to these nodules, they cannot in any sense claim to be a distinct mineral species, but are doubtless composite.]

Pelagosite. *K. Moser,* Tschermak, Min. Petr. Mitth., i., 174, 1878.

A substance occurring as a thin, dark-colored incrustation on limestone and dolomite, on the shores of the Mediterranean, as at the Island of Pelagosa (Moser). In some cases looking like varnish, and again resembling lichens. It consists of thin translucent layers, exerting on polarized light the effect of aggregate polarization. An analysis by J. Cloëz on similar material from Cape Ferrat, afforded: $CaCO_3$ 91·80, $MgCO_3$ 0·90, Fe_2O_3 0·25, SiO_2 1·22, NaCl 0·49, H_2O 4·56, organic matter 0·71 = 99·93. It is regarded as produced by the action of sea-water on the dolomite.

Des Cloizeaux and Vélain have observed similar coatings on the feldspathic rocks of Corsica, on the coast of Oran, and on basaltic lava on the coast of Réunion Island, Bull. Soc. Geol., vi., 86, 1878. [Not a mineral species.]

Pelhamine. *C. U. Shepard,* Contr. Min., 1876.—A serpentinous substance (altered asbestos), forming irregular seams and masses at the asbestos mine, at Pelham, Mass., resembling a black serpentine. Color dark greenish gray. H. = 5. G. = 2·9–3·2. B. B. infusible. Analysis: SiO_2 38·40, Al_2O_3 2·80, FeO 15·52, MgO [39·88], H_2O 3·40 = 100.

PENCATITE.—Min., p. 708; App. II., p. 43 (45).

PENNINITE, Min., p. 495; App. II., p. 43.—*Mallard* (Ann. Min., VII., x., 151, 1876) regards penninite (uniaxial) and clinochlore, or ripidolite (biaxial), as identical, both having a fundamental monoclinic form, but differing only in the method of grouping of the individuals. He calls attention to cases where a biaxial chlorite encloses a nucleus of a uniaxial chlorite, and explains the latter by the aggregation analogous to corundum.

Analyses of penninite, ripidolite, and related species from Scottish localities, *Heddle,* Trans. Soc. Edinb., xxix., 55 et seq., 1879. Anal. (by van Wervecke), pseudophite, Markirch, Vosges, *Groth,* Z. Kryst., i., 509, 1877.

Penwithite. *J. H. Collins,* Min. Mag., ii., 91, 1878; iii., 89, 1879.

Massive. H. = 3·5. G. = 2·49. Lustre vitreous Color dark amber to reddish brown. Transparent. Fracture conchoidal. Brittle. Analysis: (⅔) SiO_2 36·40, MnO 37·62, FeO 2·52, H_2O 21·80, MnO_2 tr., U_2O_3 0·30, Cu tr. = 98·64. Formula calculated by author: $MnSiO_3 + 2aq$, requiring: SiO_2 35·9, MnO 42·5, H_2O 21·5 = 100. B. B. fuses with difficulty. Occurs with quartz and rhodochrosite, in the district of Penwith (whence name), West Cornwall. [The author mentions, that if the coarse powder is digested in HCl, the manganese is dissolved out and the silica left colorless; he also mentions related substances with SiO_2, varying from 22 to 57 p. c., and G. as high as 3·4. It would seem, consequently, very doubtful whether this is to be regarded as a true mineral species.]

Percylite, Min., p. 122; App. II., p. 43.—Believed to occur at Mina San Rafael, Galeria al Norte, Bolivia, *Gregory*, Min. Mag., ii., 251, 1879. Mt. de Challacollo, Tarapaca, Peru, *Raimondi*, Min. Pérou, p. 174, 1878.

Perofskite, Min., p. 146; App. II., p. 43.—Occurrence as a microscopic constituent of nephelite-pikrite, in Bohemia, *Boricky*, Ber. Böhm. Ges., Oct. 13, 1876, p. 227. From the Val Malenco (anal. by Mauro), *Strüver*, Trans. Accad. Linc., III., iv., 210, 1880.

The question of the crystalline system of perofskite has been discussed by *von Kokscharof*, Min Russl., vi., 388, 1874; vii., 375, 1878; viii., 39, 1881 (J. Min., 1878, 38); *Des Cloizeaux*, ZS. G. Ges., xxvi., 932, 1874 ; J. Min., 1877, 160; ib., 1878, 43, 372; *Baumhauer*, Z. Kryst., iv., 187, 1879. The etching experiments of Baumhauer, supported by optical examinations, seem to prove that, as urged by von Kokscharof and accepted by Des Cloizeaux, the mineral is orthorhombic, and owes its form and optical properties to a complicated system of twinning.

An altered perofskite from Magnet Cove, Arkansas, is called **hydrotitanite** by *König* (Acad. Nat. Sci. Philad., 82, 1876). Color yellowish gray. G. = 3·681. Soft. An analysis afforded: TiO_2 82·82, Fe_2O_3 7·76, MgO 2·72, CaO 0·80, H_2O 5·50, V tr. = 99·60. [Indeterminate decomposition products are not mineral species.]

Petalite, Min., p. 229; App. II., p. 43.—**Anal.**, Elba, *Rammelsberg*, Ber. Ak. Berlin, 1878, 9. Discussion of chemical composition and relation to spodumene, *Dölter*, Min. Petr. Mitth., i., 529, 1878.

An alteration product of castorite, from Elba, has been called **hydrocastorite** by G. Grattarola (Boll. Com. Geol., 1876, 323). Occurs as a mealy aggregate of fine crystalline needles, surrounding a nucleus of the original mineral. The microscopic prismatic crystals sometimes obliquely cut off (70°); extinction parallel the prism. H. = 2. G. = 2·16. Color white. Analyses: 1, Grattarola, on material not entirely pure; 2, Sansoni (Att. Soc. Tosc., iv., 320, 1879).

	SiO_2	Al_2O_3	CaO	MgO	H_2O		
1.	59·59	21·35	4·38	....	14·66	=	99·98.
2.	58·13	19·70	4·17	0·50	15·96	=	98·46.

For the latter the not very simple formula : $Ca_3[Al_2]_5Si_{26}O_{69} + 24aq$, is calculated. [Needs further examination.]

Petzite.—Min. p. 146; App. II., p. 43; see also *Hessite*, App. III., p. 58.

Phäactinite.—See *Amphibole*, p. 5.

Pharmacolite, Min., p. 554 ; App. II., p. 43.—**Cryst.**, *Schrauf*, Z. Kryst., iv., 284, 1879.

Pharmacosiderite, Min., p. 578.—From Schemnitz, Hungary, Min. Mitth., 1875, 109. From Garonne, Dept. du Var, *Pisani*, C. R., lxxxiv., 1512, 1877.

Pseudo-isometric, according to *Bertrand*, Bull. Soc. Min., iv., 256, 1881.

Phenacite, Min., p. 263 ; App. II., p. 43.—**Cryst.**, with catalogue of observed planes, *Seligmann*, J. Min., 1880, i., 129. From Switzerland, perhaps Val Giuf, *Websky*, Ber. Ak. Berlin, 1880, 1007.

Anal., Cerro del Mercado, Durango, Mexico, *Chrustschoff*, Z. Kryst., iii., 634, 1879.

Phengite.—See *Mica Group*, p. 77.

Philadelphite.—See *Vermiculite*, p. 129.

Phillipite. *I. Domeyko,* 5th Appendix Min. Chili, 1876; 3d ed. Min. Chili, p. 248, 1879.

Compact, granular, or with fibrous structure, transverse to veins in the chalcopyrite. Lustre vitreous. Color azure blue. Translucent, astringent. Composition approximately given by the formula, $CuSO_4 + [Fe_2]S_3O_{12} + n$aq. Analysis gave: SO_3 28·96, Fe_2O_3 9·80 (iron subsulphate 2·28), CuO 14·39, MgO 0·85, H_2O 43·72, Al_2O_3 tr. = 100. Soluble in water, but unaffected by exposure to the air. Found at the copper mines in the Cordilleras of Condes, province of Santiago, Chili. Produced from the decomposition of chalcopyrite, and found in small irregular masses and bands with it in an argillaceous ochre.

Phillipsite, Min., p. 438; App. II., p. 43.—Crystalline system monoclinic, with a higher degree of pseudo-symmetry, due to repeated twinning, analogous to harmotome, *Streng,* J. Min., 1875, 585; *Trippke,* ZS. G. Ges., xxx., 178, 1878 (or J. Min., 1878, 681, 830); *Fresenius,* Z. Kryst., iii., 42, 1879; *v. Zepharovich,* Z. Kryst., v., 96, 1880. The monoclinic character of phillipsite was first assumed by *Groth,* Tabell. Uebers. Min., pp. 62, 104, 1874.

Recent formation at Bourbonne-les-Bains, *Daubrée,* C. R., lxxx., 463, 1875; do. in Algiers, ib., lxxxiv., 157, 1877.

Phœnicochroite, Min., p. 630.—Made artificially, *Meunier,* C. R., lxxxvii., 656, 1878.

Phlogopite, Min., p. 302.—See *Mica Group,* p. 77.

Pholerite, Min., p. 472; App. II., p. 44.—**Anal.,** Distr. San Pablo, Peru, *Raimondi,* Min. Pérou, 302, 1878.

Phosgenite, Min., p. 703.—**Cryst.,** Monte Poni, Sardinia, showing a close agreement with the results of *v. Kokscharof,* from Gibbas, *Hansel,* Z. Kryst., ii., 291, 1878. See also Min. Russl., viii., 118, 143, 1881.

Recent formation at Bourbonne-les-Bains, *Daubrée,* C. R., lxxxi., 182, 1875. Made artificially, *Friedel* and *Sarasin,* Bull. Soc. Min., iv., 175, 1881.

Phosphochromite, App. I., p. 12.—Pisani (Bull. Soc. Min., iii., 196, 1880) has analyzed a phospho-chromate from Beresofsk, which is near the *phosphochromite* of Hermann (App. I., see laxmannite). It occurs in mammillary forms, having a crystalline surface. Color reddish orange; powder yellow. The analysis gave:

P_2O_5	CrO_3	PbO	CuO	
9·78	15·80	70·60	4·57	= 100·75.

The formula is $Pb_3P_2O_8 + (Pb,Cu)CrO_4$.

Shepard has used the same name for a supposed substance, the existence of which even is not proved; see *Elroquite,* p. 41.

Phosphuranylite. *F. A. Genth,* Amer. Chem. J., i., 92, 1879.

Occurs as a pulverulent incrustation; shows with the microscope rectangular scales, with pearly lustre. Color deep lemon yellow. Analysis:

P_2O_5	UO_3	PbO	H_2O	
11·30	71·73	4·40	10·48	= 97·91.

The lead is regarded as being present as cerussite, which was visible under the microscope; deducting this the result becomes: P_2O_5 12·08, UO_3 76·71, H_2O 11·21 = 100. For this the formula is deduced: $(UO_2)_3P_2O_8$ + 6aq = P_2O_5 12·75, UO_3 77·56, H_2O 9·69. B.B. in the closed tube yields water, and becomes brownish yellow on cooling. Easily soluble in nitric acid. Occurs with other uranium minerals at the Flat Rock mine, Mitchell Co., N. C.; incrusts the quartz, feldspar, and mica.

Phytocollite.—See *Dopplerite,* p. 38.

Picite. *A. Nies*, Ber. Oberhess. Ges. Nat. Heilk., xix., p. 112, 1880. *A. Streng*, J. Min., 1881, i., 116.

Amorphous; in thin coatings, or in small stalactitic and spherical forms. H. = 3–4. G. = 2·83. Color dark brown. Streak yellow. Lustre vitreous to greasy. Translucent. Fracture subconchoidal. Anistropic. Analysis: Nies, after deducting 2·10 p. c. insoluble:

P_2O_5	Fe_2O_3	Al_2O_3	H_2O	
24·47	46·50	1·00	28·03	= 100.

Formula: $4[Fe_2]P_2O_8 + 3[Fe_2]H_6O_6 + 27aq$ [but, as Nies remarks, it is by no means sure that the mineral is homogeneous]. From the Eleonore mine, near Bieben, and the Rothläufchen mine, near Waldgirmes, in the neighborhood of Giessen. Closely related, as shown by Nies, to the Picites resinaceus of Breithaupt (Handb. Min., i., 897), and to a phosphate mentioned by Boricky (Ber. Ak. Wien, lvi., 16, 1867) as occurring at the Hrbek mine, St. Benigna, Bohemia.

PICKERINGITE, Min., p. 653.—**Anal.**, Colorado City, Col., *Goldsmith*, Proc. Acad. Nat. Sc. Phil., 1876, 333. Argentine Republic (Schickendantz), *Brackebusch*, Min. Argentin., 74, 1875.

A related mineral is called SONOMAITE by *E. Goldsmith* (Proc. Ac. Nat. Sc. Philad., 1876, 263). Crystalline. G. = 1·604. Silky lustre. Colorless. Analysis:

	SO_3	Al_2O_3	FeO	MgO	H_2O	
$(\frac{2}{2})$	38·54	8·01	1·78	7·33	[44·34]	= 100.

Formula: $3MgSO_4 + [Al_2]S_3O_{12} + 33aq$. From the neighborhood of the Geysers, Sonoma Co., California.

Picroallumogene of *G. Roster* (Boll. Com. Geol., 1876, 302) is another mineral very near pickeringite. Stalactitic; in nodular and fibrous radiated masses. Monoclinic or triclinic. Color white, with a rose-red tinge. Streak nearly white. Semi-translucent. Taste acid, bitter. Composition: $2MgSO_4 + [Al_2]S_3O_{12} + 28aq = SO_3$ 36·80, Al_2O_3 9·48, MgO 7·36, H_2O 46·36 = 100. Analysis:

SO_3	Al_2O_3	MgO	H_2O
36·38	9·16	8·19	45·69, K_2O 0·37, CoO tr. = 99·79.

Fuses easily in its own water of crystallization, and swells out, becoming opaque and porous. Dissolves in slightly warmed water, forming an acid solution, from which oblique prisms resembling gypsum separate on slow evaporation. Occurs with sulphur and melanterite, in the iron mine of Vigneria, Island of Elba.

PICROMERITE.—Min., p. 642; App. II., p. 44.

PICROPHARMACOLITE.—Min., p. 555; App. II., p. 44.

PICROSMINE, Min., p. 405.—**Anal.** of a related mineral, Haslau, Plötzbachthal, *Frenzel*, Min. Petr. Mitth., iii., 512, 1881.

PICROTEPHROITE.—See *Tephroite*, p. 120.

PIEDMONTITE, Min., p. 285.—Crystallographic, optical, and chemical examination, *Laspeyres*, Z. Kryst., iv., 435, 1880.

Pilarite.—See *Chrysocolla*, p. 26.

Pilinite. *A. von Lasaulx*, J. Min., 1876, 358.

Orthorhombic (on optical grounds). In minute (·005 mm. to ·01 mm.) prismatic crystals, having a rhombic section of about 120° and 60°; forming a fine felt-like mass, the needles often bent; resembles asbestos. Cleavage basal perfect, prismatic distinct. G. = 2·263. Lustre of needles silky. Color white to colorless. Needles pliable. Analysis. Bettendorff (l. c.):

SiO_2	$\underbrace{Al_2O_3, Fe_2O_3}$	CaO	Li_2O	$\underbrace{MgO, Na_2O, K_2O}$	H_2O		
55·70	18·64	19·51	[1·18]	tr.	4·97	=	100.

The formula proposed is $(Ca,Li_2)\,[Al_2]\,Si_6O_{16} + aq$. Fuses easily with strong intumescence to a sponge-like bead. Insoluble in acids, even on boiling. Occurs with quartz, epidote, and stilbite in cavities in the granite of Striegau, Silesia. Named from πίλινος, *made of felt.*

Pilolite. *Heddle,* Min. Mag., ii., 206, 1879.

Heddle has analyzed specimens of "mountain cork" (1, 2, 3, 4), and "mountain leather" (5, 6, 7), from several localities in Scotland, with the following results:

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	H_2O* (total)		
1. Portsoy	51·43	7·52	2·06	2·49	1·30	0·58	9·35	25·04	=	99·76.
2. Cabrach	51·00	12·88	0·09	2·68	0·08	....	7·54	24·74	=	99·73.
3. Tod Head	51·61	6·63	....	2·70	2·77	1·11	10·81	25·00	=	100·63.
4. Tay Port	54·37	11·27	0·21	1·09	0·33	0·98	9·49	22·41	=	100·16.
5. Tod Head	52·48	6·33	0·60	2·11	2·88	1·34	11·95	21·70	=	99·39.
6. Lead Hills	51·45	7·98	0·97	3·29	1·49	1·97	10·15	21·70	=	98·99.
7. Boyne Burn	51·10	6·81	2·27	2·82	1·01	0·86	10·16	23·90	=	98·93.

* H_2O at 100°: in (1) 10·88, in (2) 10·64, in (3) 9·27, in (4) 9·26, in (5) 5·99, in (6) 5·96, in (7) 9·2.

The quantivalent ratio for the above is approximately, $R : [R_2] : Si : H = 4 : 3 : 20 : 15$, and the calculated formula $Mg_4\,[Al_2]\,Si_{10}O_{27}, 15H_2O$.

The minerals have the characters ordinarily given under the names "mountain leather," and "mountain cork." Structure fibrous, more or less flexible and tough. Color white to pale buff, gray, etc. They occur in granular limestone, in granite veins, and in veins in sandstones and slates. Heddle states that the above mineral is not an alteration product of a variety of hornblende, but a distinct species. Named from πῖλος, *felt.* [Compare *xylotile,* p. 406.]

PINITE, Min., p. 479; App. II., p. 44.—**Anal.,** formed from andalusite, San Piero, Elba, *Grattarola,* Boll. Com. Geol., 1876, 333. Södertörn, Sweden (rosite and polyargite), *Palmgren,* Geol. För. Förh., i., 188, 1873.

From Eastern Massachusetts, analyses, occurrence, etc., *Crosby,* Am. J. Sc., III., xix., 116, 1880.

See also *Iolite,* p. 63, *Killinite* (under Spodumene), p. 112.

PISANITE, Min., p. 646.—Massa Marittima, Tuscany, optical exam., etc., SO_3 28·48, CuO 10·07, *C. Hintze,* Z. Kryst., ii., 309, 1878.

PITTICITE.—Min., p. 589; App. II., p. 44.

Plagiocitrite. *Sandberger; Singer,* Inaug. Diss., p. 13, Würzburg.

Monoclinic or triclinic. In microscopic crystals. G. = 1·881. Color lemon yellow. Translucent. Taste astringent. Analysis (after deducing 9·85 p. c. hygroscopic water):

SO_3	Al_2O_3	Fe_2O_3	FeO	NiO	CoO	MgO	CaO	Na_2O	K_2O	H_2O		
35·44	14·37	7·95	1·64	0·97	0·58	1·19	0·43	4·04	4·23	29·42	=	100·26.

Formula $R_2SO_4 + [R_2]\,SO_6 + 9aq$. Easily soluble in water, the solution giving an acid reaction; by boiling, Fe_2O_3 separates out free from SO_3. Decomposes on exposure, becoming orange yellow. B. B. swells up, fuses in its own water of crystallization, and leaves a reddish brown spongy residue. Occurs with other related sulphates at the Bauersberg near Bischofsheim vor der Rhön; derived from the decomposition of pyrite.

PLAGIONITE.—Min., p. 89; App. II., p. 44.

PLATINUM, Min., p. 10; App. II., p. 44.—Russia, *v. Kokscharof*, Min. Russl., vii., 143, 1875. *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xiv., 155, 1879.

(Eisenplatin) from Nischne Tagilsk, *Terreil*, C. R., lxxxii., 1116, 1876; made artificially, *Daubrée*, C. R., lxxx., 526, 1875.

Ural, associated with chrysolite, serpentine, chromite, *Daubrée*, C. R., lxxx., 707, 1875.

Nugget found near Plattsburgh, N. Y., analysis by *Collier*, Am. J. Sc., III., xxi., 123, 1881. Weight 104·4 grams. G. = 17·35 of platinum; G. = 10·446 of mass consisting of 46 p. c. of platinum, and 54 p. c. of chromite.

PLUMBALLOPHANE.—App. I., p. 12.

PLUMBIODITE.—App. II., p. 44.

PLUMBOCUPRITE.—App. II., p. 44.

Plumbomanganite. *Hannay*, Min. Mag., i., 151, 1877.

Massive, crystalline. G. = 4·01. Color dark steel gray, with a bronze tinge when exposed to the air for some time. Analysis gave: Mn 49·00, Pb 30·68, S 20·73 = 100·41, for which the formula $3Mn_2S + PbS$ is suggested. [An imperfect description of a single specimen of doubtful homogeneity and uncertain source is not a satisfactory basis for a new name.]

Plumbostannite. *A. Raimondi*, Minéraux du Pérou, p. 187, 1878.

Amorphous; structure granular. H. = 2. G. = 4·5 (too low because of intermixed quartz). Lustre feebly metallic. Color gray. Feel greasy, like graphite. Slightly ductile. Intimately mixed with small crystals of quartz. Analysis (deducting 38·8 p. c. quartz):

S	Sb	Sn	Pb	Fe	Zn		
25·14	16·98	16·30	30·66	10·18	0·74	=	100.

B. B. gives on charcoal antimonial fumes and a lead coating; yields metallic tin. Dissolves completely in HCl to which a little HNO_3 has been added. With concentrated nitric acid leaves a white residue of the oxides of tin and antimony and lead sulphate. From the district of Moho, province of Huancané, Peru; occurs with cassiterite and sphalerite. [Probably not homogeneous.]

POLLUCITE, Min., p. 249.—**Cryst.**, Elba, *Corsi*, Z. Kryst., vi., 200, 1881.

Anal., Elba, *Rammelsberg* (Ber. Ak. Berlin, 1878, 9,: SiO_2 [48·15], Al_2O_3 16·31, Cs_2O 30·00, Na_2O 2·48, K_2O 0·47, H_2O 2·59, corresponding to $H_2\overset{\text{I}}{R}_2[Al_2]Si_5O_{15}$. G. = 2·868; another analysis is given in ib., 1880, 669.

POLYARGYRITE.—App. I., p. 12.

POLYCRASE, Min., p. 523; App. II., p. 44.—**Cryst.**, *Brögger*, Z. Kryst., iii., 484, 1879.

Anal., Småland, Sweden, *Blomstrand*, Minnesskrift Fys. Sällsk., Lund, 1878, p. 19 (Z. Kryst., iv., 524).

Polydymite. *H. Laspeyres*, J. pr. Chem., II., xiv., 397, 1876.

Isometric; in octahedrons, frequently in polysynthetic twins, often tabular. Cleavage basal imperfect. H = 4·5. G. = 4·808–4·816. Lustre brilliant metallic on fresh fracture. Color light gray, easily tarnished. Analyses, 1, 2, Laspeyres, on 0·28 and 0·2 gr.:

	S	Ni	Co	Fe	Sb	As		
1.	40·27	53·51	0·61	3·84	0·51	1·04	=	99·78.
2.	39·20	53·13		4·12	1·15	2·30	=	99·90.

After deducting impurities (gersdorffite, ullmannite 5 p. c.), anal. 1 becomes S 41·09, Ni 54·30, Co 0·63, Fe 3·98 = 100, and from this the ratio is obtained, R : S = 4 : 5·096, corresponding to Ni_4S_5 = S 40·55, Ni 59·45 = 100.

Insoluble in HCl, soluble in HNO_3 with separation of sulphur. B. B. decrepitates, in the closed tube gives a sulphur sublimate and fuses to a dark green magnetic bead. Occurs intimately mixed with gersdorffite, ullmannite, millerite, siderite, quartz, sphalerite, galenite, bismuthinite, and other minerals, at Grünau, in Sayn-Altenkirchen, Westphalia. [Closely related to beyrichite (App. I., p. 3), if not identical with it.]

Laspeyres (ib., p. 406) expresses the opinion that the nickelwismuthglanz, or saynite of von Kobell (grünauite of Nicol, Min. p. 47), from the same locality, is a polydymite, impure through the admixture of bismuthinite, also chalcopyrite, and galenite. This, considering the distinct crystalline form of the mineral, seems, as urged by Kenngott (J. Min., 1878, 180), to be doubtful, although perhaps true of the massive mineral analyzed by von Kobell.

POLYHALITE, Min., p. 641; App. II., p. 44.—*Precht* (Ber. Chem. Ges., xiv., 2138, 1881) gives the following description of KRUGITE, a supposed new mineral near polyhalite, found at the salt works of New Stassfurt: Crystalline. H. = 3·5. G. = 2·801. According to a microscopic and optical examination, a homogeneous compound. Analyses:

	$CaSO_4$	$MgSO_4$	K_2SO_4	H_2O	NaCl	
1.	63·15	13·71	18·60	4·16	0·38	= 100.
2.	63·85	13·34	17·85	4·20	0·80	= 100·04.

Calculated formula: $K_2SO_4 + MgSO_4 + 4CaSO_4 + 2aq$, requiring: $CaSO_4$ 62·24, $MgSO_4$ 13·74, K_2SO_4 19·90, H_2O 4·12 = 100. In cold water the magnesium sulphate is dissolved, and gypsum and the double salt $K_2SO_4 + CaSO_4 + 2aq$ are left insoluble; in hot water the magnesium and potassium sulphates are dissolved out, and only the gypsum is left behind. Named for the Mining Director, D. Krug, v. Nidda.

Posepnyte. *J. von Schröckinger*, Verh. G. Reichs., 1877, 128.

In plates and nodules, sometimes brittle, sometimes hard. Color generally dirty light green. G. = 0·85–0·95. Separated by ether into two parts; analyses by Dietrich, (1), of the portion soluble in ether; (2), the insoluble portion:

	C	H	O	
1.	71·84	9·95	18·21	= 100.
2.	84·27	11·74	3·99	= 100.

The insoluble portion is regarded as being ozocerite, and for the rest the formula $C_{22}H_{36}O_4$ is calculated, requiring, C 72·52, H 9·89, O 17·59 = 100. From the Great Western mercury mine, Lake Co., California.

PREDAZZITE.—Min., p. 708; App. II., p. 45.

PREHNITE, Min., p. 410; App. II., p. 45.—**Cryst.**, Zöptau, *v. Rath*, Z. Kryst., v., 254 1880.

Pyro-electrical properties, *Hankel*, Wied. Ann., vi., 55, 1879.

Anal. (and cryst.), Tuscany, *Corsi*, Boll. Com. Geol., 1878, 54; 1879, 155. Monte Catini (prehnitoid), *Bechi*, Z. Kryst., iv., 399; Trans. Accad. Linc., III., iii., 114, 1879. Kuchelbad, near Prague, *Preis* and *Vrba*, Ber. Böhm. Ges., 1879, p. 468. Between Huancavelica and Ayacucho, Prov. d'Angaraes, Peru, anal. (by Saldan), *Raimondi*, Min. Pérou, 313, 1878. Templeton, Canada, *Harrington*, Geol. Canada, 1878.

Chlorastrolite (Min., p. 412) is shown by Hawes (Am. J. Sc., III., x., 25, 1875) to be essentially an impure prehnite. An analysis gave him: SiO_2 37·41, Al_2O_3 24·62, Fe_2O_3 2·21, FeO 1·18, MgO 3·46, CaO 22·20, Na_2O 0·32 (?), H_2O 7·72 = 99·75. A microscopic examination proved the want of homogeneity.

Zonochlorite (Appendix II., p. 63) is probably also an impure prehnite; *Hawes* (Am. J. Sc., III., x., 24, 1875) obtained from an analysis of a dark green specimen: SiO_2 35·94, Al_2O_3 19·41, Fe_2O_3 6·80, FeO 4·54, MgO 2·48, CaO 22·77, Na_2O tr., H_2O 8·40 = 100·34. Microscopic examination showed the presence of green earthy particles as impurities disseminated through a white mineral.

PRICEITE, App. II., p. 45.—A mineral, apparently identical with priceite, has been called PANDERMITE by *vom Rath*, Ber. nied. Ges. Bonn, July 2, 1877. Massive, finely crystalline, resembling marble. Color snow white. H. = 3. G. = 2·48. Calculated composition, $Ca_2B_6O_{11} + 3aq = B_2O_3$ 55·85, CaO 29·79, H_2O 14·36 = 100. Analyses, 1, vom Rath; 2, Pisani, Min., p. 215, Paris, 1875

	B_2O_3	CaO	FeO	MgO	K_2O	H_2O		
1.	[54·59]	29·33	0·30	0·15	0·18	15·45	=	100.
2.	[50·1]	32·0	....	....	....	17·9	=	100.

Occurs in more or less irregular lumps or nodules of varying size up to a ton, in gray gypsum, at Panderma, on the Black Sea.

Proidonina—PROIDONITE. *A. Scacchi*, Att. Accad. Napoli, vi., 1873 (Contrib. Min., ii., 65).

Silicon fluoride (SiF_4), observed in the exhalations at Vesuvius at the time of the eruption in 1872.

PROUSTITE, Min., p. 96; App. II., p. 45.—**Cryst.**, Chañarcillo, Chili, *Streng*, J. Min., 1878, 900.

PSEUDOAPATITE, Min., p. 531.—Pseudomorphous after pyromorphite, from the Churprinz mine, near Freiberg; analysis: P_2O_5 39·28, CaO 56·66, SO_3 1·42, CO_2 [2·64], Cl tr. = 100, *Frenzel*, Min. Petr. Mitth., iii., 364, 1880.

Pseudobrookite. *A. Koch*, Min. Petr. Mitth., i., 77, 344, 1878; *Gonnard*, Mem. Ac. Lyon, xxiv., 161, 1879–80; *Schmidt*, Z. Kryst., vi., 100, 1881.

Orthorhombic; in thin tabular (parallel $i\text{-}\bar{\imath}$) rectangular crystals, resembling some forms of brookite. Planes (Groth, Z. Kryst., iii., 306), $i\text{-}\bar{\imath}$, $i\text{-}\breve{\imath}$, I, $i\text{-}\bar{2}$, $1\text{-}\bar{\imath}$, $\frac{1}{3}\text{-}\bar{\imath}$, $1\text{-}\breve{\imath}$, $1\text{-}\breve{3}$; $i\text{-}\bar{\imath} \wedge I = 135° 54'$, $i\text{-}\bar{\imath} \wedge 1\text{-}\bar{\imath} = 138° 41'$. Cleavage brachydiagonal, distinct; $i\text{-}\bar{\imath}$ vertically striated. H = 6. G. = 4·98. Lustre adamantine on crystalline faces, on fracture surfaces greasy. Color dark brown to black; the thinnest crystals red and translucent. Streak ochre yellow. Fracture uneven to subconchoidal.

Analysis (on 0·1 gr.): TiO_2 52·74, Fe_2O_3 42·29, ign. 0·69, Al_2O_3, CaO, MgO, SiO_2 tr. = 95·72; the state of oxidation of the iron is in doubt. The author regards it as dimorphous with menaccanite. B. B. nearly infusible; reacts for iron and titanium with the fluxes. Decomposed in part by boiling HCl, wholly so by H_2SO_4. Found with szaboite, in cavities in the andesite of the Aranyer Berg, Transylvania; also with szaboite and tridymite in the trachyte of Riveau Grand, Monte Dore.

Groth (l. c.) shows that the crystallographic determinations of Koch are faulty, and that the crystals may be referred to the axes of brookite by making $i\text{-}\breve{\imath}$ the basal plane, with which it may be identical, only differing in the large amount of iron. Vom Rath, however (Ber. nied. Ges. Bonn, March 3, 1879), thinks this improbable, on the ground that, with this change of position, the analogy with brookite in the vertical striation would no longer exist; he also urges that, as yet, no one of the three forms of TiO_2 has been found in volcanic rocks.

Pseudocotunnite. *A. Scacchi*, Att. Accad. Napoli, vi., 1873 (Contrib. Min., ii., 38).

Observed in acicular yellow opaque crystals, destitute of lustre, accompanying cotunnite, at Vesuvius, as a result of the eruption of 1872. Composition probably $PbCl_2 + KCl$.

PSEUDOMALACHITE, Min., p. 568; App. II., p. 45.—*Schrauf* (Z. Kryst., iv., i., 1879) uses Bernhardi's name, LUNNITE, for the group of minerals which have been included (see Min.) under PSEUDOMALACHITE, on the hardly sufficient ground that the latter name suggests only the indistinctly crystalline or massive forms, which resemble malachite. For the crystalline varieties, which are pseudo-monoclinic (triclinic), have G. = 4·4, and correspond mostly to $Cu_6P_2H_4O_{12}$, he uses the name *dihydrite* (D); they show no loss at 200°. The names *ehlite* (E) and *phosphorocalcite* (P) he gives to the compounds $Cu_5P_2H_6O_{13}$ and $Cu_6P_2H_6O_{14}$, respectively, and regards the three as entering in varying proportions to form the different massive varieties; the latter have a lower specific gravity, and lose water on ignition at 200°. Analyses: 1, "dihydrite," crystalline variety from Rheinbreitbach; 2, "ehlite," in light grayish green hemispherical forms, from Ehl; 3, pseudomalachite, resembling malachite in structure, from Nischne-Tagilsk; 4, spherical form, with concentric structure, deep emerald green, from Libethen.

	P_2O_5	CuO	H_2O
1. G. = 4·309	23·86	69·25	6·76, FeO 0·19 = 100·06.
2. G. = 4·102	22·07	66·97	7·59, FeO 0·30, SiO_2 3·01 = 99·94.
3. G. = 4·175	23·23	69·02	8·09 = 100·34.
4. G. = 4·156	22·16	69·11	8·02, FeO 0·22, SiO_2 0·11 = 99·62.

According to Schrauf's view, anal. 1 corresponds to a molecular mixture of 3D + 1P; 2, after deducting 8·8 p. c. chrysocolla (CuH_2SiO_4 + aq), to simply "dihydrite;" 3, to D + E + P; 4, to 4P + 2E + D; where the letters D, E, P have the values explained above. [A more extended chemical study of these minerals, with regard to the possible mechanical mixtures in the massive varieties with concentric structure, is needed to establish the value of this very artificial hypothesis.]

Pseudonatrolite. *Grattarola*, Att. Soc. Tosc., iv., 229, 1879 (Boll. Com. Geol., 1872, 284).

Orthorhombic (?). In minute, needle-like crystals, 0·5 mm. thick; crystals not terminated, six planes in the prismatic zone. Extinction parallel to the axis. H. = 5–6. Lustre vitreous to pearly. Colorless, white in the mass. Analysis:

	SiO_2	Al_2O_3	CaO	MgO	$\underbrace{Li_2O, Na_2O, K_2O}$	H_2O	
(⅔)	62·64	14·76	8·54	tr.	1·00	14·82	= 101·76

B. B. fuses less readily than natrolite. Partially soluble in HCl. From the granite of San Piero, Elba. [Needs further examination.]

PSEUDOPHITE.—See *Penninite*, p. 90.

PSILOMELANE, Min., p. 180.—Salm Chateau, Belgium, analyses, discussion of composition, *Laspeyres*, J. pr. Ch., II., xiii., 1, 176, 1876. Laspeyres mentions especially the "lithium-psilomelane," or LITHIOPHORITE, as described by Frenzel (App. I., p. 9).

According to *Weisbach*, the kakochlor, from Rengersdorf, near Görlitz, belongs with lithiophorite. An analysis by Iwaya is quoted by him (J. Min., 1878, 846), and a second is quoted by *Frenzel*, J. Min., 1880, ii., 113 (see also J. Min., 1879, 55).

A variety of psilomelane, from Kalteborn, is called CALVONIGRITE by *Laspeyres*, J. pr. Ch., II., xiii., 226, 1876.

Psittacinite. *F. A. Genth*, Am. J. Sc., III., xii., 35, 1876. New tellurate of lead and copper, id., Proc. Am. Phil. Soc., xiv., 229, 1874 (Appendix II., p. 55).

In thin crypto-crystalline coatings, sometimes small mammillary or botryoidal; also pulverulent. Color siskin-green to olive-green, sometimes with grayish tint. Analyses, Genth (l. c.), on material more or less impure through admixture of quartz and limonite:

	V_2O_5	PbO	CuO	H_2O	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO
1.	15·87	42·89	14·72	undet.	10·10	3·83	2·19	$\underbrace{0·65 \quad 0·15.}$	
2.	14·64	41·36	14·34	7·42	15·13	$\underbrace{1·29 \quad 2·72 \quad \text{undet.}}$			
3.	15·77	42·38	15·03	7·25	$\underbrace{15·57 \quad 4·00.}$				
4.	9·96	27·12	9·75	undet.	48·84.				
5.	19·05	50·17	16·66	undet.	7·60.				

The mean quantivalent ratio deduced from the above for Pb : Cu : V : H = 1 : 0·98 : 2·25 : 2·15 = 9 : 9 : 20 : 18, corresponding to the formula $3Pb_3V_2O_8 + Cu_3V_2O_8 + 6CuH_2O_2 + 12aq$, which requires: V_2O_5 19·32, PbO 53·15, CuO 18·95, H_2O 8·58 = 100. Related to

chileite, Min., p. 612. B. B. fuses easily to a black, shining mass. Reacts for lead, copper, and vanadium with the fluxes. Soluble in dilute nitric acid.
Occurs associated with gold, cerussite, chalcopyrite, and limonite, on quartz, at the Iron Rod mine, and New Career mine, in the Silver Star District, Montana. Named from *psittacinus,* siskin or parrot green.

PUCHERITE, App. I., p. 12; II., p. 45.—Made artificially, *Frenzel,* J. Min., 1875, 680.
Occurrence at the "Arme Hilfe" mine, at Ullersreuth, near Hirschberg, Vogtland, and at the mine "Sosaer Glück," at Sosa, near Eibenstock, *Weisbach,* J. Min., 1880, ii., 113.

PYRARGYRITE, Min., p. 94; App. II., p. 45.—**Cryst.**, Andreasberg, *vom Rath,* Pogg. Ann., clviii., 422, 1876. Chañarcillo, Chili, *Streng,* J. Min., 1878, 913; also anal. (p. 916) showing 3·8 p. c. As. Andreasberg, Freiberg, etc., *Groth,* Min.-Samml. Strassburg, p. 62, 1878.

PYRICHROLITE.—App. II., p. 45.

PYRITE, Min., p. 62; App. II., p. 45.—**Cryst.**, Waldenstein, Carinthia, *Helmhacker,* Min. Mitth., 1876, 13. *V. Kokscharof,* Min. Russl., viii., 190, 1878. *Groth,* Min.-Samml. Strassburg, p. 31, 1878. Ordubad, Russian Armenia, *Websky,* ZS. G. Ges., xxxi., 222, 1879. Przibram, *Vrba,* Z. Kryst., iv., 357, 1880. Böckstein, Salzburg, *v. Zepharovich,* Lotos, 1875 (Z. Kryst., v., 270, 1880). Crystallo-genetic observations, *Scharff,* Abh. Senck. Ges., 1878.
Recent formation at Bourbonne-les-Bains, *Daubrée,* C. R., lxxx., 605, 1875.
Analyses, *Girard* and *Morin,* Ann. Ch. Phys., V., vii., 229, 1876.

PYRITOLAMPRITE.—App. II., p. 46.

PYROAURITE, Min., p. 179.—Described by *Heddle* (Min. Mag., ii., 107, 1878), from the island of Haaf-Grunay, Scotland. Occurs in thin seams in serpentine. Structure obscurely fibrous. Color silvery white. Lustre pearly. Analyses :

	Fe_2O_3	MgO	H_2O	CO_2		
1.	22·13	37·80	39·27	1·02	=	100·22.
2.	22·45	37·57	39·51	1·03	=	100·56.
3.	23·63	36·85	40·02	....	=	100·50.

B. B. infusible, becomes chocolate brown, and strongly magnetic. Soluble in acids. Heddle proposes to call this mineral IGELSTRÖMITE (after the discoverer), instead of pyroaurite, on the ground that the golden color is not essential.

PYROCHLORE, Min., p. 512; App. II., p. 46.—See *Hatchettolite,* p. 56.

PYROCHROITE, Min., p. 177.—Mossgrufva, Wermland, *Sjögren,* Geol. För. Förh., ii., 531, 1875 ; iii., 181, 1876; iv., 159, 1878. *Nordenskiöld* (anal. by Stahre), iv., 163, 1878. Occurs with manganosite (q. v.).

Pyroconite.—See *Pachnolite,* p. 88.

Pyroïdesine. *C. U. Shepard,* Cat. Meteorites, 1872.—A substance near serpentine. The mean of two analyses gave : SiO_2 42·45, MgO 33·07, FeO 6·85, H_2O 16·40. De Regla, Cuba.

PYROLUSITE, Min., p. 165 ; App. II., p. 46.—Formed artificially, *Hannay,* Min. Mag., ii., 90, 1878.
Groth shows (Min.-Samml. Strassburg, p. 112, 1878), on the basis of measurements by Hirsch, that $I \wedge I = 99° 30'$.
Composition of the "Braunstein" group discussed, *Laspeyres,* J. pr. Ch., II., xiii., 176, 215, 1876.

From Gosalpur, Jabalpur distr., India, anal. *F. R. Mallet*, Rec. Geol. Surv. India, xii., 99, 1879.

PYROMORPHITE, Min., p. 535; App. II., p. 45.—**Cryst.**, Mine Friedrichssegen, in Nassau, *Seligmann*, Verh. Nat. Ver. Bonn, xxxiii., 257, 1876.

Baumhauer shows by the results of etching with solvents, that the crystals are pyramidally hemihedral, J. Min., 1876, 411.

On the relation of uniaxial pyromorphite to biaxial mimetite, *Bertrand*, Bull. Soc. Min., iv., 36; *Jannettaz*, ib., p. 39, 1881; *Jannettaz* and *Michel*, ib., p. 196 (see *Mimetite*, p. 81).

Anal., Dernbach, Nassau, *Hilger*, J. Min., 1879, 132.

Pyrophosphorite. *C. U. Shepard, Jr.*, Am. J. Sc., III., xv., 49, 1878.

Massive, earthy. H. = 3–3·5. G. = 2·50–2·53. Color snow-white, dull; also in part bluish gray, with small botryoidal structure. Analyses: Shepard (l. c.), 1, mean of two analyses; 2, same, after deducting impurities.

		P_2O_5	MgO	CaO	Fe_2O_3, Al_2O_3	SO_3	SiO_3	ign.	
1.	($\frac{2}{2}$)	50·80	3·09	44·46	0·44	0·63	0·36	0·39	= 100·17.
2.		51·67	3·17	45·16 = 100.					

From 2, above, the following formula is calculated: $Mg_2P_2O_7 + 4(Ca_3P_2O_8 + Ca_2P_2O_7)$, which requires: P_2O_5 51·57, CaO 45·20, MgO 3·23 = 100. Named in allusion to its apparent composition as a pyrophosphate. From the West Indies; exact locality unknown. [Was the material analyzed homogeneous? Needs further examination.]

PYROPHYLLITE, Min., p. 454; App. II., p. 46.—**Analyses**, *Helmhacker*, Min. Petr. Mitth., ii., 256, 1879. *Dewalque*, Bull. Soc. Geol. Belg., vi., 150, 151, 1879. As petrifying material, *Genth*, Am. Phil. Soc. Philad., xviii., 259, 1879. A related mineral from Delsbo, Helsingland, *Jolin*, Geol. För. Förh., i., 237, 1873.

PYROSMALITE, Min., p. 414; App. II., p. 46.—Nordmark, anal. and discussion of composition, *Ludwig*, Min. Mitth., 1875, 211. Occurrence at the Kogrufva (formerly Bjelkesgrufva), Nordmark, *Sjögren*, Geol. För. Förh., ii., 409, 1875. Dannemora, Sweden, anal., *Engström*, Geol. För. Förh., iii., 116, 1876.

PYROSTILPNITE, Min., p. 93.—Probable occurrence at Schemnitz, Hungary, *Becke*, Min. Petr. Mitth., ii., 94, 1879.

A mineral from Chañarcillo, Chili, is described by *Streng* as pyrostilpnite (J. Min., 1878, 917); but *Schrauf* shows that it has the same form as rittingerite, as determined by him (J. Min., 1879, 144), and the true character of it is still in doubt, *Streng*, J. Min., 1879, 547.

PYROXENE, Min., p. 212; App. II., p. 46.—**Cryst.** (augite), Bell, near Laach, *Laspeyres*, Z. Kryst., i., 203, 1877. Nordmark, *Sjögren*, Geol. För. Förh., iv., 364, 1879. Achmatowsk, Ural, lamellar twin growth, *vom Rath*, Z. Kryst., v., 495, 1881. Nordmark, *Lehmann*, Z. Kryst., v., 532, 1881. *Von Kokscharof*, Min. Russl., viii., 234, 1881.

Thermo-electrical characters, *Hankel*, Wied. Ann., i., 279, 1877.

Augite and biotite crystals, in parallel position, do. hornblende, Vesuvius, *vom Rath*, J. Min., 1876, 389. Analyses of augite and hornblende associated together, *Hawes*, Am. J. Sc., III., xvi., 397 (Report Min. Lith. New Hampshire, p. 63).

Anal. (diopside), Nordmarksberg, *Nauckhoff*, Geol. För. Förh., i., 167, 1873. Långban (richterite), *Engström*, Geol. För. Förh., ii., 469, 1875. Finland (malacolite), Œfv. Finsk. Vet. Soc., xvii., 70, 71, 1874–5. Santorin, *Fouqué*, C. R., lxxx., Mar., 1875. Altered to uralite, *Harrington*, Geol. Canada, 1878. Kaiserstuhl (3·55 p. c. TiO_2), *Knop*, Z. Kryst., i., 64, 1877. Wallenfels, near Dillenburg (chromdiopside), *Oebbeke*, Z. Kryst., ii., 104. Dun Mt., New Zealand, *Hilger*, J. Min., 1879, 129. Amherst Co., Va., *Page*, Ch. News, xlii., 194, 1880. Wiesenthal, Baden (diallage), *Petersen*, J. Min., 1881, i., 264.

Analyses of Scottish varieties, with discussion of the products of alteration, *Heddle*, Trans. Roy. Soc. Ed., xxviii., 453, 1878.

Discussion of composition, with analyses, *Dölter*, Min. Mitth., 1877, 65; Min. Petr. Mitth., i., 49, 1878; ii., 193, 1879; iii., 450, 1880.

Artificially made (augite), *vom Rath*, Ber. nied. Ges. Bonn, July 2, 1877; do., diopside, *Gruner*, C. R., lxxxvii., 937, 1878.

PYRRHITE, Min., p. 763; App. II., p. 46.—See *Microlite*, p. 80.

PYRRHOTITE, Min., p. 58; App. II., p. 46.—**Cryst.**, twin, Elizabethtown, Ontario (anal. by Harrington), *E. S. Dana*, Am. J. Sc., xi., 386, 1876. Bottino, Italy, *Grattarola*, Boll. Com. Geol., 1876; *D'Achiardi*, Att. Soc. Tosc., ii., 114, 1876. Auerbach, *Roth*, Ber. Oberhess. Ges. Nat. Heilk., 1878, 45. Chañarcillo, Chili, *Streng*, J. Min., 1878, 925. Streng urges that pyrrhotite is isomorphous with sternbergite, and should be regarded as orthorhombic, with pseudo-hexagonal symmetry due to twinning (see *Sternbergite*, p. 115.

Anal., Todtmoos (1·8 p. c. Ni), *Mutschler*, Ann. Ch. Pharm., clxxxv., 208. American specimens, containing Ni, *How*, Min. Mag., i., 124, 1877. Polson's Lake, N. S. (0·77 Ni), *Harrington*, Can. Nat., II., ix., 307, 1880.

Analyses with discussion of composition, *Lindström*, Œfv. Ak. Stockh., xxxii., No. 2, 25, 1875; *Habermehl*, Ber. Oberhess. Ges. Nat. Heilk., xviii., 83, 1879.

QUARTZ, Min., p. 189; App. II., p. 46.—**Cryst.**, La Gardette, Dauphiné, twin (*P*2) *Gonnard*, Verh. nied. Ges. Bonn, xxxi., 139, 1874. Japan, twin with inclined axes, *vom Rath*, Pogg. Ann., clv., 57, 1875. Twin (*i*–2), *Groth*, Pogg. Ann., clviii., 220, 1876. Oberstein, *v. Lasaulx*, J. Min., 1876, 264. On calcite crystals in parallel position, pseudo-twins *i*–2, *E. S. Dana*, Am. J. Sc., xii., 448, 1876 (see also J. Min., 1876, 171, 405, 730). With basal plane, *Lehman*, Ber. Nat. Ges. Leipzig, March 12, 1875; *Maskelyne*, Z. Kryst., i., 67. Brazilian amethysts, *Groth*, Z. Kryst., i., 297, 1877. Pyrogene quartz in lava, *Lehmann*, Verh. Nat. Ver. Bonn, xxxiv., 203, 1877. Kremnitz, *vom Rath*, Ber. nied. Ges. Bonn, Dec. 3, 1877 (Z. Kryst., ii., 99, 1878). *Groth*, Min.-Samml. Strassburg, p. 92, 1878. Striegau, Silesia, *Websky*, ZS. G. Ges., xxx., 374, 1878. Bohemia, *Krejci*, Ber. Ges. Böhm., 1879, 30. Reichenstein, Silesia, *Hare*, Z. Kryst., iv., 298. Zöptau, Moravia, *vom Rath*, Z. Kryst., v., 1, 1880. Dissentis, *vom Rath*, Ber. nied. Ges. Bonn, Nov. 8, 1880. Remarkable crystals from Alexander Co., N. C., *Hidden*, Am. J. Sc., III., xxii., 23, 1881. *Von Kokscharof*, Min. Russl., viii., 127, 1881.

Crystallo-genetic observations, *Scharff*, Abhandl. Senck. Nat. Ges., 1874; J. Min., 1876, 168. Containing liquid carbon dioxide (CO_2), *Hartley*, J. Ch. Soc., II., xiv., 137, 237. Containing CO_2 and NaCl, from pegmatite, in Norway, *Helland*, Arch. Math. Nat. Christ., ii., 445, 1877. Middlefield, N. Y., inclosures, *Hirschwald*, J. Min., 1879, 378; *Lewis*, Pr. Ac. Nat. Sc. Phil., 1880, 292. Inclosing much CO_2, Branchville, Conn., and other localities (smoky quartz), *Hawes*, Am. J. Sc., III., xxi., 203, 1881. Analysis of gases in Branchville smoky quartz (CO_2,N,H_2S,SO_2,H_3N,F), *A. W. Wright*, Am. J. Sc., III., xxi., 209, 1881.

Rotatory effect for heat rays of spectrum, *Desains*, C. R., lxxxiv., 1056; same for ultra-violet, *Soret* and *Sarasin*, ib., lxxxiv., 1362. Accurate determination of indices of refraction for different rays, *Sarasin*, C. R., lxxxv., 1230, 1878. Circular polarization for different temperatures, *Joubert*, C. R., lxxxvii., 497, 1878; *Sohncke*, Wied. Ann., iii., 516, 1878; *von Lang*, Pogg. Ann., clvi., 422, 1875. Pyro-electric characters, *Hankel*, Wied. Ann., x., 618. Specific gravity determinations, *Church*, Geol. Mag., II., ii., 321, 1875.

Made artificially, *Hautefeuille*, C. R., lxxxvi., 1133, 1194, 1878; xc., 830, 1880 (Bull. Soc. Min., i., 1, 1878); also *Friedel* and *Sarasin*, Bull. Soc. Min., ii., 113, 1879.

A variety of quartz, having a "peculiar metallic pearly lustre," and forming a coating on ordinary quartz crystals, has been called COTTERITE by *Harkness* (Min. Mag., ii., 82, 1878), from Rockforest, Ireland.

An impure variety of silica, occurring in white earthy masses, is called PASSYITE by *E. Marchand*, Ann. Ch., Phys., V., i., 392, 1874.

RABDIONITE.—App. I., p. 13.

Rabdophane.—See *Rhabdophane*, p. 103.

RAIMONDITE, Min., p. 656.—Optical characters, *Des Cloizeaux*, Bull. Soc. Min., iv., 41, 1881.

RALSTONITE, App. I., p. 13; II., p. 47.—Analogous to garnet in optical character, biaxial, with an angle of 90° (see p. 50), *Bertrand*, Bull. Soc. Min., iv., 34, 1881. According to *Brandl*, quoted by Groth (Tabell. Uebers. Min., p. 42, 126, 1882), the true formula is $3(Na_2,Mg,Ca)F_2 + 8[Al_2]F_6 + 6H_2O$.

Rammelsbergite, Min., p. 77; App. II., p. 47.—**Anal.**, Portezuelo del Carrizo, Dept. of Huasco, Chili, *Domeyko*, Min. Chili, 3d ed., p. 186, 1879.

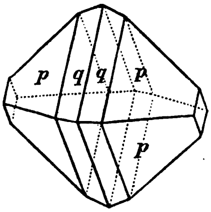
Randite. A canary-yellow incrustation on granite, at Frankford, near Philadelphia, Penn., is described by *König* (Proc. Ac. Nat. Sc. Philad., 1878, 408) as a hydrous carbonate of calcium and uranium. He gives an analysis, made on a very small amount (0·047 gr.) of impure material: [CO_2 29·34], U_2O_3 31·63, CaO 32·50, H_2O 6·53 = 100. *T. D. Rand* (ib., 1880, 274) shows that the coating consists largely of calcite, and after this has been removed by acetic acid, there remain the unattacked tufts of acicular crystals of randite; these, dissolved in hydrochloric acid, yielded largely of calcium and uranium, with a trace of phosphoric acid, alumina, etc. He justly adds, that further investigation is needed to establish the composition of the mineral.

Rauite.—App. II., p. 47.

Realgar, Min., p. 26.—**Cryst.**, Binnenthal, *Groth*, Min.-Samml. Strassburg, p. 20, 1878. *Fletcher*, Phil. Mag., V., ix., 189, 1880.

Occurrence in trachyte, of Tolfa, Rome, Italy, *Sella*, Accad. Linc. Trans., III., i., 66, 1877. In Iron Co., Utah, *W. P. Blake*, Am. J. Sc., III., xxi., 219, 1881.

Reddingite. *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xvi., 120, 1878; ibid., xvii., 365, 1879.



Orthorhombic, habit octahedral. Axes, c (vert.) : $\bar{b}$: $\breve{a}$ = 1·0930 : 1·1524 : 1. Observed planes (see figure): 1 (*p*), 1-$\bar{2}$ (*q*), *i*-$\bar{i}$ (*b*). *I* ∧ *I* = 98° 6′, *p* ∧ *p* = 114° 44′ and = 103° 10′ (terminal) = 110° 43′ (basal); *q* ∧ *q* = 144° 30′. Also granular, massive. Cleavage distinct in one direction. H. = 3–3·5. G. = 3·102. Lustre vitreous to sub-resinous. Color pale rose-pink to yellowish-white, sometimes dark reddish-brown on surface from alteration. Translucent to transparent. Fracture uneven. Brittle. Formula: $Mn_3P_2O_8 + 3aq$. Percentage composition: P_2O_5 34·72, MnO 52·08, H_2O 13·20 = 100. Analyses: 1, H. L. Wells, after deducting 12·08 p. c. quartz; 2, after deducting 4·42 p. c. quartz.

		P_2O_5	FeO	MnO	CaO	Na_2O	H_2O		
1.	(⅔)	34·52	5·43	46·29	0·78	0·31 (Li_2O tr.)	13·08	=	100·41.
2.		35·16	7·89	43·22	0·71	....	12·27	=	99·25.

In the closed tube, first whitens, then turns yellow, and finally brown, but does not become magnetic. Fuses in the naked lamp-flame. B. B. colors the flame pale green, and fuses easily to a blackish-brown non-magnetic globule. Reacts for manganese and iron with the fluxes. Soluble in acids. Occurs sparingly at Branchville, Fairfield Co., Conn., intimately associated with fillowite, fairfieldite, dickinsonite, in a vein of albitic granite. Black octahedral crystals, pseudomorphs after reddingite, are also found. Named from Redding, the name of the town in which the locality is situated.

In crystalline form, reddingite is closely related to scorodite and strengite, but differs from them in composition, containing but three equivalents of water, and having the metals in the protoxide state.

Redonite.—App. I., p. 13.

Reichardtite.—See *Epsomite*, p. 42.

Reinite. *K. v. Fritsch*, Z. gesammt. Nat. III., iii., 864, 1878; *Lüdecke*, J. Min., 1879, 286.

Tetragonal: *c* (vert.) = 1·279 (approx.). In octahedral crystals, with 1-*i* as narrow truncation; 1 ∧ 1 = 122° 8′ (basal) = 103° 32′ (pyr.). Cleavage, *I*, indistinct. H. = 4.

G. = 6·640. Lustre dull, submetallic. Color blackish brown. Streak brown. Opaque except in the thinnest splinters. Fracture uneven. Analysis, E. Schmidt:

WO_3	FeO	
75·47	24·33	CaO, MgO tr. = 99·80.

Formula: $FeWO_4 = WO_3$ 76·31, FeO 23·68 = 100. Same composition as wolframite, but differs in form; probably isomorphous with scheelite and wulfenite. B. B. fuses to a dark brown slaggy bead, which is not magnetic. With salt of phosphorus in O. F., brownish red, in R. F., with metallic tin, grayish green. In aqua regia dissolves, with the separation of yellow tungsten trioxide. Occurs with large quartz crystals, from Kimbosan, in Kei, Japan. Named for Prof. Rein, of Marburg, who brought the mineral from Japan. [A pseudomorph?]

REISSITE, App. I., p. 14.—See *Epistilbite*, p. 42.

RESANITE.—App. II., p. 48.

RESIN.—**Anal.**, Greenland, *Chydenius*, Geol. För. Förh., ii., 549, 1875. Oberschlesien, *v. Lasaulx*, Z. Kryst., v., 345, 1881. For various fossil resins, see list on p. xiii,

RESTORMELITE.—App. I., p. 13.

RETINITE. Pitchstone (Des Cloizeaux, Min., p. 346), from Russia, anal., *Pisani*, Bull. Soc. Min., ii., 42, 1879.

RHABDITE. A mineral (anal. by Carnot: Fe 84·28, P 12·10, As 1·65, S 1·75, C tr. = 99·78) formed by combustion in the coal mines of Commentry, France, is referred by *Mallard* (Bull. Soc. Min., iv., 230, 1881) to the meteoric mineral called rhabdite by Rose.

Rhabdophane. *Lettsom*, Z. Kryst., iii., 191, 1878; *L. de Boisbaudran*, C. R., lxxxvi., 1028, 1878.

Named from two specimens in the Oxford University collection, which have for fifty years gone by the name of blende, from Cornwall: exact source unknown. By a spectroscopic examination *Lettsom* has found it to give the absorption bands of didymium and erbium, and concludes that it is a phosphate of those bases. *Boisbaudran* remarks that monazite gives the same results with the spectroscope, so that rhabdophane might be a variety of that species. *Bertrand* finds that the mineral is uniaxial and positive (Bull. Soc. Min., iii., 58, 1880); an analysis gave: P_2O_5 27·70, $Ce_2O_3(Di_2O_3,La_2O_3)$ 67·20. In optical character, it is shown, consequently, to agree not with monazite, but with cryptolite and phosphocerite (Min., p. 529), with which it has the same composition.

RHAGITE.—App. II., p. 48.

RHODITE.—App. II., p. 48.

RHODOCHROSITE, Min., p. 691; App. II., p. 48.—**Cryst.**, Daaden, Rheinprovinz, *Weiss*, ZS. G. Ges., xxxi., 801, 1879. Eleonore mine (Louise mine, according to Seligmann), Horhausen, *Sansoni*, Z. Kryst., v., 250, 1880.

Pseudomorph after alabandite and barite, *Döll*, Verh. G. Reichs., 1875, 95.

Anal., Moët-Fontaine, Ardennes, *de Koninck*, Bull. Ac. Belg., II., xlvii., 568, 1879.

A variety of rhodochrosite has been called MANGANOSIDERITE by *Bayer* (Verh. Nat. Ver. Brünn, xii., May 10, 1873). In appearance it resembles sphærosiderite. An approximate analysis gave: $MnCO_3$ 54·0, $FeCO_3$ 38·8, $CaCO_3$ 6·84, $MgCO_3$ tr., corresponding nearly to $2MnCO_3 + FeCO_3$. From Dobschau, Felsöbanya, Nagybanya, Kapnik, in Hungary.

Deposits of a ferriferous manganese carbonate, at Moët Fontaine (Rahier), Belgium, are described by *Firket*, Mem. Soc. Geol. Belg., v., 33, 1878; Bull. Soc. Geol. Belg., vi., 152, 1879. *Penfield* has analyzed a variety from Branchville, Conn., with 16·76 FeO, Am. J. Sc., III., xviii., 50, 1879. For other intermediate varieties, see *Siderite*, p. 109.

RHODONITE, Min., p. 225.—**Cryst.**, Pajsberg, Sweden (pajsbergite), *Sjögren*, Geol. För. Förh., v., 259, 1881.
Occurrence in the Ural, *Lebedef*, Verh. Min. Ges. St. Pet., II., xiii., 1, 1878.
Anal. (18 p. c. CaO = bustamite), Långban, *Lindström*, Œfv. Ak. Förh. Stockh., xxxv., 6, p. 57, 1880.

A variety of rhodonite from Franklin Furnace, N. J., is called KEATINGINE by Shepard (Contrib. Min., 1876), it contains 5·6 p. c. ZnO (= fowlerite).

RIONITE.—App. I., p. 14.

RIPIDOLITE, Min., p. 497; App. II., p. 48.—See *Penninite*, p. 90.

RITTINGERITE, Min., p. 94; App. II., p. 48.—Occurs at Schemnitz, Hungary, *Becke*, Min. Petr. Mitth., ii., 94, 1879.
See also *Pyrostilpnite*, p. 90.

RIVOTITE.—App. II., p. 48.

Rogersite. *J. L. Smith*, Am. J. Sc., III., xiii., 367, 1877.
Massive. As a thin mammillary crust on samarskite. H. = 3·5. G. = 3·313. Color white. Analyses (stated to be only approximate): 1, Cb_2O_5 18·10, Y_2O_3, etc. 60·12, H_2O 17·41 = 95·63; 2, Cb_2O_5 20·21, H_2O 16·34, Y_2O_3 undet. Considered as a decomposition product of samarskite, with which, and with hatchettolite, it occurs in Mitchell Co., N. C. Named after Prof. Wm. B. Rogers. [Needs further examination.]

RŒMERITE, Min., p. 655.—**Cryst.**, *Lüdecke*, Z. gesammt. Nat., III., v., 407, 889, 1880.

RŒPPERITE.—App. II., p. 49.

ROMEITE, Min., p. 547.—According to *Bertrand*, the octahedral crystals are formed by the grouping of 8 rhombohedral crystals of 90° about the central point, Bull. Soc. Min., iv., 240, 1881.

Roscoelite. *J. Blake*, Am. J. Sc., III., xii., 31, 1876; *Genth*, ib., p. 32. *H. E. Roscoe*, Proc. Roy. Soc., xxv., 109, 1876. *Genth*, Am. Phil. Soc. Philad., xvii., 119, 1877, or Z. Kryst., ii., 8, 1877.
Micaceous in structure; basal cleavage perfect. Scales minute, often arranged in stellate or fan-shaped groups. Biaxial, acute bisectrix negative, normal to cleavage, $\rho < v$ (Des Cloizeaux, Bull. Soc. Min., i., 51, 1878; iv., 56, 1881).
Soft. G. = 2·902 (Roscoe); 2·921, 2·938, purest (Genth). Lustre pearly, inclining to submetallic. Color dark clove brown to greenish brown, dark brownish green. Analyses: 1, Genth (after deducting 0·85 gold, quartz, etc.); 2, 3, Roscoe.

	SiO_2	V_2O_3	Al_2O_3	Fe_2O_3	Mn_2O_3	FeO	MgO	CaO	Na_2O	K_2O	Li_2O	H_2O
1.	47·69	20·56	14·10	....	....	1·67	2·00	....	0·19	7·59	tr.	4·96 = 98·76.
2.	41·25	28·85 V_2O_5	14·34	1·04	1·45	....	1·96	0·61	0·72	8·25		0·94 hygrosc. [water 2·12 = 101·53.
3.	....	28·36 V_2O_5	13·94	1·23	0·85	....	2·06	0·62	0·92	8·87		1·22 hygrosc. [water 2·42.

In his first paper, Genth gives five other analyses, made on material more or less impure. He also announces the vanadium as present as V_6O_{11} (= $2V_2O_3$ + V_2O_5), but in the later publication regards it possible that it is all V_2O_3; he shows that the mineral is always more or less impure through mechanical admixture, and on this ground questions the correctness of Roscoe's results. Genth deduces the formula $K(Mg,Fe)[Al_2,V_2]_2Si_{12}O_{32} + 4aq$, which requires: SiO_2 49·33, Al_2O_3 14·09, V_2O_3 20·62, FeO 1·64, MgO 1·83, K_2O 7·55, H_2O 4·94 = 100. Roscoe, on the other hand, makes the mineral a vanado-silicate, thus: $4AlVO_4 + K_4Si_9O_{20}$ + aq, which requires: SiO_2 41·18, V_2O_5 27·63, Al_2O_3 15·59, K_2O 14·24, H_2O 1·36 = 100. B. B. fuses easily to a black glass. Gives with salt of phosphorus a dark yellow bead O. F., and an emerald green bead R. F. Only slightly acted upon by acids.

Occurs intimately mixed with gold in seams ($\frac{1}{10}$ to $\frac{1}{20}$ in. thick) in porphyry, and filling cavities in quartz, at the gold mine at Granite Creek, near Coloma, El Dorado Co., California; also from Big Red Ravine, near Sutter's mill, where gold was first discovered in California (*Hanks*, Min. Sc. Press, June 25, 1881). Hanks remarks, that at the Granite Creek locality, some 400 or 500 lbs. of the mineral have been discovered, which were wasted in the extraction of the gold.

Genth also describes (l. c.) a mineral occurring in the Magnolia District, Colorado, as a thin earthy incrustation, of a grayish to olive green color on calaverite, also inclosed in quartz, and giving it a green color. An analysis of the quartz gave: Quartz 79·38, Te 1·05, Au 0·03 = 80·46; the balance (19·5 p. c.) is assumed to belong to the green mineral which forms the coloring matter. An analysis of this, after the deduction of the quartz, gave (mean of 5 partial analyses): SiO_2 56·74, Al_2O_3 19·62, V_2O_3 7·78, FeO 3·84, MgO 2·63, Na_2O 0·94, K_2O 8·11, MnO,Li_2O tr., H_2O undet. = 99·66. Genth regards this as probably closely related to roscoelite, perhaps a variety.

ROSELITE, Min., p. 560; App. II., p. 49.—Analyses by *Winkler*, J. pr. Ch. II., xvi., 86, 1877 (quoted by Weisbach, Jahrb. Berg.-Hüttenwesen, 1877).

	As_2O_5	CoO	CaO	MgO	H_2O		
1.	52·93	10·56	24·93	3·95	8·35	=	100·72.
2	52·41	10·03	25·17	4·22	8·22	=	100·05.

These correspond to the formula: $R_3As_2O_8 + 2aq$ (not 3aq, Schrauf); if Ca : Co : Mg = 10 : 3 : 2, then the formula gives: As_2O_5 52·39, CoO 10·25, CaO 25·51, MgO 3·65, H_2O 8·20 = 100.

Rosterite.—See *Beryl*, p. 13.

ROSTHORNITE.—App. II., p. 49.

Rubislite. *Heddle*, Trans. Soc. Edinb., xxix., 112, 1879.

A dark green compact granular or fine foliated aggregate. G. = 2·44. Analysis: SiO_2 37·85, Al_2O_3 10·92, Fe_2O_3 9·84, FeO 9·01, MnO 0·46, CaO 4·22, MgO 8·00, K_2O 3·33, H_2O. 16·13 = 99·76. Completely decomposed by hydrochloric acid. B. B. fuses to a brown slag. From the granite of Rubislaw, near Aberdeen, Scotland. [To be classed with the already too large list of doubtful substances of the so-called "chlorite group."]

RUTILE, Min., p. 159; App. II., p. 49.—**Cryst.**, paramorphs after arkansite (brookite), Magnet Cove, *vom Rath*, J. Min., 1876, 397; pseudomorphs after hematite, Binnenthal, *id.*, Z. Kryst., i., 13, 1877, and eightlings from Magnet Cove, Ark., ibid., p. 15. (Ilmenorutile), Wschiwoi-See, Ilmen Mts., *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xii., 284; xiii., 419; xiv., 239. Associated with magnetite in parallel position, Binnenthal, *Seligmann*, Z. Kryst., i., 340, 1877. In splendent crystals, from Alexander Co., North Carolina, *Hidden*, Am. J. Sc., III., xxi., 159, 1881.

Mallard includes rutile among the pseudo-tetragonal minerals (Ann. Min., VII., x., 134, 1876); see also *Brookite*, p. 18.

As a microscopic constituent of rocks, *Sauer*, J. Min., 1879, 569 (see zircon); 1880, i., 94; 1881, i., 227.

Janovsky (Ber. Ak. Wien, lxxx., 34, 1880) has given the name ISERIT to what he regards as a new titanate. It was found among the black grains of the so-called "iserin" of the Iserwiese, Bohemia. It is distinguished from the true iserin by the absence of conchoidal fracture and the brown color. In thin fragments it is honey yellow. Crystalline form like rutile, occasionally in twins; cleavage imperfect. G. = 4·52. Analysis: TiO_2 70·01 ($\frac{5}{3}$), FeO 28·68 ($\frac{2}{2}$), MnO 1·41, MgO 0·32, Cb_2O_5,SiO_2 0·44 = 99·73, corresponding to the formula: $FeTi_2O_5$. [Groth (Z. Kryst., v., 400) justly remarks that the mineral is not far from the ferruginous rutile called nigrine, and that a more exact determination as to form, homogeneity, etc., is needed to prove its independent character. If it is an independent species the name is an unfortunate one, as tending to confusion with the distinct iserin, also called iserite.]

SAHLITE.—See *Pyroxene*, p. 100.

SAL AMMONIAC.—App. II., p. 49.

SAMARSKITE, Min., p. 520; App. II., p. 49.—**Cryst.** description, Mitchell Co., N. Carolina, *E. S. Dana*, Am. J. Sc., III., xi., 201, 1876.

Analyses, Mitchell Co, N. C.: 1, *Miss E. H. Swallow*, Proc. Nat. Hist. Bost., xvii., 424, 1875. 2, *O. D. Allen*, Dana's Text-Book Min., 1877, p. 340, and Am. J. Sc., III., xiv., 130, 1877. 3, *J. L. Smith*, Am. J. Sc., III., xiii., 362, 1877. 4, *Rammelsberg*, ZS. G. Ges., xxix., 817, 1877.

		Ta_2O_5	Ca_2O_5	SnO_2,WO_3	UO_3	$Ce_2O_3(Di_2\ La_2,O_3)$	Y_2O_3	FeO	MnO	CaO	H_2O
1.		54·96		0·16	9·91 UO	5·17 CeO	12·84 YO	14·02	0·91	0·52 MgO	0·66,
							[insol. residue from cerium oxalate 1·25 = 100·40.				
2.	$(\frac{2}{2})$	18·20	37·50	0·08	12·54	4·17	14·48	10·75	0·78	0·55	1·12
											[= 100·17.
3.		.....	55·13	0·31	10·96	4·24	14·49	11·74	1·53	MgO tr.	0·72
											[= 99·12.
4.	G. = 5·836	14·36	41·07	0·16	10·90	2·37	6·10	14·61	Fe_2O_3, Er_2O_3 10·80, TiO_2 [0·56 (SiO_2) = 100·93.		

Anal. of Miask samarskite, *Rammelsberg*, ZS. G. Ges., xxix., 817, 1877.

Examination of the earths contained in samarskite from North Carolina: *J. L. Smith* ("mosandrum"), C. R., lxxxvii., 146, 148, 831, 1878. *Delafontaine* (terbium), Bibl. Univ., II., lxi., 273, 1878; *id.* (decipium, phillipium), ib., III., iii., 246, 250, 1880; C. R., xciii., 63, 1881. Same subject discussed by *Marignac*, Bibl. Univ., III., iii., 413, 1880.

Damour (Bull. Ac. St. Pet., xxiii., 463, 1877) shows that the VIETINGHOFITE of *v. Lomonossof* is essentially a ferruginous variety of samarskite. Amorphous. H. = 5·5–6. G. = 5·53. Color black, dull. Streak brown. Lustre submetallic. Easily decomposed by H_2SO_4. An analysis gave: Cb_2O_5 51·00, TiO_2 1·84, ZrO_2 0·96, U_2O_3 8·85, Y_2O_3 6·57, $Ce_2(Di,La)_2O_3$ 1·57, FeO 23·00, MnO 2·67, MgO 0·83, ign. 1·80 = 99·09. Locality near Lake Baikal, in the Ural.

SAPONITE, Min., p. 472; App. II., p. 49.—Analyses, from igneous rocks in Scotland, *Heddle*, Trans. Soc. Edinb., xxix., 91 et seq., 1879. See also *Bowlingite*, p. 17.

Sarawakite. *Frenzel*, Min. Mitth., 1877, 300. Occurs in minute crystals, with many planes and rounded angles, "probably tetragonal." Soft. Lustre adamantine. Colorless or wine yellow to greenish yellow. Transparent. Contains antimony, anhydrous. Found in cavities in the native antimony of Borneo. [Needs further examination. Senarmontite ?]

SARCOPSIDE.—App. I., p. 14.

SAUSSURITE.—**Anal.**, Midsäterfjeld, Bergen, Norway, *Hjortdahl*, Nyt. Mag. Nat., xxiii., 1877. Analyses quoted, and discussion of the relations between the different varieties, *J. D. Dana*, Am. J. Sc., III., xvi., 340, 395, 1878.

SAYNITE.—See *Polydymite*, p. 95.

SCAPOLITE, Min., p. 317; App. II., p. 50.—**Analyses**, Rossie, N. Y., *Sipöcz*, Min. Mitth., 1877, 266. Boxborough, Mass., *Becke*, 1877, 267. Various Canadian localities, *F. D. Adams*, Am. J. Sc., III., xvii., 315, 1879. Bamle, Norway, *Michel-Lévy*, Bull. Soc. Min., i., 43, 1878. Monzoni, *Kiepenheuer*, Ber. nied. Ges. Bonn, Aug. 4, 1879. Malsjö, Arendal, and Gouverneur, *Sipöcz*, Min. Petr. Mitth., iv., 265, 1881.

Adams calls attention to the fact that unaltered scapolite uniformly contains chlorine (up to 2·48 p. c.). The presence of this element is also shown by Neminar in meionite, and by Sipöcz and Becke (l. c.).

See also *Meionite*, p. 74.

A scapolite from Galway, Ontario Co., Canada, has been called ONTARIOLITE by *C. U. Shepard* (Am. J. Sc., III., xx., 54, 1880). It occurs in prismatic crystals in a limestone; the color is black or gray, from the presence of admixed impurities. The pure portions are transparent and colorless, H. = 7–7·5. [The value of an approximate analysis given is destroyed by the impurity of the material analyzed; thus far it has no claim to be considered an independent species.]

SCHEELITE, Min , p. 605; App. II., p. 50.—**Cryst.**, Untersulzbachthal, etc., *Groth*, Min.-Samml. Strassburg, p. 157, 1878.

Absorption bands in spectrum (Ce, La, Di), *Cossa*, Accad. Linc. Mem., III., iii., 24, 31, 1878.

Occurrence with gold, Charity mine, Warren's, Idaho, and Golden Queen mine, Lake Co., Col , *Silliman*, Am. J. Sc., III., xiii., 451, 1877. From the Victoria Reef mine, Adelong, New South Wales, *Liversidge*, Proc. Roy. Soc. N. S. W., Nov. 3, 1880.

SCACCHITE.—App. II., p. 50.

SCHIRMERITE.—App. II., p. 50.

Schneebergite. *A. Brezina*, Verh. Geol. Reichs., 1880, 313.

Isometric; in small (0·5–1 mm.) octahedrons. Cleavage dodecahedral in traces., H. = 6·5. G. = 4·1 (Weidel). Lustre vitreous to adamantine. Color honey yellow. Transparent. Fracture conchoidal. Brittle. Consists principally (Weidel) of lime and antimony, with a little iron, and traces of copper, bismuth, zinc, magnesia, and sulphuric acid. B. B. infusible, becomes slightly brown. Insoluble in acids. Found by Lhotsky, at Schneeberg, Tyrol, near the union of anhydrite (or gypsum) with chalcopyrite and magnetite. [Needs further examination. Perhaps related to atopite, p. 10.]

SCHORLOMITE, Min., p. 390.—According to *Knop*, does not occur at Oberschaffhausen, in the Kaiserstuhl (Z. Kryst., i., 58, 1877); but the mineral which has received that name is either a titaniferous melanite or pyroxene.

Intimately associated with melanite, Magnet Cove, Ark., *König*, Proc. Acad. N. Sc. Phil., 1876, 36.

Schraufite. *J. von Schröckinger*, Verh. Geol. Reichs., 1875, 134.

A mineral resin occurring in small masses and in layers, in the schistose sandstone (Carpathian sandstone), near Wamma, in Bukowina. H. = 2–3. G. = 1·0–1·12. Color hyacinth to blood red. Translucent. Fracture semi-conchoidal to splintery. Melting point 326°, when decomposition goes on. Partially soluble in alcohol, benzol, and chloroform ; completely soluble in sulphuric acid, the larger portion of the resin separating as a grayish-yellow slimy mass, upon dilution with water. Analysis by Dietrich :

C	H	O
73·81	8·82	17·37.

Formula: $C_{11}H_{16}O_2$, requiring : C 73·33, H 8·89, O 17·78 = 100. With this resin correspond also a resin from Mizun and Höflein, and less closely others from the neighborhood of Lemberg. Schröckinger proposes to include the several occurrences under the name Schraufite, after Prof. A. Schrauf, of Vienna. The same resin occurs in the Libanon, according to John (Verh. G. Reichs., 1876, 255); see also *Bronner*, Württ. Nat. Jahresb., xxxiv., 81, 1878.

SCHREIBERSITE.—Min., p. 61; App. II., p. 50.

SCHRÖCKERINGERITE.—App. II., p. 50.

SCHWARTZEMBERGITE, Min., p. 120.—Optically uniaxial, negative, *Bertrand*, Bull. Soc. Min., iv., 87, 1881.

SCOLECITE, Min., p. 428; App. II., p. 50.—**Cryst.**, *Lüdecke* (J. Min., 1880, ii., 200; 1881, ii., 1) distinguishes between the monoclinic (Iceland and Kandallah) and triclinic (from the

Schattige Wichel, Fellinen Alp, Faröe, and Etzlithal) varieties, and makes them isomorphous with similar varieties of mesolite.

Pyro-electrical characters, *Hankel*, Wied. Ann., vi., 56, 1879.

Anal. (Bechi), Casarzia, Liguria, *Issel*, Boll. Com. Geol., 1879, 530. Etzlithal, *Schmid*, Ber. Jenaisch. Ges. Med. Nat., July 9. 1880. Schattige Wichel, Fellinen Alp, *Lüdecke*, J. Min., 1881, ii., 19.

SCORODITE, Min., p. 574.—**Cryst.**, Beresofsk, Ural, *v. Kokscharof*, Min. Russl., vi., 307, 1874. Dernbach, Nassau, *v. Lasaulx*, J. Min., 1875, 629; *vom Rath*, J. Min., 1876, 394.

Anal., Distr. Lucma, Peru, *Raimondi*, Min. Pérou, p. 228, 1878.

Made artificially, *Bourgeois* and *Verneuil*, Bull. Soc. Min., iii., 32, 1880.

See also *Strengite* and *Reddingite*.

An earthy mineral, formed from the decomposition of arsenopyrite, and referred to scorodite, has been called JOGYNAITE by *N. v. Nordenskiöld*. Occurs with beryl at Adun-Tschilon, Nertschinsk. See *v. Kokscharof*, Bull. Acad. St. Pet., xix., 571, 1873.

SCOLOPSITE.—See *Ittnerite*, p. 63.

SEEBACHITE, App. II., p. 50.—See *Herschelite*, p. 57.

SELLAITE, App. I., p. 14.—The corresponding compound, MgF$_2$, made artificially, *Cossa*, Accad. Linc. Mem., III., i., 33, 1876, or Z. Kryst., i., 207, 1877.

Corrections of angles and symbols previously given, *Strüver*, Att. Accad. Torino, xii., 59, 1876.

SELWYNITE, Min., p. 509; App. I., p. 19.—According to a microscopic examination by *Ulrich*, a mixture, consisting of a felsite-like base, with hydrous chromic oxide and occasional octahedrons of chromite, Am. J. Sc., III., xi., 235, 1876.

Semseyite. *Krenner*, Ungar. Revue, 1881, 367. Briefly announced as containing sulphur, antimony, and lead, and related to plagionite, from Wolfsberg, in the Harz. Occurs in gray crystals, with diaphorite, sphalerite, and pyrite, at Felsöbanya.

SENARMONTITE, Min., p. 184.—According to *Mallard* (Ann. Min., VII., x., 108, 1876), pseudo-isometric, the crystals being made up of 48 triclinic individuals. The same subject has been investigated by *A. Grosse-Bohle* (Z. Kryst., v., 222, 1880); he concludes that the species is to be regarded as monoclinic, and the crystals made up of 12 individuals (including those parallel, 24), twinned parallel to *O* and 1; he however suggests, in conclusion, that the optical anomalies may have another explanation, and the mineral still be included in the isometric system. An examination of artificial crystals of arsenolite led to similar results.

SEPIOLITE, Min., p. 456.—A fibrous variety from Utah, analyzed by *Chester*, Am. J. Sc., III., xiii., 296, 1877.

SERICITE, Min., p. 487.—A massive muscovite, as shown by *Laspeyres* (Z. Kryst., iv., 244), who explains the varying results of earlier investigators by the greater or less impurity of the substance examined. He regards it as having owed its origin to the alteration of feldspar. On the sericite from the Taunus, see *Wichmann*, Verh. Nat. Ver. Bonn, xxxiv., 1, 1877.

SERPENTINE, Min., p. 464 ; App. II., p. 51.—Description and analyses : Pusunsaari, *Ungern*, *Schildt*, Œfv. Finsk. Vet. Soc., xvii., 70, 1874–75. Zöblitz, Greifendorf, Waldheim, *Lemberg*, ZS. G. Ges., xxvii., 531, 1875. New Jersey, *Berwerth*, Min. Mitth., 1875, 110. Vosges, *Weigand*, Min. Mitth., 1875, 183. Northern Norway, *Pettersen*, J. Min., 1876, 613. Nordmark, *Lundström*, Geol. För. Förh., iii., 191, 1876. Långban, Wermland (7·8 p. c. MnO), *Paijkull*, Geol. För. Förh., iii., 351, 1877. Verrayes, Val d'Aosta, *Cossa*, Accad. Linc. Mem., III., ii., 933, 1878. Reichenstein, Silesia, *Hare*, Inaug. Diss. Breslau, 1879 (Z. Kryst., iv., 294). Florida, Mass. (picrolite), anal. by Melville, *Wadsworth*, Bost. Soc. Nat. Hist., xx., 286, 1879.

Microscopic examination, metaxoite, picrofluite, *Wiik*, Œfv. Finsk. Vet. Soc., xvii., 8, 1874–75.

A serpentinous mineral is called TOTAIGITE by *Heddle* (Trans. Soc. Edinburgh, xxviii., 455, 497, 1878). It appears as a pseudomorphous substance surrounding malacolite, in a granular limestone; resembles danburite, from Danbury, Ct. Lustre weak, glimmering. Color pale fawn, sometimes blue-black. Cleavage distinct. Fracture conchoidal. Soft. Often surrounded itself by yellow green or dark gray serpentine. Analyses: 1, fawn-colored variety; 2, dark blue variety, on the surface ochre yellow; G. = 2·84–2·893.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	H_2O		
1.	37·22	0·76	....	1·05	0·23	44·97	5·24	....	....	10·64	=	100·11.
2.	36·19	0·26	0·29	2·96	0·45	45·57	3·27	0·42	0·25	10·20	=	99·87.

Locality Totaig, Ross-shire, Scotland. The author justly does not regard this as in any sense a mineral species [but why should it receive a name ?]. Its method of occurrence suggests that it is an intermediate product between the pyroxene and the final serpentine; but the author calls attention to the fact that it contains more magnesia than the last-named species.

Serpierite. *Des Cloizeaux*, Bull. Soc. Min., iv., 89, 1881; *Bertrand*, ib.

Orthorhombic; in minute tabular (*O*) crystals elongated, often grouped in light tufts, and striated in the direction of the shorter diagonal. Observed planes: *O*, *I*, 1, also 1-ĭ, $\frac{3}{4}$-ĭ, probable, and $\frac{2}{3}$-ĭ, $\frac{4}{3}$-ĭ, $\frac{5}{3}$-ĭ, 8-ĭ, all doubtful. $I \wedge I = 98° 42'$, $O \wedge 1 = 115° 32'$. Optic-axial plane macrodiagonal, bisectrix negative. 2H = 43° 35′–44° 20′, and 2E = 65° 57′–67° 10′, red; dispersion $\rho > v$. Color greenish bluish. Transparent. In composition, according to Damour, a basic sulphate of copper and zinc. [Needs further examination on the chemical side.] From Laurium, Greece.

Siderazot. *O. Silvestri*, Pogg. Ann., clvii., 165, 1876.

A product of volcanic eruption, observed at Mt. Etna after the eruption of Aug., 1874, as a very thin coating on lava. Non-crystalline. Lustre metallic, resembling steel. Slowly attacked by acids. An analysis gave: Fe 90·86, N 9·14 = 100, which corresponds to Fe_5N_2, or that adopted by Frémy for the artificial iron nitride.

SIDERITE, Min., p. 688; App. II., p. 51.—**Anal.**, San Giovanni, Val d'Arno, Italy, *Grattarola*, Boll. Com. Geol., 1876, 342. Felsöbanya, anal. by Dietrich (27·7–44·4 p. c. $MnCO_3$), Kapnik (3·98 $MnCO_3$), *v. Schröckinger*, Verh. geol. Reichs., 1877, 114. Newburyport, Mass., *Miss E. H. Swallow*, Proc. Bost. Soc. Nat. Hist., xvii., 464, 1875. Earthy variety (amorphous), easily soluble in cold acids, from the Schwelm mine, *Muck*, Z. Berg.-Hütt.-Sal.-Wesen, xxviii., 189, 1880.

Recent formation at Bourbonne-l'Archambault, *Daubrée*, C. R., lxxx., 1300, 1875.

See also *Rhodochrosite*, p. 103, for other intermediate compounds.

Sideronatrite. *Raimondi*, Minéraux du Pérou, p. 212, 233, 1878. *Domeyko*, 3d ed. Min. Chili, p. 158, 1879.

In crystalline masses. H. = 2·5. G. = 2·153. Color dark yellow. Streak pale yellow to yellowish white. Analysis:

SO_3	Fe_2O_3	Na_2O	H_2O
43·26	21·60	15·59	15·35, earthy matter 3·20, NaCl mechanically mixed 1·06 = 100·06.

Formula $Na_2SO_4 + [Fe_2]S_2O_9 + 6aq$. Insoluble in water, but decomposed on heating, with the separation of iron sesquioxide. Soluble in acids. From the mine San Simon, Huantajaya, province of Tarapaca, Peru.

Another sulphate, almost identical with sideronatrite, has been called URUSITE by *A. Frenzel* (Min. Petr. Mitth., ii., 133, 359, 1879). Orthorhombic. Pulverulent, earthy; also in lumps, but consisting of minute prismatic crystals with pinacoids, and also *I*, 1, 1-ī and *O*. Soft. G. = 2·22. Color lemon to orange yellow. Streak ochre yellow. Transparent in minute crystals. Calculated formula: $Na_4[Fe_2]S_4O_{17} + 8aq$ = SO_3 42·78, Fe_2O_3 21·39, Na_2O 16·58, H_2O 19·25 = 100. Analyses, 1, 2; 1, after deducting 3 p. c. insoluble:

	SO_3	Fe_2O_3	Na_2O	H_2O		
1.	42·08	21·28	16·50	16·80	=	99·66.
2.	41·64	22·00	17·24	[19·12]	=	100·00.

Insoluble in water, easily soluble in HCl. Decomposed in boiling water, with separation of Fe_2O_3. Found underlying deposits of iron vitriol (melanterite) on the Urus plateau, near Sarakaja, on the naphtha island, Tscheleken, in the Caspian Sea. [Both of the above sulphates are near the uncertain bartholomite of Cleve, App. II., p. 6.]

Siderophyllite.—See under *Mica Group*, p. 80.

SIEGBURGITE, App. II., p. 51.—Full description by *v. Lasaulx*, J. Min., 1875, 128.

Silaonite.—See *Guanajuatite*, p. 53.

Silberwismuthglanz.—See *Alaskaite*, p. 3.

SILVER, Min., p. 9; App. II., p. 51.—**Cryst.**, twins, *vom Rath*, Z. Kryst., iii., 12, 1878. Silver ores from Orenburg, *v. Beck*, J. Min., 1876, 162.

S. B. Wight describes a supposed alloy of silver and copper (Ag 53 to 75 p. c.) of a light brass color, and G. = 9·943, 9·330; from the Detroit and Lake Superior Copper Co., Eng. Min. J., xxx., 153, 1880.

SIMLAITE.—App. II., p. 51 (44).

SIMONYITE.—App I., p. 14; II., p. 51 (8).

Sipylite. *J. W. Mallet*, Am. J. Sc., III., xiv., 397, 1877; xxii., 52, 1881.

Tetragonal; in octahedrons. 1 ∧ 1 (pyr.) 100° 45′ = 127° (basal). Cleavage 1, distinct. Usually imperfectly crystalline, or in irregular masses. H. = 6 nearly. G. = 4·89. Lustre resinous and pseudo-metallic. Color brownish black to brownish orange; in splinters red brown. Streak light cinnamon brown to pale gray. Translucent. Fracture uneven, and small conchoidal. Brittle. Analysis by W. G. Brown:

Cb_2O_5	WO_3	SnO_2	ZrO_2	Eb_2O_3	Ce_2O_3	La_2O_3	Di_2O_3	UO	FeO	BeO	MgO	CaO	Na_2O	K_2O	H_2O
48·66*	0·16	0·08	2·09	27·94†	1·37	3·92‡	4·06§	3·47	2·04	0·62	0·05	2·61	0·16	0·06	3·19

[MnO tr., Li_2O tr., F tr. = 100·48.

* With Ta_2O_5 about 2 p. c. † With Y_2O_3 about 1 p. c. ‡ Di_2O_3, tr. § Ce_2O_3, tr.

Taking together the acid oxides of columbium (niobium), tantalum, tungsten, tin, and zirconium as $\overset{v}{M}_2O_5$, and reducing all the basic elements to the form $\overset{ii}{R}O$, and neglecting the water, the ratio $RO : M_2O_5 = 221 : 100$ is obtained, which corresponds to the formula: $R_3M_2O_8 + 4R_2M_2O_7$. Mallet prefers to include the water, making the hydrogen basic, and deduces on this supposition the formula: $R_3M_2O_8$. This view, as he shows, is supported by the fact that in form sipylite is very near fergusonite.

B. B. decrepitates, and glows brilliantly, becomes pale greenish yellow and opaque; infusible. In the closed tube gives off acid water. With borax in O. F. gives a yellow bead, pale on cooling; in R. F. assumes a greener tint. Boiled in strong HCl partially dissolves, the solution reacting for zirconium with turmeric paper; when metallic tin is added and the solution diluted, a sapphire blue color is obtained (columbium). Decomposed completely, though slowly, in boiling concentrated sulphuric acid. Occurs sparingly, imbedded in, or more commonly adherent to, masses of allanite and magnetite, at the northwest slope of Little Friar Mountain, Amherst Co., Virginia. Named from *Sipylus*, one of the children of Niobe, in allusion to the names niobium and tantalum.

Delafontaine (C. R., lxxxvii., 933, 1878) states that sipylite contains yttrium, erbium (in small quantities), philippium (see samarskite), and also the ytterbium of Marignac (see gadolinite).

SKUTTERUDITE, Min., p. 71; App. II., p. 51.—**Anal.**, *Ramsay*, J. Ch. Soc., 1876, 153.

SMALTITE, Min., p. 70; App. II., p. 51.—*Bauer* (ZS. G. Ges., xxvii., 245, 1875) questions the conclusion of Groth as to the hemihedral character of the species, while the latter gives further descriptions (Min.-Samml. Strassburg, 43, 1878) of hemihedral forms.
Found in Zapotlan, Jalisco, Mexico, *Navia*, Naturaleza, iv., 41, 1877.
Discussion of composition, *Rammelsberg*, Pogg. Ann., clx., 131, 1877.

SMITHSONITE, Min., p. 692; App. II., p. 52.—Zinc ore deposits at Wiesloch, Baden, *Schmidt*, Heidelberg, 1881.

SNARUMITE.—See *Anthophyllite*, p. 7.

SODA NITRE (Caliche), Min., p. 592.—In South America, occurrence, exploitation, etc., *V. L'Olivier*, Ann. Ch. Phys., V., vii., 289, 1876. Anal., Tarapaca, Peru, *Raimondi*, Min. Pérou, p. 289 et seq., 1878. *Machattie*, Chem. News, xxxi., 263, 1875.

SODALITE, Min., p. 330; App. II., p. 52.—**Cryst.**, Is. Laaven, Langesundfiord, Norway, *Klien*, J. Min., 1879, 534.
From Ditró, Transylvania, *Koch*, Min. Mitth., 1877, 332; J. Min., Beil.-Bd., i., 149, 1880. From Tiahuanaco, Bolivia, optical examination, *Feussner*, Z. Kryst., v., 581, 1881; analysis, *Bamberger*, ib., p. 583.

Sommarugaite.—See *Gersdorffite*, p. 51.

Sonomaite.—See *Pickeringite*, p. 93.

SPATHIOPYRITE.—App. II., p. 52.

SPHALERITE, Min., p. 48.—**Cryst.**, *Groth*, Min.-Samml. Strassburg, p. 23, 1878. *Sadebeck*, ZS. G. Ges., xxx., 573, 1878. *Hautefeuille*, C. R., xciii., 774, 1881.
Effect on indices of refraction of change of temperature, and of curving of surfaces of prism, *Calderon*, Z. Kryst., iv., 504, 1880; *Voigt*, ibid., v., 113, 1880.
"Faserige blende," in part wurtzite, *v. Lasaulx*, J. Min., 1876, 629. Christophite, St. Agnes, Cornwall, *Collins*, Min. Mag., iii., 91, 1879.
American blendes containing indium, *Cornwall*, Am. Chem., vii., 389, 1877; Norwegian do., *Wleugel*, Nyt. Mag. Nat Christ., xxiv., 333, 1879. Gallium in sphalerite, from the Pierrefitte mine, Vallée Argelès, Pyrénées, *L. de Boisbaudran*, C. R., lxxxi., 493, 1875.

Sphærocobaltite. *Weisbach*, Jahrb. Berg.-Hütt., 1877. In small spherical masses. Crystalline in structure, both concentric and radiated. Externally velvet black; within rose red. Streak peach-blossom red. H. = 4. G. = 4·02–4·13. Formula: $CoCO_3 = CO_2$ 36·94, CoO 63·06. Analysis, Winkler:

CO_2	CoO	Fe_2O_3	CaO	H_2O	
34·65	58·86	3·41	1·80	1·22	= 99·94.

Iron hydrate is present in small quantity, as an impurity. B. B. in closed tube becomes black. Attacked slowly by cold acids; rapidly with effervescence when warmed. Occurs with roselite at Schneeberg, Saxony.

SPHENE.—See *Titanite*, p. 122.

SPIAUTERITE.—See *Wurtzite*, p. 132.

SPINEL, Min., p. 147; App. II., p. 52.—**Cryst.**, Albani Mts., Italy, *Sella*, Z. Kryst., i., 233, 1877. Polysynthetic twins, *Strüver*, Accad. Linc. Trans., III., ii., 109, 1878. Taschkent, *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xiii., 426; Z. Kryst., iv., 642.

Determinations of specific gravity, *Church*, Geol. Mag., II., ii., 322, 1875.

Made artificially, *Meunier*, C. R., xc., 701, 1880. Anal., Monte di Tiriolo, near Catanzaro, *Mauro*, Accad. Linc Trans., III., iii., 65, 1879.

See also *Gahnite.*

Spodiosite. *H. V. Tiberg*, Geol. För. Förh., i., 84, 1872.

Orthorhombic. In prismatic crystals, flattened parallel the brachypinacoid, with the planes, *i-ĭ*, *I*, 1, 2-*ĭ*. $I \wedge i\text{-}\breve{i} = 132°$, $I \wedge I = 96°$, $2\text{-}\breve{i} \wedge 2\text{-}\breve{i} = 33°$ top. H. = 5. G. = 2·94. Lustre dull porcelain-like, but vitreous. Color ash gray, inclining to brown. Streak white. Fracture uneven. Brittle.

Analysis by C. H. Lundström :

P_2O_5	CaO	F	As_2O_5	CO_2	Cl	Fe_2O_3	Al_2O_3	MnO	MgO	H_2O	insol.		
32·20	49·81	[4·71]*	0·24	3·90	0·12	1·24	1·11	0·55	2·27	2·70	1·15	=	100.

* Including loss [but the analysis should show an excess].

Disregarding the calcium carbonate, the mineral consists essentially of calcium phosphate and calcium fluoride, in the ratio of 5 : 4 or $5Ca_3P_2O_8 + 4CaF_2$; but the analysis hardly gives a definite decision as to the true composition.

B. B. fuses in the thinnest splinters to a white enamel; does not decrepitate. Soluble in HCl and HNO_3, with effervescence. From the Krangrufva, Wermland, Sweden. Named from σποδιος, *ash gray.* [Perhaps a pseudomorph of apatite, after some other mineral.]

SPODUMENE, Min., p. 228.—**Analyses**: 1, *Pisani*, C. R., lxxxiv., 1509, 1877; 2, 3, *Dölter*, Min. Petr. Mitth., i., 524, 526, 1878 ; 4, 5, *Julien*, Ann. N. Y. Acad. Sc., i., 322, 1879; 6, *Penfield*, Am. J. Sc., III., xx., 259, 1880 ; 7, *J. L. Smith*, Am. J. Sc., III., xxi., 128, 1881; 8, *Genth*, priv. contrib. The spodumene from Pennikoja, in Somero, Finland, has been analyzed by *Cajander*, Œfv. Ak. Finsk., xvii., 70, 1874–5.

	SiO_2	Al_2O_3		FeO	MnO	CaO	MgO	Li_2O	K_2O	Na_2O	ign.	
1. Brazil, G. 3·16	63·80	27·93		1·05	0·12	0·46	....	6·75	....	0·89	....	= 101·00.
2. Norwich	63·79	27·03		0·39	....	0·73	0·21	7·04	0·12	1·10	....	= 100·41.
3. Brazil	63·34	27·66		1·15	....	0·69	....	7·09	....	0·98	....	= 100·91.
4. Goshen, G. = 3·19	63·27	23·73	Fe_2O_3	1·17	0·64	0·11	2·02	6·89	1·45	0·99	0·36	= 100·63.
5. Chesterfield, G. = 3·185–3·201	61·86	23·43	Fe_2O_3	2·73	1·04	0·79	1·55	6·99	1·33	0·50	0·46	= 100·68.
6. Branchville, G. = 3·193 (½)	64·25	27·20	Fe_2O_3	0·20	....	....	....	7·62	tr.	0 39	0·24	= 99·90.
7. Alexander Co., N. C., *Hiddenite*, G. = 3·152–3·189	64·35	28·10	Fe_2O_3	0·25	....	....	....	7·05	....	0·50	0·15	= 100·40.
8. Alexander Co., N. C., *Hiddenite*, G. = 3·166	63·95	26·58	Cr_2O_3 0·18	1·11	....	....	....	6·82	0·07	1·54		= 100·25.

All of these analyses correspond more or less closely to the true formula (Dölter) of the species, viz.: $Li_2Al_2Si_4O_{12}$; note the chromium found by Genth in hiddenite (anal. 8).

The variety of spodumene from Alexander Co., N. C. (anal. 7, 8), occurs in prismatic crystals from ½ inch to 3 inches in length. The crystals are often highly modified, showing many planes not before observed on the species; they are often twins; the forms have been described by *E. S. Dana*, Am. J. Sc., III., xxii., 179. Perfectly transparent, and color from pale yellowish green to deep emerald green; those of the latter color are highly valued as gems, having a peculiar brilliancy, as compared with the emerald, in consequence of the pleochroism; the largest stone cut thus far weighs nearly 2½ carats. They occur in cavities in a gneissoid rock, with emerald (q. v.), quartz, monazite, rutile, mica. The name *hiddenite* was given by Smith, after W. E. Hidden, through whom they have been introduced as gems, and who has succeeded in finding them in place ; those first found (by J. A. D. Stephenson) were of a pale yellowish-green color, and were obtained loose in the overlying soil.

The ALTERATION OF SPODUMENE at Goshen and Chesterfield, Mass., has been studied by *Julien*, Ann. N. Y. Acad. Sc., i., 318, 1879 ; that of the Branchville mineral has been investigated by *G. J. Brush* and *E. S. Dana*, Am. J. Sc., III., xx., 257, 1880 (or Z. Kryst., v., 192).

According to Julien, the Chesterfield crystals are often of immense size, reaching a length of 35 inches, and a diameter of 10 or 11 inches (see above 4, 5, for analyses of unaltered material). Julien describes pseudomorphs after spodumene of cymatolite, of killinite, of muscovite, of albite, of quartz, and of "vein granite." The substance (see below) called cymatolite by Shepard, has a fibrous to wavy structure, silky lustre, white color; H. = 1·5–2; G. = 2·696–2·700. The cymatolite from Goshen was earlier (Eng. Min.

J., xxii., 217) called AGLAITE by the same author. Analyses: 1, Manning Farm, Goshen; 2, Barrus Farm, Goshen; 3, Chesterfield Hollow.

	SiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Li_2O	Na_2O	K_2O	H_2O		
1.	58·51	21·80	0·85	0·29	1·44	0·84	0·19	6·88	6·68	2·40*	=	99·88.
2. *Aglaite*	58·11	24·38	1·66	0·18	0·75	0·48	0·09	2·57	8·38	3·01†	=	99·61.
3. ($\frac{2}{3}$)	58·58	22·28	1·77	0·15	0·45	0·93	0·10	9·08	4·48	2·08‡	=	99·90.

* With nitrogenous organic matter 0·44. † Do. 0·43. ‡ Do. undet.

The killinite has the following characters: H. = 3·5; G. = 2·623–2·652. Lustre dull and greasy to vitreous. Color greenish gray to olive green and greenish black. Analysis, Chesterfield Hollow:

SiO_2	Al_2O_3	FeO	MnO	CoO	MgO	CaO	Li_2O	Na_2O	K_2O	H_2O
46·80	32·52	2·33	0·04	0·04	0·48	0·77	0·32	0·78	7·24	7·66, organic matter 1·14 [= 100·12.

Brush and *Dana* describe, from Branchville, Ct., pseudomorphs after spodumene, of a substance called β spodumene (mixture of albite and eucryptite) of cymatolite (mixture of albite and muscovite), of albite, of microcline, of killinite, of "vein granite." The original crystals of spodumene (now mostly altered) were of great size, sometimes 4 feet long, 12 inches wide, and 2 to 4 inches thick. The unaltered spodumene occurring as a core in many large crystals is transparent, and either colorless or of a fine amethystine purple; for analysis see 6, above.

The first product of the alteration, resulting from the exchange of Na for one-half the Li, is a substance called *β spodumene*. It is compact, apparently homogeneous, with an indistinct fibrous to columnar structure. H. = 5·5–6. G. = 2·644–2·649. Color white, milky, or greenish white. Translucent. Fusibility, 2·25. Three analyses on material from different crystals gave nearly identical results. It is decomposed by HCl into two portions, one soluble and the other insoluble. Analyses by Penfield: 1, of the original material; 2, the soluble portion (32·10 p. c., calculated to 100); 3, insoluble portion (67·56 p. c., calculated to 100):

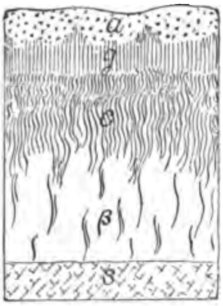
	SiO_2	Al_2O_3	Li_2O	Na_2O	K_2O	ign.		
1. β spodumene ($\frac{2}{3}$)	61·51	26·56	3·50	8·14	0·15	0·29	=	100·15.
2. Soluble part	48·13	40·50	10·90	....	0·47	....	=	100.
3. Insoluble part	68·18	20·07	....	11·75	....	....	=	100.

The whole has the composition $(Li,Na)_2Al_2Si_4O_{12}$, or $Li_2Al_2Si_2O_8 + Na_2Al_2Si_6O_{16}$. The insoluble part is albite ($Na_2Al_2Si_6O_{16}$); the soluble portion is a new mineral called *eucryptite* (*εὖ, well, κρυπτός, concealed*), and has the composition $Li_2Al_2Si_2O_8$. Examined under the microscope in thin sections (1) parallel to fibres, the irregular interlacing fibres of eucryptite are seen imbedded in albite; (2) transverse to fibres, the eucryptite forms bands with hexagonal outline (see figure), surrounded by albite, like quartz in a "graphic granite." See also *Eucryptite*, p. 44.

The second stage in the alteration is *cymatolite;* it results from β spodumene, by the exchange of K for the remaining Li, that is, the change of eucryptite to muscovite. The cymatolite has a fibrous or wavy structure. G. = 2·692–2·699; color white or slightly pinkish. Two analyses by Penfield, of independent specimens, gave essentially identical results; one of these is:

	SiO_2	Al_2O_3	MnO	Na_2O	K_2O	Li_2O	H_2O		
($\frac{2}{3}$)	60·55	26·38	0·07	8·12	3·34	0·17	1·65	=	100·28.

This corresponds to: $(Na,K,H)_2Al_2Si_4O_{12}$, or $(K,H)_2Al_2Si_2O_8 + Na_2Al_2Si_6O_{16}$. The microscopic examination shows that cymatolite is not, as previously assumed, a simple mineral, but, corresponding to the formula, a very uniform mechanical mixture of *muscovite* and *albite*. In some sections the transitions from β spodumene to cymatolite, *i. e.*, from eucryptite to muscovite, are clearly seen. In other cases the muscovite and albite have each segregated together, so that they are distinct. For example, in the figure, $s =$ unaltered spodumene, $\beta = \beta$ spodumene, $c =$ cymatolite, $g =$ mica, $a =$ albite.



As further steps in the alteration there result: albite, often fibrous, like β spodumene, also muscovite, and granular microcline. Still again pseudomorphs occur of killinite. This often retains the structure of the spodumene. The color is light bluish green, to oil green and dark grass green. Analyses: 1, Penfield, of variety showing prismatic structure; 2, Dewey, of compact variety.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	K_2O	Na_2O	Li_2O	H_2O	
1.	48·93	34·72	0·54	0·33	0·64	....	9·64	0·35	....	5·04	= 100·19.
2.	53·47	32·36	0·79	0·42	0·72	0·17	7·68	0·44	0·04	4·07	= 100·16.

The examination of thin sections under the microscope showed a slight want of homogeneity, and also revealed a very fine scaly micaceous structure; the killinite is doubtless to be regarded as an impure compact muscovite, like most other members of the pinite group.

The following scheme explains the above changes of the spodumene, supposing an exchange of the alkali metal:

$$\begin{array}{lll}
\underset{\text{Spodumene}}{2[Li_2Al_2Si_4O_{12}]} & = [\underset{\text{Eucryptite}}{Li_2Al_2Si_2O_8} + \underset{\text{Albite}}{Na_2Al_2Si_6O_{16}}] & \beta \text{ spodumene.} \\
& = [\underset{\text{Muscovite}}{(K,H)_2Al_2Si_2O_8} + \underset{\text{Albite}}{Na_2Al_2Si_6O_{16}}] & \text{cymatolite.} \\
& = \underset{\substack{\text{Muscovite} \\ \text{(or killinite.)}}}{(K,H)_2Al_2Si_2O_8} + \left\{ \begin{array}{l} Na_2Al_2Si_6O_{16} \text{ albite,} \\ \text{or } K_2Al_2Si_6O_{16} \text{ microcline.} \end{array} \right. &
\end{array}$$

For further explanations reference must be made to the original papers.

STANNITE.—Min., p. 68; App. II., p. 52.

STAUROLITE, Min., p. 388; App. II., p. 52.—**Cryst.**, *v. Kokscharof*, Min. Russl., vii., 159, 1875; viii., 110, 1881.

New twins and drillings, Fannin Co., Ga., *E. S. Dana*, Am. J. Sc., III., xi., 384, 1875.

A related mineral is called XANTHOLITE by *Heddle* (Min. Mag., iii., 59, 1879). In rough nodular crystals (monoclinic ?), imbedded in biotite. Cleavage in one direction distinct. H. = 6·7. Lustre vitreous to pearly. Color yellowish brown. Fracture conchoidal. Analysis:

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	H_2O	F	
($\frac{2}{2}$)	27·12	45·91	8·64	6·91	0·53	3·67	4·41	2·88	0·09	= 100·16.

The material analyzed was not free from biotite. The larger crystals often contain small imbedded crystals, with one perfect cleavage, and of a dark green color, which, it is thought, may perhaps be the same mineral. Found with wollastonite, garnet, and zircon, near Milltown, Loch Ness, Scotland.

[The composition of the mineral, as remarked by Heddle, is essentially that of staurolite, and as the want of perfect homogeneity in the material analyzed is admitted, and as staurolite is a species which is conspicuous for its inclosing impurities, no good reason can be given for separating this mineral from it. It does not deserve a name.]

Steatargillite. *E. E. Schmid,* Ber. Med.-Nat. Ges. Jena, July 9, 1880. A doubtful substance, filling, with quartz and ferrite, the small amygdaloidal cavities in the porphyritic rocks of the Höllekopf, at Kammerberg, and of the Tragberg, at Langewiesen, near Ilmenau. Massive, earthy. H. = 1·25. G. = 2·29–2·46. Color white to light green. Feel greasy. B. B. fuses to a greenish gray black specked enamel; yields much water in the tube, becoming black, and giving a bituminous odor. Analyses: 1, green, Höllekopf (insol. 6 p. c.); 2, green, Tragberg; 3, white, Höllekopf (insol. about 2 p. c.):

		SiO_2	Fe_2O_3	Al_2O_3	FeO	MgO	CaO	H_2O	
1.	G. = 2·287	37·20	25·56	8·09	3·78	15·56	0·98	8·70*	= 99·36.
2.	G. = 2·465	32·77	17·73	11·12	12·51	14·19	0·91	9·77†	= 99·00.
3.	G. = 2·307	38·67	24·72	10·69	0·95	12·95	1·36	9·65‡	= 98·99.

* In vacuo, at ordinary temperature 1·91; at 100° 3·90. † Do. 4·55, 2·52. ‡ Do. 0·70, 7·27.

[The author justly remarks that the material analyzed was not homogeneous. This is not a mineral species. Compare delessite, hullite (this App., p. 60), etc.]

Steeleite.—See *Mordenite,* p. 83.

STEPHANITE, Min., p. 106; App. II., p. 53.—**Cryst.**, Freiberg, Saxony, *Groth,* Min.-Samml. Strassburg, p. 69, 1878. Przibram, *Vrba,* Z. Kryst., v., 418, 1881.
Anal., Przibram, *Kolar,* Z. Kryst., v., 435, 1881.

STERCORITE, Min., p. 551.—**Anal.**, Guañape Islands, *Raimondi,* Min. Pérou, p. 28, 1878.

STERLINGITE.—App. II., p. 53 (15).

STERNBERGITE, Min., p. 54.—Recent analyses of minerals identical with or closely related to sternbergite: 1, Joachimsthal, Rammelsberg, Min. Chem. 2d ed., p. 66, 1875; 2, Andreasberg, Streng, J. Min., 1878, 794; 3, Joachimsthal, Janovsky, Z. Kryst., iii., 187, 1878; 4, Freiberg (argyropyrite of Weisbach, see below), Winkler, Jahrb. Berg.-Hütt., 1878; 5, 6, Joachimsthal (frieseite of Vrba, see below), Preis, Z. Kryst., iii., 187, 1878.

	S	Ag	Fe
1.	29·10	35·27	35·97 = 100·34.
2.	30·71	32·89	35·89, Cu 0·19 = 99·74.
3.	33·14	30·03	34·67, SiO_2 1·32 = 99·16.
4. *Argyropyrite,* G. = 4·206	32·81	29·75	36·28 = 98·84.
5. *Frieseite*	33·0	29·1	37·4 = 99·5.
6. *Frieseite*	33·9	27·6	37·3 = 98·8.

To the above analyses, which show a continual increase in sulphur and iron, and a corresponding decrease in silver, Vrba (Z. Kryst., iii., 186) adds the *argentopyrite* of v. Waltershausen, which gave him S 34·2, Ag 26·5, Fe 39·3; Schrauf (Ber. Ak. Wien, lxiv., 192, 1871) has shown that this is not a pseudomorph (Min., p. 39), but an independent species (G. = 5·53) isomorphous with sternbergite. According to Streng (J. Min., 1878, 785), who describes crystals of "Silberkies" from Andreasberg (anal. 2 above), the composition of the above series of minerals may be expressed by the general formula $Ag_2S + pFe_nS_{n+1}$, of which the first member is acanthite, and the second pyrrhotite; on the ground of this relation he is led to suggest that the latter mineral may be only pseudo-hexagonal (orthorhombic), and then it would be isomorphous with acanthite. Vrba regards this suggestion as not improbable.

Weisbach's argyropyrite (anal. 4, above) occurs at the Himmelfürst mine, at Freiberg, in small crystals, orthorhombic but pseudo-hexagonal, through twinning. Cleavage basal, perfect. H. = 2. G. = 4·206. Color on fresh fracture yellow bronze. Not brittle. Weisbach also found smaller crystals of similar form and color at Marienberg. H. = 4. G. = 4·06–4·12. Brittle.

Vrba's frieseite (anal. 5, 6, above) is from Joachimsthal, Bohemia. In small, thick, tabular, and rectangular crystals; orthorhombic, and very near sternbergite in angle, also similarly twinned parallel $I (I \wedge I = 118° 20')$. Cleavage basal, perfect. In thin laminæ, flexible. Color pinchbeck brown to blackish brown. In very thin plates dark greenish gray, translucent. H. about 2. G. = 4·217. Associated with dolomite, smaltite, pyrrhotite, proustite, rittingerite. Z. Kryst., ii., 153, 1878; iii., 186, 1878; v., 426, 1881.

Stelefeldtite.—Min., p. 188; App. II., p. 53.

Stibianite. *E. Goldsmith*, Proc. Acad. Nat. Sc. Philad., 1878, 154.

An alteration product of stibnite, from Victoria, Australia. Massive, porous. Color reddish yellow, of powder pale yellow. Lustre dull. H. = 5. G. = 3·67. Analysis by W. H. Dougherty (l. c.): Sb_2O_5 81·21, H_2O 4·46, gangue 13·55. After deduction of the impurities: Sb_2O_5 94·79, H_2O 5·21 = 100, which corresponds to the formula $Sb_2O_5 + H_2O$. [So obviously impure a material cannot rank as a species. It is near stibiconite, but, according to Goldsmith, contains only Sb_2O_5.]

Stibiconite, Min., p. 188.—**Anal.** (by Santos) of a related mineral from Sevier Co., Arkansas, *Mallet*, Chem. News, xxxvi., 167, 1877. Borneo, *Frenzel*, Min. Mitth., 1877, 298. Chayramonte, Cajamarca, Peru, *Raimondi*, Min. Pérou, p. 196, 1878.

In extensive deposits in Sonora, Mexico, *E. T. Cox*, Am. J. Sc., III., xx., 421, 1880.

Stibioferrite.—App. II., p. 53.

Stibiotriargentite, Stibiohexargentite.—App. I., p. 15.

Stibnite, Min., p. 29; App. II., p. 53.—**Cryst.**, Arnsberg, Westphalia, *Seligmann*, J. Min., 1880, i., 135.

Anal., Sevier Co., Ark., *Dunnington*, Amer. Assoc., 1877, 183. Several analyses, *C. E. Wait*, with description of occurrence in Arkansas, Trans. Amer. Inst. Min. Eng., viii., 43 et seq., 1880.

Stilbite, Min., p. 442; App. II., p. 53.—Monoclinic, according to *v. Lasaulx* (Z. Kryst., ii., 576, 1878), and isomorphous with harmotome and stilbite. On its chemical relations to these species, *Fresenius*, ib., iii., 42, 1878.

Anal. (sphærostilbite), Annapolis Co., Nova Scotia, *How*, Phil. Mag., V., i., 134, 1876. Faroē, *Heddle*, Min. Mag., i., 91, 1877. San Piero, Elba, *Grattarola* and *Sansoni*, Att. Acc. Tosc., iv., 173, 1879; *Sansoni*, ib., p. 312. Miage Glacier, Mt. Blanc, *Cossa*, Acc. Linc. Trans., III., v., 86, 1881.

See also *Foresite*, p. 47.

Stilpnomelane, Min., p. 460.—Microscop. exam., *Fischer*, Z. Kryst., iv., 368, 1880.

Stirlingite.—App. II., p. 53 (49).

Strengite. *A. Nies*, J. Min., 1877, 8; *G. A. Kōnig*, Proc. Acad. Nat. Sc. Philad., 1877, 277.

Orthorhombic. Observed planes, $i\text{-}\bar{i}$, $i\text{-}\breve{2}$, 1. Axes, c (vert.) : $\bar{b}$: $\breve{a}$ = 1·1224 : 1·1855 : 1. $i\text{-}\breve{2} \wedge i\text{-}\breve{2}$ = 118° 51′, $i\text{-}\bar{i} \wedge 1$ = 129° 11′, $1 \wedge 1$ = 101° 38′ and 115° 36′ (terminal) = 111° 30′ (basal). Cleavage $i\text{-}\bar{i}$, imperfect. Crystals rare; in habit and angle near scorodite. Generally in spherical and botryoidal forms, aggregates with radiated fibrous structure, and drusy surface. H. = 3–4. G. = 2·87. Lustre vitreous, brilliant. Color peach-blossom red, carmine red, and various other shades; sometimes nearly colorless. Streak yellowish white. Translucent to transparent. Analyses: 1, Nies, after deducting 0·15 insol.; 2, Kōnig.

	P_2O_5	Fe_2O_3	H_2O		
1. Eleonore Mine	37·42	43·18	19·40	=	100.
2. Rockbridge Co.	39·30	42·30	19·87	=	101·47.

Formula $[Fe_2]P_2O_8 + 4aq$, which requires: P_2O_5 37·97, Fe_2O_3 42·78, H_2O 19·25 = 100. The mineral is isomorphous with scorodite, and closely related in composition to barrandite. In form also near reddingite. B. B. fuses readily to a black shining bead, coloring the flame bluish green. Iron reaction with borax. Dissolves easily in warm HCl; in HNO_3 insoluble.

Occurs with cacoxenite, at the Eleonore iron mine, near Giessen; also in colorless crystals with eleonorite, at the Rothläufchen mine, near Waldgirmes, in the same region. In distinct crystals, pink to red, in cavities in dufrenite, from Rockbridge Co., Va.; the crystals are different in habit from those described by Nies, and allow of only approximate measurements. Named after Prof. A. Streng, of Giessen.

STRIGOVITE.—App. II., p. 53.

STROMEYERITE.—Min., p. 54; App. II., p. 54.

STRONTIANITE, Min., p. 699; App. II., p. 54.—**Cryst.** description, new forms, twins like aragonite, Hamm, Westphalia, *Laspeyres*, Verh. Nat. Ver. Bonn, xxxiii., 308, 1876. Mifflin Co., Penn., *H. C. Lewis*, Proc. Ac. Nat. Sc. Phil., 1876, 11.

STRUVITE, Min., p. 551; App. II., p. 54.—**Cryst.**, *Sadebeck*, Min. Mitth., 1877, 113, 221; *vom Rath*, Ber. nied. Ges. Bonn, Jan. 7, 1878; anal. by *Mac Ivor*, ib., Jan. 13, 1879.

Stützite. *Schrauf*, Z. Kryst., ii., 245, 1878.

Monoclinic, with pseudo-hexagonal symmetry (clino-hexagonal). Crystals highly modified, 39 occurring planes; vertically striated in prismatic zone. Isomorphous with dyscrasite and chalcocite, and in form near jordanite. Lustre metallic. Color lead gray, with reddish tinge. Streak blackish lead gray. Fracture uneven to subconchoidal.

Composition uncertain, perhaps Ag_4Te, requiring Te 22·5, Ag 77·5 = 100. The silver percentage determined approximately with the blowpipe = 72 p. c. (1), = 77 p. c. (2). Easily fusible to a dark bead, from which a silver globule is obtained by reduction with soda.

Identified on a single specimen in the collection of the Vienna University; locality probably Nagyag, Transylvania. Associated with gold and hessite on quartz. Named after Stütz, who, in 1803, described a tellurium mineral from Nagyag, which was probably identical with this, and called it tellursilberblende.

STYPTICITE.—See *Fibroferrite*, p. 47.

Subdelessite.—See *Delessite*, p. 36.

Sulfuricin.—See *Melanophlogite*, p. 74.

Sulfatallophane.—See *Allophane*, p. 3.

SULPHATITE.—Min., p. 614; App. II., p. 54.

SULPHUR, Min., p. 20; App. II., p. 54.—**Cryst.**, *v. Kokscharof*, Min. Russl., vi., 368, 1874. *vom Rath*, Pogg. Ann., clv., 41, 1875. Sicily, *v. Zepharovich*, *Lotos*, 1876 (J. Min., 1876, 561); *Groth*, Min.-Samml. Strassburg, p. 8, 262, 1878; *Fletcher*, Phil. Mag., V., ix., 186, 1880.

SUSANNITE, Min, p. 626; App. II., p. 54.—See *Leadhillite*, p. 67.

SYLVANITE, Min., p. 81; App. II., p. 54.—**Cryst.** discussion of the system (monoclinic), *Schrauf*, Z. Kryst., ii., 211, 1878.

Anal., Grand View mine, Colorado, *F. W. Clarke*, Am. J. Sc., III., xiv., 286, 1877. Smuggler mine, Col., *Jennings*, Trans. Am. Inst. Min. Eng., vi., 507, 1877.

SYLVITE, Min., p. 111; App. II., p. 54.—Vesuvius, *Scacchi*, Att. Accad. Napoli, vi., 1873 (Contrib. Min., II., 23). A salt from Vesuvius, yielded *W. Smith*, KCl 67·13, NaCl 31·01, K_2SO_4 1·86 = 100, Ch. News, xxxvi., 57, 1877.

SYNGENITE.—App. II., p. 54.

Szaboite. *A. Koch*, Min. Petr. Mitth., i, 79, 350, 1878; *von Lasaulx*, Z. Kryst., iii., 288, 1879; *Gonnard*, Bull. Soc. Min., ii, 150, 184, 1879.

Triclinic; in minute (1 mm. long, ·5 broad) thin tabular (*i–ĭ*) prismatic crystals, terminated at one extremity and vertically striated; also acicular. *Ĭ* ∧ *I′* = 87° 15′, *i–ī* ∧ *I* = 133° 34′. H. = 6–7. G. = 3·505. Lustre vitreous; on some planes tending to metallic and pearly. Color hair brown; in thinnest translucent crystals brownish red, hyacinth red. Streak tending to copper red. Translucent to opaque. Analysis:

SiO_2	Fe_2O_3(Al_2O_3 tr.)	CaO(MgO tr.)	Na_2O	ign.		
52·35	44·70	3·12	tr.	0·40	=	100·57.

The calculated formula is $Ca_2[Fe_2]_{11}Si_{35}O_{105}$, or $RSiO_3$; but v. Lasaulx remarks that the iron is probably mostly present as FeO. B. B. fuses with difficulty; with borax an iron bead. Partially decomposed by HCl. Related in composition to babingtonite, and in form to the pyroxene group; most closely to rhodonite.

Occurs with pseudobrookite (q. v.) and tridymite, in cavities in the andesite of the Aranyer Berg, Transylvania. Also on Mte. Calvario (Etna), near Biancaville, Sicily; also Riveau-Grand, Monte Dore. Named after Prof. J. Szabó, of Budapest.

Szmikite. *T. von Schröckinger*, Verh. Geol. Reichs., 1877, 115.

Amorphous, stalactitic, with botryoidal surface. H. = 1·5. G. = 3·15. Color whitish, on the fracture reddish white to rose red. Fracture earthy, splintery. Analyses: 1, Schrauf; 2, Dietrich, gave:

	SO_3	MnO	H_2O		
1.	47·43	41·78	10·92	=	100·13.
2.	47·11	41·61	11·19	=	99·91.

These correspond to the formula: $MnSO_4 + H_2O$, requiring: SO_3 47·43, MnO 42·01, H_2O 10·65 = 100. Exposed to damp air in small fragments becomes deeper red, and increases slightly in weight. From Felsöbanya, Transylvania. Named after Mr. Szmik, Counsellor of Mines.

TACHYLYTE, Min., p. 245.—Occurrence of a similar mineral in the basalt of Royat, Puy-de-Dôme, *Gonnard*, Bull. Soc. Min., iii., 211, 1880.

TALC.—Min., p. 451; App. II., p. 54.

TALCOSITE.—App. I., p. 15.

TAMMITE.—App. II., p. 55.

TANTALITE, Min., p. 514; App. II., p. 55.—From North Carolina, *König*, Proc. Ac. Nat. Sc. Phil., 1876, 39. Coosa Co., Ala., *J. L. Smith*, Am. J. Sc., III., xiv., 323, 1877. Yancey Co., N. C., analysis, *Comstock* (Am. J. Sc., III., xix., 181, 1880): ($\frac{2}{7}$) Ta_2O_5 59·92, Cb_2O_5 23·63, FeO 12·86, MnO 3·06, MgO 0·34 = 99·81. Massive. G. = 6·88.

See also *Columbite*, p. 29.

A manganesian variety is called MANGANTANTALITE by *A. E. Nordenskiöld* (Geol. För. Förh., iii., 284, 1877). In orthorhombic (?) crystals. Cleavage in one direction distinct, in two others less so; the last make with each other and with the first-named nearly right angles. H. = 5·5–6. G. = 6·3. Lustre vitreous. Color reddish to blackish brown; by transmitted light a fine red.

Composition given by the (approximate) analysis: $Ta_2O_5(Cb_2O_5)$ 85·5, MnO 9·5, FeO 3·6, CaO 1·2 = 99·8. Formula, $(Mn,Ca,Fe)Ta_2O_6$, which requires: Ta_2O_5 86·43, MnO 9·01, FeO 3·42, CaO 1·14 = 100. B. B. unaltered; gives a clear bead with salt of phosphorus; with soda a manganese reaction. Occurs with tourmaline, petalite, lepidolite, microlite, at Utö, Sweden. [The specific gravity leaves little doubt that the mineral contains considerable columbic acid (say 80 p. c.), and is to be considered as a mere variety of tantalite or columbite. Compare the manganese columbite of Branchville, p. 29.]

TAPALPITE.—App. II., p. 55.

TAPIOLITE.—Min., p. 518; App. II., p. 55.

Tarapacaite. *Raimondi*, Minéraux du Pérou, p. 274, 1878. Occurs in minute fragments of a brilliant yellow color, in the midst of soda nitre (caliche). Essentially a potassium chromate, but mixed with a little sodium chloride, sodium nitrate, and sodium and potassium sulphates. From the province of Tarapaca, Peru ; also (Domeyko, Min. Chili, 3d ed., 447) in the natural salt deposits of the desert of Atacama, Chili. [Needs further examination.]

Taznite. *Domeyko*, C. R., lxxxv., 977, 1877; Min., Chili, 3d ed., p. 298, 1879.

Amorphous, more or less fibrous in structure. Earthy. Color yellow. Soluble in hydrochloric acid. Regarded as an arsenio-antimonate of bismuth, analogous to bindheimite, and believed to have been derived from the alteration of some sulpharsenite or antimonate of bismuth. Very impure, from the admixture of varying quantities of bismuth ochre. An analysis gave : Bi_2O_3 (sol. in HNO_3) 42·00, Bi_2O_3 (united with Sb and As) 29·50, Sb_2O_5 5·29, As_2O_5 12·20, Fe_2O_3 7·00, H_2O 4·90, insol. 1·00 = 101·89. A second analysis gave : Bi_2O_3 51·35, Sb_2O_5 11·17, As_2O_5 16·54, Fe_2O_3 8·70, H_2O 4·54, insol. (silicates) 12·50 = 98·80. Obtained with other bismuth minerals from the mines of Tazna and of Choroloque, in Bolivia. [A heterogeneous substance.]

Telaspyrine. *C. U. Shepard*, Contrib. Min., 1877. Pyrite containing tellurium, from Sunshine Camp, Colorado.

TELLURITE, Min., p. 188.—In cracks in native tellurium, at the Keystone, Smuggler mines, and as an incrustation at the John Jay mine, Colorado. In minute prismatic crystals. Cleavable in one direction. Yellow to white. Composition, TeO_2. *Genth*, Am. Phil. Soc. Philad., xvii., 118, 1877.

TELLURIUM, Min., p. 19 ; App. II., p. 55.—From various mines in Bowlder County, Colorado, *Genth*, Am. Phil. Soc. Philad., xvii., 113, 1877.

Genth describes a peculiar variety from the Mountain Lion mine, which Berdell has called LIONITE. It occurs in thin plates. H. = 3. G. = 4·005. Color dark gray. Apparently homogeneous in appearance, but in fact containing 36 p. c. SiO_2 and 6 p.c. Al_2O_3 (Fe_2O_3).

TENNANTITE, Min., p. 104.—**Anal.**, Wilhelmine mine, Seilauf, in the Spessart, *Petersen*, J. Min., 1881, i., 262.

Sandbergerite, from several localities in Peru, *Raimondi*, Min. Pérou, p. 115 et seq., 1878.

A variety of tennantite is called FREDRICITE by *H. Sjögren* (Geol. För. Förh., v., 82, 1880). Massive, compact. H. = 3·5. G. = 4·65. Lustre brilliant, metallic. Color and streak iron black ; sometimes superficially tarnished green, red, brown. Opaque. Fracture uneven. Brittle. Analysis :

S	As	Sb	Sn	Cu	Pb	Ag	Fe
27·18	17·11	tr.	1·41	43·23	3·34	2·87	6·02 = 100·16.

Formula approximately 4RS, As_2S_3, or that of tennantite, with, however, the unusual constituents, lead, tin, and silver. It also differs from tennantite in color and texture. B. B. decrepitates and fuses easily to a black shining mass, which gives a copper bead with soda. In the closed tube gives a sublimate of arsenic trisulphide. Attacked slightly by HCl; decomposed by strong HNO_3, with the separation of lead sulphide and arsenic trioxide. Occurs in small masses imbedded in geocronite. Associated with galenite at Falu, Sweden.

TENORITE, Min., p. 126.—Triclinic, according to *Kalkowsky*, chiefly on optical grounds, Z. Kryst., iii., 279, 1879.

A product of the alteration of tenorite is called ATELINA (atelite) by *Scacchi* (Att. Accad. Napoli, vi., Dec. 13, 1873). Observed as more or less complete pseudomorphs after tenorite, and formed by the action on the latter of hydrochloric acid; as a result the black color is changed to green. An analysis gave: CuO 45·59, $CuCl_2$ 38·19, H_2O and loss 16·22 = 100. This corresponds to $2CuO + CuCl_2 + 3H_2O$, or $CuCl_2 + 2(H_2CuO_2) + H_2O$, which requires: CuO 45·76, $CuCl_2$ 38·68, H_2O 15·56 = 100. Found at Mt. Vesuvius, as a result of the eruption of April, 1872. [Not far from atacamite.]

TEPHROITE, Min., p. 259; App. II., p. 55.—**Anal.**, Långban, Sweden, *Pisani*, C. R., lxxxiv., 1511, 1877. An analysis of picrotephroite, from Långban, Weimland, Sweden, gave *S. R. Paijkull:* SiO_2 33·70, MnO 51·19, CaO 0·95, MgO 12·17, ign. 0·44 = 98·45; Geol. För. Förh., iii, 351, 1877.

TEQUEZQUITE. Corruption of Tequixquitl, a mineral substance formed of mixtures of different salts, especially sodium carbonate, and sodium chloride; from Texcoco, Zumpango, in the Valle de Mexico, and elsewhere in Mexico. Naturaleza, iii., 239–246, 1875.

TETRADYMITE.—Min., p. 30; App. II., p. 55.

TETRAHEDRITE, Min., p. 108; App. II., p. 55.—**Cryst.**, twins, *Kopp*, J. Min., 1877, 62. Horhausen, *Seligmann*, Z. Kryst., i., 335, 1877; *Groth*, Min.-Samml. Strassburg, p. 66, 1878. Horhausen, *vom Rath*, Z. Kryst., v., 258, 1880.

Analyses, Newburyport, Mass., *Miss E. H. Swallow*, Proc. Bost. Nat. Hist. Soc., xvii., 465, 1875. Clara mine, Schappbachthal, *Mutschler*, Ann. Ch. Pharm., clxxxv., 206. Gärdsjön, Wermland (aphtonite), *Nilson*, Z. Kryst., i., 417, 1877. Kahl, near Biber, Hesse, with Co 0·50, As 2·6, *Mutschler*, Jahrb. Min., 1877, 275. Brixlegg, Tyrol, *Untchj* and *Becke*, Min. Mitth., 1877, 273, 274. Huallanca, Peru, occurrence described, *H. Sewell*, Am. J. Sc., III., xv., 317, 1877; anal. by *Comstock*, ibid., xvii., 401, 1869. Hungary, *Hidegh*, Min. Mitth., ii., 350, 1879. Mine d'Araqueda, Cajabamba, Peru, *Raimondi*, Min. Pérou, p. 114, 1878. Arizona (16·23 Pb), *Clarke* and *Owens*, Am. Chem. Journ., ii., 173, 1880.

Recent formation at Bourbonne-les-Bains, *Daubrée*, C. R., lxxx., 463, 1875.

A variety is called MALINOFSKITE by *Raimondi* (Domeyko, 5th Append. Min. Chili, 1876; also Raimondi, Min. Pérou, p. 122, 1878). Occurs massive. Color gray with a metallic lustre. An analysis gave: S 24·27, Sb 24·74, As 0·56, Pb 13·08, Cu 14·37, Ag 11·92, Fe 9·12, Zn 1·92 = 100. Remarkable for its high percentage of lead. From the mines of Carpa and Llaccha (above anal.), district of Recuay, Peru.

Another mineral, near tetrahedrite, is called FRIGIDITE by *A. D'Achiardi.* Rarely crystallized; generally granular, compact, massive, with a subconchoidal structure. H. = 4. G. = 4·8. Lustre metallic. Color grayish steel. Powder grayish black. B. B. fuses easily, yielding copious antimonial fumes. Analysis by A. Funaro:

S	Sb	Cu	Fe	Ni	Ag	Zn	SiO_2		
29·60	25·59	19·32	12·67	7·55	0·04	tr.	2·20	=	96·97.

This does not correspond very closely with ordinary tetrahedrite, nor with the mineral called COPPITE by *Bechi*, from this same locality, and for which he obtained: S 27·01, Sb 29·61, Cu 30·10, Fe 13·08 = 99·80 (referred to tetrahedrite by D'Achiardi, Min. Tosc., ii., 341, 1873). [In view, however, of the incompleteness of Funaro's analysis (3 p. c. loss, 2 p. c. gangue), the calculation of a formula has but little value.] From the mines in the Valle del Frigido, Apuan Alps.

Thaumasite. *Nordenskiöld*, C. R., lxxxvii., 314, 1878; *Lindström*, Œfv. Ak. Stockh., Nov. 13, 1878.

Massive, compact. H. = 3·5. G. = 1·877. Lustre greasy, dull. Color white. Translucent. Fracture subconchoidal. Analyses by Lindström, on material collected, 1, by Polheimer, about 1805; 2, by Nordenskiöld, 1859; and 3, by Engberg, 1878:

	SiO_2	CO_2	SO_3	CaO	H_2O	Al_2O_3	MgO	Na_2O	K_2O	Cl		
1.	9·62	6·90	13·12	27·43	42·16	0·17	tr.	0·18	0·07	0·13	=	99·78.
2.	9·70	6·81	12·59	27·17	41·80	0·17	....	0·07	0·07	0·14	=	98·52.
3.	9·78	6·88	13·34	27·24	42·63	0·13	....	0·07	0·10	0·10	=	100·27.

The formula calculated by Lindström is $CaSiO_3 + CaCO_3 + CaSO_4 + 14aq$, which requires: SiO_2 9·93, CO_2 7·28, SO_3 13·25, CaO 27·82, H_2O 41·72 = 100. B. B. swells up, colors the flame red, but infusible. In salt of phosphorus a skeleton of silica. In the closed tube decrepitates and gives off much water.

Occurs filling cavities and crevices at the Bjelke mine, near Aareskuta, Jemtland, Sweden; at first soft, but hardens on exposure to the air. A fine fibrous chalk-white mineral occurs with it, and is regarded as a decomposition product; H. = 1·5–2·5. Composition: SiO_2 11·85, CO_2 6·86, SO_3 13·31, CaO 25·74, Al_2O_3 (Fe_2O_3) 2·58. Named from ϑαυμαζω, *to be surprised*, in allusion to the remarkable composition.

Törnebohm (quoted by Lindström) states that the material analyzed was homogeneous under the microscope, having a fibrous structure. Bertrand (Bull. Soc. Min., iii., 159; iv., 8) states that he identified calcite, gypsum, and a third mineral, probably wollastonite, in thaumasite, and hence regards it as a mixture; he states that chemical trials by Damour confirm this conclusion. Nordenskiöld, however (Geol. För. Förh., v., 270, 1880), claims that Bertrand's observations were not made on the pure mineral, and that the mixture proposed would not have the above composition. Finally, Cohen confirms by microscopic examination the essentially homogeneous (J. Min., 1881, ii., 21 ref.) appearance; he separated some gypsum and a carbonate soluble in acetic acid, but does not regard the matter as settled. A further critical examination is needed, in view of the seemingly very improbable composition deduced.

THENARDITE, Min., p. 615.—Province of Arequipa, Peru, *Raimondi*, Min. Pérou, p. 287, 1878. Balchaschsee, Central Asia, *vom Rath*, Z. Kryst., iv., 430; Ber. nied. Ges. Bonn, Aug. 4, 1879.

Occurs in large deposits on the Rio Verde, Arizona, *B. Silliman*, Am. J. Sc., III, xxii., 204, 1881. An analysis of this by Dunham gave: ($\frac{2}{2}$) SO_3 56·36, Na_2O [43·02], CaO 0·12, MgO 0·02, Cl 0·10, insol. 0·38 = 100.

From Aguas Blancas, Atacama, cryst. anal., *Bärwald*, Z. Kryst., vi., 36, 1881.

Thinolite.—See *Gay-Lussite*, p. 51.

THOMSENOLITE, Min., p. 129; App. II., p. 55.—See *Pachnolite*, p. 88.

THOMSONITE, Min., p. 424; App. II., p. 55.—**Cryst.** form determined with accuracy. $I \wedge I = 90° 26'$, $\dot{c}$ (vert.) : $\bar{b}$: $\breve{a}$ = 1·0095 : 1 : 0·9925, from Is. Laaven, Langesunfiord, Norway, *Brögger*, Z. Kryst., ii., 289, 1878.

Anal., Grand Marais, Minn., *König*, Nat. Leisure Hour, 1878, No. 8. Monzoni, *John*, Verh. Geol. Reichs., 1875, 305.

Peckham and *Hall* (Am. J. Sc., III., xix., 122, 1880) describe in detail the thomsonite amygdules from the diabase of Grand Marais, Lake Superior. These occur in place, and also as polished pebbles on the shores of the lake. Three varieties are distinguished: I., opaque white, resembling porcelain, with conchoidal or occasionally fibrous structure; II., in spherical or ellipsoidal forms, with fibrous radiated structure; sometimes with several centres, often flesh-red, with zones of green, red, and white; III. (called LINTONITE), structure fine granular, not radiated or crystalline, and of green color; sometimes this variety forms a centre surrounded by either var. I. or II. Hardness of the different forms 5–6. G. = 2·33–2·35; 2·2 in weathered pebbles. Analyses by Miss L. A. Linton: 1, var. I.; 2, var. II.; 3, calculated from 2, on the assumption that the true amount of SiO_2 is 40·45 p. c. (as in 1), the remainder being due to free quartz; 4, var. III.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	Na_2O	K_2O	H_2O	
1.	$\frac{3}{3}$ 40·45	29·50	0·23	....	10·75	4·76	0·36	13·93	= 99·98.
2.	$\frac{3}{3}$ 46·02	26·72	0·81	....	9·40	3·76	0·39	12·80	= 99·90.
3.	40·45	29·37	0·88	....	10·43	4·28	0·42	13·93	= 99·76.
4. *Lintonite.*	40·61	30·21	....	0·40	10·37	4·06	0·49	13·75	= 99·89.

The analyses prove that all the specimens examined are the same species, thomsonite. The polished pebbles are often of great beauty, and are highly valued for ornaments.

THORITE, Min., p. 413; App. II., p. 55.—Arendal, Norway, crystals in form of zircon (pseudomorphs), and analysis, *Nordenskiöld*, Geol. För. Förh., iii., 226, 1876. Hitterö, *Lindström*, ib., v., 500, 1881.

A mineral related to thorite, but differing in the large percentage of uranium present, has been described by Collier (Journ. Am. Ch. Soc., ii., 73, 1880) under the name URANOTHORITE. Massive. H. = 5. G. = 4·126. Lustre resinous to subvitreous. Color dark red brown. Streak yellow brown. Fracture subconchoidal. An analysis by H. B. Parsons yielded:

SiO_2	ThO_2	U_2O_3	Fe_2O_3	Al_2O_3	PbO	CaO	MgO	Na_2O	H_2O	
19·38	52·07	9·96	4·01	0·33	0·40	2·34	0·04	0·11	11·31	= 99·95.

B. B. infusible. From the Champlain iron region, N. Y., exact locality unknown.

THROMBOLITE, Min., p. 562.—*Schrauf* (Z. Kryst., iv., 28, 1879) obtained G. = 3·67, also: CuO 39·44, Fe_2O_3 1·05, H_2O 16·56, Sb_2O_5 6·65, Sb_2O_3 32·52, loss 3·78 = 100. Whether this is a true compound or only a mixture is uncertain; if the former, the mineral belongs with the no less uncertain stetefeldtite, partzite (Min., p. 188) and rivotite (App. II., p. 48).

THURINGITE, Min., p. 507.—**Cryst.** and **anal.**, Zirmsee, Carinthia, *v. Zepharovich*, Z. Kryst., i., 371, 1877; ii., 195, 1878.

Tincalconite. *C. U. Shepard.* Borax from California, pulverulent and efflorescent, 32 p. c. water, Bull. Soc. Min., i., 144.

TITANITE, Min., p. 383; App. II., p. 55.—**Cryst.**, in mica schist, Lama della Spedalaccio, *Uzielli*, Accad. Linc. Mem., III., i., 158, 1877. Albani Mts., *Sella*, Z. Kryst., i., 250, 1877. Tyrol, *W. J. Lewis*, Phil. Mag., V., iii., 455, 1877. Zermatt (greenovite), *Hintze*, Z. Kryst., ii., 310, 1878. Finland, *F. J. Wiik*, Z. Kryst., ii., 496; *Groth*, Min.-Samml. Strassburg, p. 252, 1878. Zöptau, *vom Rath*, Z. Kryst., v., 255, 1880. Ilmen Mts., *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xvi., 254, 1881.

Absorption of light measured photometrically, *Pulfrich*, Z. Kryst., vi., 155, 1881.

Optical determination in thin sections of rocks, *Fouqué* and *Lévy*, Ann. Min., VII., xii., 437, 1877.

Anal., Waldheim, Saxony (0·88 Y_2O_3), *Schmöger*, ZS. G. Ges., xxvii., 204, 1875. Grenville, Canada, *Harrington*, Geol. Canada, 1878.

In enormous crystals, with apatite, from Renfrew, Canada, sometimes weighing 72 lbs. (Kunz).

A variety of titanite from Småland, Sweden, is called ALSHEDITE by *C. W. Blomstrand* (Minnesskrift Fys. Sällsk. Lund, 1878, p. 7). Occurs in imperfect crystals, sometimes small, sometimes 1–1·5 in. in length; also massive, imbedded in quartz. Form uncertain, probably similar to titanite (Topsöe); two cleavages inclined 125½°. H. = 3·36. G. = 5. Color pale brown to ash gray. Opaque. B. B. readily fusible to a black bead; soluble in HCl. Analysis: 1, mean of 5 more or less complete analyses; 2, mean of 3 analyses:

	SiO_2	TiO_2	SnO_2	Al_2O_3	Fe_2O_3	Y_2O_3	CaO	MnO	MgO	K_2O, Na_2O	H_2O	
1. (5)	28·26	36·61	0·47	3·41	4·25	2·78	21·06	0·98	0·48	0·70	1·20	= 100·17.
2. (3)	30·61	35·86	0·38	3·47	3·61	2·57	20·51	0·82	0·32	0·58	1·89	= 100·62.

The mineral consequently falls between titanite and keilhauite, and is not far from grothite, Min., p. 386.

Titanomorphite. *A. von Lasaulx*, J. Min., 1879, 568; Z. Kryst., iv., 162, 1879. Monoclinic; isomorphous with titanite, with corresponding planes and angles. Usually in granular aggregates, often with fibrous structure, surrounding kernels of rutile, or of rutile and menaccanite (nigrin), or menaccanite alone, from the alteration of which it has arisen. Color white. Optically biaxial (microscope), with interference figures resembling those of titanite ($\rho > v$). 2E = 45°–50°; positive. Analysis by Bettendorff:

TiO_2	CaO	FeO	
74·32	25·27	tr.	= 99·59.

This corresponds to $CaTi_2O_5$, or a calcium titanate. B. B. fuses to a gray glass. With salt of phosphorus gives a reaction for titanium; by HCl partially, by H_2SO_4 completely decomposed.

From the hornblende schists of the "hohe Eule," Lampersdorf, Silesia. Lasaulx regards the white decomposition product of titanic iron, often observed, especially in hornblendic rocks, and called LEUCOXENE by Gümbel, as identical with titanomorphite; this would seem, however, to require further proof. Compare remarks by C. W. Cross, Min. Petr. Mitth., iii., 401, 1880. [According to Groth (Tab. Uebers. Min., p. 118, 1882), *Knop* states that titanomorphite is identical with titanite.]

TOCORNALITE, App. II., p. 56.—Several chloro-iodides of silver and mercury are described by *Domeyko*, 5th App., p. 40, 1876; 6th App., p. 30, 1878; 3d ed. Min. Chili, p. 430 et seq., 1879.

TOPAZ, Min., p. 376; App. II., p. 56.—**Cryst.**, Framont, and optical exam., *Bertrand*, Z. Kryst., i., 297, 1877. Saxony and Bohemia, *Laspeyres*, Z. Kryst., i., 374, 1877. Ilmen Mts., *v. Jeremejef*, Verh. Min. Ges. St. Pet., II., xiii., 416. Durango, Mexico, *Des Cloizeaux*, J. Min., 1878, 40. Russian, *Seligmann*, Z. Kryst., iii., 80, 1878. Mt. Bischof, Victoria, *vom Rath*, Ber. nied. Ges. Bonn, Jan. 13, 1879. Elba, *Corsi*, Z. Kryst., v., 604, 1881.

Pseudo-orthorhombic (monoclinic), according to the view of *Mallard*, Ann. Min., VII., x., 155, 1876.

Crystallogenetic discussion, *Scharff*, J. Min., 1878, 168. Specific gravity determinations, *Church*, Geol. Mag., II., ii., 322, 1875. Inclosures, CO_2, etc., *Hartley*, J. Ch. Soc., March, 1877, 241; *Erhard* and *Stelzner*, Min. Petr. Mitth., i., 450, 1878; *A. A. Julien*, J. Amer. Ch. Soc., iii., 41, 1881.

Anal. (pycnite), Cerro del Mercado, Durango, Mexico, *Chrustschoff*, Z. Kryst., iii., 634, 1879. Loss upon ignition, *Rammelsberg*, Wied. Ann., vii., 147, 1879.

Altered to muscovite (damourite), *Frenzel*, Min. Petr. Mitth., iii., 513, 1881. Pyrophysalite altered to massive damourite, Kårarfvet, Fahlun, Sweden, *Atterberg*, Geol. För. Förh., ii., 402, 1875.

TORBANITE, Min., p. 742.—Liversidge describes the so-called "kerosene shale" of New South Wales, and refers it to torbanite; this is the substance called *wollongongite*, which name, however, is not appropriate, as the specimen described came not from Wollongong, but from Hartley, Proc. Roy. Soc. N. S. W., Dec. 8, 1880.

Tobermorite. *Heddle*, Min. Mag., iv., 119, 1880.

Massive, fine granular. G. = 2·423. Color pale pinkish white. Translucent. Analyses: 1, Tobermory; 2, north of Tobermory, toward Bloody Bay.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O	H_2O	
1.	46·51	2·40	1·14	1·85	33·40	0·47	1·45	0·36	12·61	= 100·19.
2. G. = 2·423	46·62	3·89	0·66	1·08	33·98	....	0·57	0·89	12·11	= 99·81.

Occurs filling cavities in the rocks near Tobermory, Island of Mull. [Very near gyrolite, if not identical with it.]

TORBERNITE.—Min., p. 585; App. II., p. 56.

TOURMALINE, Min., p. 365; App. II., p. 56.—In crystals as an outer shell, enveloping orthoclase, from Port Henry, N. Y., *E. H. Williams*, Am. J. Sc., III., xi., 273, 1876.

Pseudo-rhombohedral, analogous to beryl and apatite, according to the view of *Mallard*, Ann. Min., VII., x., 150, 1876.

Power of conducting heat and electricity, *S. P. Thompson* and *O. J. Lodge*, Phil. Mag., V., viii., 18, 1879; ib., x., 67, 1880; same subject, *Fitzgerald*, Sc. Proc. Dubl. Soc., II., i., 370, 1880. Specific gravity determinations, *Church*, Geol. Mag., II., ii., 322, 1875. Relation of electrical conductivity to absorption of light, with reference to Maxwell's theory, *S. P. Thompson*, Phil. Mag., V., xii., 112, 1881. Absorption of light measured photometrically, *Pulfrich*, Z. Kryst., vi., 151, 1881. Electricity produced by pressure, *Jacques* and *Pierre Curie*, C. R., xcii., 186, 1881.

Anal., in dolomite at Campo Longo, Elba, *Engelmann*, Z. Kryst., ii., 312, 1878.

Occurrence of red and green varieties at Wolkenburg, Saxony, *Credner*, Ber. Ges. Leipzig, ii., 49 (J. Min., 1877, 528). As a contact mineral adjoining a granite vein, Mt. Willard, N. H., *Hawes*, Am. J. Sc., III., xxi., 21, 1881.

TRAUTWINITE.—App. II., p. 56.

TRIDYMITE, Min., p. 805 ; App. II., p. 56.—Pseudo-hexagonal through twinning (triclinic), as shown by an optical examination by *Schuster*, Min. Petr. Mitth., i., 71, 1878, and nearly the same time independently by *v. Lasaulx*, Z. Kryst., ii., 253, 1878.

In white ashes ejected from the island Vulcano, *Baltzer*, ZS. G. Ges., xxvii., 57, 1875.

Made artificially, *Hautefeuille*, C. R., lxxxiii., 1133, 1194, 1878 (Bull. Soc. Min., i., 1, 1878). Found with zinc spinel in a zinc furnace, as products of the alteration of the zinc muffles, *Schulze* and *Stelzner*, J. Min., 1881, i., 121.

See also *Asmanite*, p. 10.

TRINKERITE.—App. I., p. 16.

TRIPHYLITE, Min., p. 541.—**Analyses** by S. L. Penfield : 1, Bodenmais, Bavaria, color light blue, G. = 3·549; 2, Norwich, Mass., color grayish green, G. = 3·534 (Am. J. Sc., III., xvii., 226, 1879) ; 3, Grafton, N. H., color light blue, G. = 3·52, ib., xiii., 426, 1877.

	P_2O_5	FeO	MnO	CaO	MgO	Li_2O	K_2O	Na_2O	H_2O	gangue		
1. $(\frac{2}{2})$	43·18	36·21	8·96	0·10	0·83	8·15	....	0·26	0·87	0·83	=	99·39.
2. $(\frac{2}{2})$	44·76	26·40	17·84	0·24	0·47	9·36	....	0·35	0·42	....	=	99·84.
3. $(\frac{2}{2})$	44·03	26·23	18·21	0·94	0·59	8·79	0·32	0·12	1·47	....	=	100·70.

These correspond closely to the formula : $\overset{\text{i}}{R}\overset{\text{ii}}{R}PO_4 = \overset{\text{i}}{R}_3PO_4 + \overset{\text{ii}}{R}_3P_2O_8$, which is thus proved to be the true composition of the species.

TRIPHYLITE—LITHIOPHILITE. *G. J. Brush* and *E. S. Dana*, Am. J. Sci., III., xvi., 118, 1878; ibid., xviii., 45, 1879.

Orthorhombic. Cleavage: basal highly perfect; brachydiagonal nearly perfect; prismatic interrupted, $I \wedge I = 130°$. Massive. H. = 4·5. G. = 3·424–3·482. Lustre vitreous to resinous. Color, salmon color, honey yellow, yellowish brown, light clove brown. Streak uncolored. Transparent to translucent. Fracture uneven to subconchoidal. Optic-axial plane in the basal section; acute bisectrix, positive, normal to brachypinacoid. Axial angle in oil ($n = 1·47$), 74° 45′ red, 79° 30′ blue. Axial colors, $\breve{a}$ deep pink, c (vert.) pale greenish yellow, $\bar{b}$ faint pink.

Composition : $LiMnPO_4$, or $Li_3PO_4 + Mn_3P_2O_8$, with the manganese partly replaced by iron. Percentage composition : P_2O_5 45·22, MnO 45·22, Li_2O 9·56 = 100. Analyses: 1, H. L. Wells (ib., xvi., 118); 2, S. L. Penfield (ib., xviii., 47) :

		P_2O_5	FeO	MnO	Li_2O	Na_2O	H_2O	gangue		
1. G. = 3·478	$(\frac{2}{2})$	44·67	4·02	40·86	8·63	0·14	0·82	0·64	=	99·78, Wells.
2. G. = 3·482	$(\frac{2}{2})$	45·22	13·01	32·02	9·26	0·29	0·17	0·29	=	100·26, Penfield.

The composition is analogous to that of triphylite (q. v.), of which it is properly a variety peculiar in that it contains mostly manganese in place of iron. In the closed tube gives traces of moisture, turns dark brown and fuses, but does not become magnetic. Fuses in the naked lamp-flame, and B. B. gives an intense lithia-red flame, streaked with pale green on the lower edge. With fluxes reacts for manganese (O. F.) and iron (R. F.). Soluble in acids.

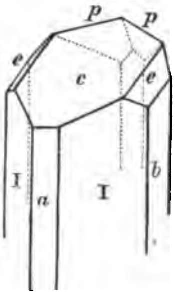
Occurs at Branchville, Fairfield Co., Conn., in a vein of albitic granite. In irregular masses intimately associated with spodumene (and cymatolite, q. v.), also with eosphorite, triploidite, rhodochrosite, uraninite. Named from *lithium* and *φιλός*, *friend*.

At the above locality there is found a large quantity of a black mineral derived from the alteration of lithiophilite, as shown both by its composition and by the fact that it retains more or less of the structure of the original mineral, and sometimes incloses a nucleus of it. It is generally grayish to pitch black, with sometimes a purple or violet tinge. H. = 3–4. G. = 3·26–3·40. Analyses: 1, F. P. Dewey, ib., xvii., 367; 2, H. L. Wells, ib., xvii., 368.

	P_2O_5	Fe_2O_3	Mn_2O_3	MnO	Li_2O	Al_2O_3	CaO	K_2O	Na_2O	H_2O	insol.	
1. G. = 3·395 ($\frac{2}{2}$)	40·66	12·56	25·27	11·66	5·66	0·10	0·18	....	0·49	3·07	....	MgO tr. = 99·65.
2. G. = 3·265 ($\frac{2}{2}$)	40·38	15·89	14·71	18·80	4·83	....	0·72	0·26	tr.	3·37	0·90	= 99·86.

Triplite, Min., p. 543; App. II., p. 56.—From Helsingfors, Finland, *F. J. Wiik*, Œfv. Finsk. Vet. Soc., xvii., 7, 1874–5.

Triploidite. *G. J. Brush* and *E. S. Dana*, Am. J. Sci., xvi., 42, 1878.



Monoclinic. Axes, c (vert.) : b : $\grave{a}$ = 0·80367 : 0·53846 : 1; β = 71° 56. Observed planes (see figure): O (c), i–$\grave{i}$ (b), i-i (a), I, 1–$\grave{i}$ (e), 2–2 (p). $I \wedge I$ = 59° 6′, $c \wedge I$ = 98° 53′, $c \wedge e$ = 125° 12′, $c \wedge p$ = 103° 25′, $a \wedge p$ = 127° 11′. Crystals striated vertically. Commonly in crystalline aggregates, parallel-fibrous to columnar; also divergent, or confusedly fibrous to nearly compact, massive. Cleavage: orthodiagonal perfect.

H. = 4·5–5. G. = 3·697. Lustre vitreous to greasy adamantine. Color yellowish to reddish brown, in isolated crystals also topaz to wine yellow, occasionally hyacinth red. Streak nearly white. Transparent to translucent. Fracture subconchoidal. The axes of elasticity in the clinodiagonal section nearly coincide respectively with the vertical axis (3° to 4° behind), and a normal to the orthopinacoid. No color absorption.

Composition: $R_4P_2O_9, H_2O$ or $R_3P_2O_8 + R(OH)_2$. If R = Mn : Fe = 3 : 1, percentage composition: P_2O_5 31·91, FeO 16·18, MnO 47·86, H_2O 4·05 = 100. Analyses of two varieties by S. L. Penfield:

		P_2O_5	FeO	MnO	CaO	H_2O	
1.	($\frac{2}{2}$)	32·11	14·88	48·45	0·33	4·08	= 99·85.
2		32·24	18·65	42·96	undet.	4·09,	quartz 1·09.

In the closed tube gives off neutral water, turns black and becomes magnetic. Fuses quietly in the naked lamp-flame, and B. B. in the forceps colors the flame green. Reacts for manganese and iron in the fluxes. Soluble in acids.

Occurs at Branchville, Fairfield Co., Conn., intimately associated with eosphorite, dickinsonite, lithiophilite, and other species, in a vein of albitic granite. In crystalline form triploidite is very similar to wagnerite, and as the formulas of the latter species and of triplite are closely analogous ($R_3P_2O_8 + RF_2$), it is concluded that the three species are isomorphous; in triploidite, the hydroxyl (OH) takes the place of the fluorine. Named from triplite and εἶδος, *form*, in allusion to the close similarity between the two species.

Trippkeite. *Damour* and *vom Rath*, Z. Kryst., v., 245, 1880 (or Bull. Soc. Min., iii., 175).

Tetragonal; c (vert.) = 0·9160. Observed planes: O, i–i, I, 1, $\frac{1}{2}$, 3, $\frac{3}{2}$–3, $\frac{3}{4}$–3, $\frac{6}{5}$–$\frac{24}{5}$. Cleavage parallel, i–i perfect, I a little less so (vom Rath). Optically uniaxial, positive (Des Cloizeaux). In small brilliant crystals (1 to 2 mm.), of a bluish-green color.

According to a qualitative examination by Damour, essentially an arsenite of copper (nCuO, As_2O_3). Easily soluble in HNO_3 and HCl. B. B. in the closed tube becomes emerald green on slight heating, then the green disappears and the color becomes brownish; on continued ignition the color becomes yellowish green a second time. Fuses easily to a green slag. In the open tube gives crystals of arsenic trioxide. Occurs with olivenite, as an older formation, in druses in massive cuprite from Copiapo, Chili. Named after the young mineralogist, Dr. Paul Trippke, who died June 16, 1880. [Needs further examination on the chemical side.]

Tritochorite.—See *Eusynchite*, p. 44.

TRITOMITE, Min., p. 412.—Brevig and Barkevig, Norway, complete analyses, *Engström*, Inaug. Diss. Upsala, 1877 (Z. Kryst., iii., 200).

TRÖGERITE.—App. I., p. 16; II., p. 56.

TROILITE, Min., p. 57; App. II., p. 57.—Composition, FeS (not Fe_7S_8, Meunier, App. II., p. 57), according to analyses of *J. Lawrence Smith*, C. R., lxxxi., 976, 1875.

TSCHEFFKINITE.—Min., p. 387; App. II., p. 57.

TSCHERMAKITE, App. II., p. 57.—Conclusion of Hawes, that tschermakite is only an ordinary triclinic feldspar, confirmed by *Bauer*, ZS. G. Ges., xxvii., 235 et seq., 1875.

TURGITE.—Min., p. 167; App. II., p. 57.

TURNERITE.—See *Monazite*, p. 82.

TURQUOIS, Min., p. 580.—Microscopic examination, *Bucking*, Z. Kryst., ii., 163; iii., 81, 1878.
Occurrence in New Mexico, *B. Silliman*, Am. J. Sc., III., xxii., 67, 1881.

Tyreeite. *Heddle*, Min. Mag., iv., 189, 1881. One and a half hundred weight of the carnelian marble of Tyree, Scotland, dissolved in sixteen gallons of dilute HCl left as a residue, thirty pounds sahlite, a little scapolite and titanite, and some ounces of a *red mud*. By decantation, 1·91 grams of a powder of deep brick-red color was obtained. Of this mud sulphuric acid dissolved ·78 gram, leaving 1·13 insoluble. The last was analyzed, and decided to be an impure talc. The soluble portion yielded: Fe_2O_3 38·22, Al_2O_3 8·23, FeO 3·16, MnO 0·39, MgO 29·94, CaO 2·21, H_2O 12·47, P_2O_5 4·71, SiO_2 1·02 = 100·35. To this last obviously heterogeneous substance the new name is provisionally given. [Certainly no name ever given had less claim for recognition in the Science of Mineralogy.]

TYROLITE.—Min., p. 570; App. II., p. 57.

Tysonite. *Allen* and *Comstock*, Am. J. Sc., III., xix., 390, 1880.
Forms the central portion of hexagonal crystals, sometimes an inch or more in diameter, showing the planes *O*, *I*, *i*–2. The crystals are for the most part altered to bastnäsite (see below). Cleavage basal distinct. H. = 4·5–5. G. = 6·12–6·14. Lustre vitreous to resinous. Color pale wax yellow. Streak nearly white. Analyses:

	Ce*	La,Di†	F		
($\frac{2}{2}$)	40·19	30·37	[29·44]	=	100·00.

* Atomic weight 141·2. † Joint atomic weight, specially determined, 138.

This gives the ratio Ce + (La,Di) : F = ·504 : 1·547, corresponding to the formula $(Ce,La,Di)_2F_6$. B. B. blackens, but does not fuse. In closed tube decrepitates, changes color to a light pink. Insoluble in HCl and HNO_3, but soluble in H_2SO_4, with evolution of HF. Occurs in feldspar near Pike's Peak, Colorado. Named after Mr. S. T. Tyson.

The crystals, of which tysonite sometimes forms a central zone, consist for the most part or entirely of *bastnäsite* (App. I., p. 2, also called hamartite by Nordenskiöld), which has arisen from the alteration of the original mineral. Cleavage wanting. H. = 4–4·5. G. = 5·18–5·20. Lustre vitreous to resinous. Color reddish brown. Streak light yellowish gray. An analysis ($\frac{2}{2}$) gave: Ce_2O_3 41·04, $(La,Di)_2O_3$ 34·76, CO_2 20·15, F *undet.*
The joint atomic weight of the three metals was determined to be 140·2, calculating part of the oxides to form normal carbonates, the remainder as metals, and estimating the fluorine by difference, the result is obtained:

$(Ce,La,Di)_2O_3$	Ce,La,Di	CO_2	F		
50·13	21·82	20·15	7·90	=	100.

This corresponds closely to the formula: $[R_2]F_6 + 2[R_2]C_3O_9$, which requires: $(Ce,La,Di)_2O_3$ 49·94, Ce,La,Di 21·32, CO_2 20·07, F 8·67 = 100. Compare parisite, Min., p. 702.

ULEXITE, Min., p. 598; App. II., p. 57.—Chemical composition discussed, *How*, Chem. News, xxxv., 189, 1877; *Reynolds*, ib., p. 213.

Anal., Tarapaca, Peru, *Raimondi*, Min. Pérou, p. 263, 1878. Prov. Salta, Argentine Repub., *Kyle*, Anal. Soc. Cientif. Arg., x., 169, 1880.

Occurs in Kern Co., Cal., *Blake*, Am. J. Sc., III., xxii., 323, 1881.

See also *Franklandite*, p. 48.

ULLMANNITE.—Min., p. 73; App. II., p. 57.

URANINITE, Min., p. 154; App. II., p. 57.—Occurrence in Mitchell Co., N. C., *Kerr*, Am. J. Sc., xiv., 496, 1877; *Hidden*, ib., xxii., 22, 1881.

Occurs in small brilliant octahedral crystals, G. = 9·22–9·28, at Branchville, Conn., *Brush* and *E. S. Dana* (Am. J. Sc., III., xvi., 35, 1878); analysis ($\frac{2}{3}$) by *Comstock* (ib., xix., 220, 1880): U 81·50, Pb 3·97, Fe 0·40, O 13·47, H_2O 0·88 = 100·22. After the determination of the amounts of UO_2 and UO_3, the analysis becomes:

UO_3	UO_2	PbO	FeO	H_2O		
40·08	54·51	4·27	0·49	0·88	=	100·23.

This corresponds to the formula: $3\overset{\text{IV}}{R}O_2 + 2\overset{\text{VI}}{R}O_3$, with $\overset{\text{IV}}{R} = \overset{\text{IV}}{U}, Pb_2Fe_2$, and $\overset{\text{VI}}{R} = \overset{\text{VI}}{U}$. B.B. the mineral reacts with fluxes for uranium, and on reduction yields a globule of lead. In the closed tube gives off traces of water, which has a slightly acid reaction, the cause of which is not explained.

Uranocircite. *Weisbach*, Jahrb. Berg.-Hüttenwesen, 1877, Abhandl., p. 48.

Orthorhombic; form similar to that of autunite. Cleavage basal highly perfect; macrodiagonal and brachydiagonal distinct. G. = 3·53. Color yellow green. Optically biaxial. Acute bisectrix coincides with *c* (vert.); axial angle = 15°–20°.

Composition: $BaU_2P_2O_{12} + 8aq = P_2O_5$ 14·00, UO_3 56·75, BaO 15·07, H_2O 14·18 = 100. Analysis, Winkler (l. c.):

P_2O_5	UO_3	BaO	H_2O		
15·06	56·86	14·57	13·99	=	100·48.

Earlier analyses by Georgi, and Uwao Imai, gave confirmatory results. Church (Min. Mag., i., 234, 1877) finds, that *in vacuo* over H_2SO_4, at 20° C., 6aq go off; and the remainder (2aq) at a red heat. Occurs in quartz veins near Falkenstein, Saxon Voigtland. Formerly called autunite (lime-uranite).

URANOPHANE.—Min., p. 805; App. II., p. 57.

URANOSPHÆRITE.—App. II., p. 57.

URANOSPINITE, App. II., p. 58.—In tabular crystals, combinations of *O*, $\frac{1}{2}$-$\bar{i}$, and $\frac{1}{2}$-$\breve{i}$, with two undetermined domes. $O \wedge \frac{1}{2}\text{-}\bar{i} = O \wedge \frac{1}{2}\text{-}\breve{i} = 124° 28'$; *c* (vert.): $\bar{b}:\breve{a} = 2{\cdot}9123 : 1$ (approx.): 1. *Weisbach*, Jahrb. Berg. Hüttenwesen, 1877, Abhandl., p. 46 (Z. Kryst., i., 394).

Contains, perhaps, 10aq (not 8aq), according to *Church*, Min. Mag., i., 236, 1877.

Uranothorite.—See *Thorite*, p. 121.

URANOTIL, App. I., p. 16; II., p. 58.—Occurs at the "Weisser Hirsch" mine, at Neustädtel, Saxony. In capillary crystals and crystalline groups, also massive, with fine fibrous fracture. G. = 3·814–3·898. Analyses: 1, 2, Winkler:

	SiO_2	UO_3	Fe_2O_3*	CaO	H_2O		
1.	13·02	63·93	3·03	5·13	14·55	=	99·66.
2.	14·48	62·84	2·88	5·49	13·79	=	99·48.

* With tr. aluminum and cobalt oxides.

The formula deduced (that of Boricky) is $Ca[U_2]_3Si_3O_{16} + 9aq$, which requires: SiO_2 14·26, UO_3 68·46, CaO 4·44, HO_2 12·84 = 100. *Weisbach*, J. Min., 1880, ii., 111.

Genth has obtained for uranotil, from Mitchell Co., N. C. (⅔): SiO_2 13·72, UO_3 66·67, Al_2O_3, Fe_2O_3 tr., PbO 0·60, BaO 0·28, SrO 0·13, CaO 6·67, P_2O_5 0·29, H_2O 12·02 = 100·38, for which he calculates the formula : $Ca_3(UO_2)_6Si_6O_{21} + 18aq$, requiring: SiO_2 13·95, UO_3 66·98, CaO 6·51, H_2O 12·56 = 100. Amorphous. H. = 2·5. G. = 3·834. Amer. Chem. Journ., i., 88, 1879.

Urvölgyite.—See *Herrengrundite*, p. 57.

Urusite.—See *Sideronatrite*, p. 109.

VAALITE.—App. II., p. 58.

VALENTINITE, Min., p. 184.—On barite from Nagybanya, *Brun*, Z. Kryst., v., 105, 1880.

VALLERIITE.—App. II., p. 58.

VANADINITE, Min., p. 184; App. II., p. 59.—**Cryst.**, Kappel, Carinthia, *v. Zepharovich*, Lotos, 1876 (J. Min., 1876, 561); Kappel, Carinthia, *Vrba*, Z. Kryst., iv., 353, 1880. Cordoba, *Websky*, Ber. Ak. Berlin, 1880, 799, and Z. Kryst., v., 542, 1881.

Analyses, Wanlock-Head, Dumfriesshire, *Frenzel*, Min. Petr. Mitth., iii., 504, 1881. Cordoba, *Rammelsberg*, Ber. Ak. Berlin, 1880, 661. Occurrence at Bölet, Sweden, *Nordenström*, Geol. För. Förh., iv., 209, 1878; anal. Nordström, ib., iv., 267, 1879.

Occurrence in brilliant red crystals at the Hamburg, and other mines in the Silver District, Yuma Co., Arizona, *B. Silliman*, Am. J. Sc., III., xxii., 198, 1881. At the Castle Dome mines, *W. P. Blake*, Min. Sc. Press, Aug. 13 (Am. J. Sc., xxii., 410), 1881.

VANADIOLITE.—App. I., p. 16.

VANADITE.—Min., p. 610; App. II., p. 59.

Vanuxemite. *C. U. Shepard*, Contrib. Min., 1876. A product of the decomposition of zinc ores at Sterling Hill, N. J. Occurs in irregular patches in a firm ochery aggregate. Massive, with an even or conchoidal fracture. Color white ; dull. H. = 2·5–3. G. = 2·5. Does not adhere to the tongue, but emits a slight clayey odor on being breathed upon. An analysis gave : SiO_2 35·64, Al_2O_3 11·70, ZnO 32·48–36·0, H_2O 14·80–19·88. [Obviously a mixture of white clay with hydrous zinc silicate, and hence not a mineral species.]

VARISCITE, Min., p. 582; App. II., p. 59.—The mineral called peganite from Montgomery Co., Ark., is shown by *Chester* (Am. J. Sc., III., xiii., 295; xv., 207) to be identical with the variscite of Breithaupt (Min., p. 582, and Petersen, J. Min., 1871, 357), and also with callainite of Damour (Min., p. 572). Occurs in crusts consisting of minute prismatic crystals, in sheaf-like aggregates; also amorphous. Observed planes: I, $i\text{-}\bar{\imath}$, $i\text{-}\breve{\imath}$, O; $I \wedge I$ = 114° 6′. H. = 4. Lustre brilliant. Color deep emerald green, bluish green to colorless. Transparent to translucent. B. B. infusible. Analysis (after deducting 70 and 50 p. c. quartz) :

	P_2O_5	Al_2O_3	H_2O		
(⅔)	44·35	31·85	23·80	=	100.

This corresponds to the formula : $Al_2P_2O_8 + 4aq$, or the composition of variscite, according to Petersen (J. Min., 1871, 357).

Anal., *Helmhacker*, Min. Petr. Mitth., ii., 245, 1879.

Vasite.—See *Orthite*, p. 87.

Venasquite.—See *Ottrelite*, p. 87.

Venerite. *T. S. Hunt*, Trans. Amer. Inst. Min. Eng., iv., 325, 1876.
Occurs as a greenish, earthy-looking "clay ore," in irregular layers in the schists connected with the magnetite of Jones mine, near Springfield, Berks Co., Penn. The purer portions have a pea-green, or apple-green color when moist; becomes greenish white on drying, and falls to powder. Under the microscope is seen to consist mostly of minute, shining, transparent scales, with some impurities. Analysis by G. W. Hawes, on material purified by washing, gave: SiO_2 28·93, Al_2O_3 13·81, Fe_2O_3 5·04, FeO 0·27, CuO 16·55, MgO 17·47, H_2O 12·08, insol. 6·22 = 100·37. After deducting the insoluble portion, this becomes: SiO_2 30·73, Al_2O_3 14·67, Fe_2O_3 5·35, FeO 0·29, CuO 17·58, MgO 18·55, H_2O 12·83 = 100. Named in allusion to the alchemistic symbol for copper.

[The substance examined is so evidently wanting in homogeneity, that it cannot be regarded as a mineral species.]

VERMICULITE, Min., p. 493; App. II., p. 59.—Analyses (by Gooch) of varieties from Lerni, Delaware Co., Penn., and Pelham, Mass., and discussion of the relations of this group of minerals, *J. P. Cooke*, Amer. Acad. Sc., x., 453, 1875. Anal., Walney Island, North Lancashire, England, *Parke*, Proc. York. Geol. Pol. Soc., II., iv., 254, 1877.

A related mineral (decomposition product) is called PROTOVERMICULITE by *König* (Proc. Ac. Nat. Sc. Philad., 1877, 269). Micaceous structure. Optic-axial angle small. H. = 2. G. = 2·269. Color yellowish silvery to bronze. Analysis: SiO_2 33·28, Al_2O_3 14·88, Fe_2O_3 6·36, FeO 0·57, MgO 21·52, H_2O (combined) 3·36, H_2O (hygroscopic) 20·54, MnO,TiO_2 tr. = 100·51. König (l. c.) has also analyzed the jefferisite of West Chester, Penn.

Another related mineral, from Philadelphia, is called PHILADELPHITE by *H. C. Lewis* (Proc. Ac. Nat. Sc. Phil., Dec., 1879). Micaceous. H. = 1·5. G. = 2·80. Color brownish red. Inelastic, feel greasy; axial angle 31°–39°. Analysis $(\frac{2}{2})$: SiO_2 35·73, Al_2O_3 15·77, Fe_2O_3 19·46, FeO 2·18, MgO 11·56, CaO 1·46, Na_2O 0·90, K_2O 6·81, H_2O 4·34, TiO_2 1·03, V_2O_3 0·37, MnO 0·50, NiO,CoO 0·06, CuO 0·08, P_2O_5 0·11, Li_2O,Cl,SO_3, etc. tr. = 100·36. Another analysis by Haines gave: 38·79 SiO_2, etc. The mineral is very hygroscopic, and on heating (150°–160°) expands to ten times its volume; a small fragment exfoliating raised 50,000 times its own weight. Lewis makes a series of careful experiments to determine at what temperatures the water is given off. König writes the formula for his mineral $R_3[R_2]Si_3O_{12} + H_2O$, and Lewis for his, $R_4[R_2]_2Si_5O_{20} + 2H_2O$; both are essentially the same as other varieties already described, except in the amount of water present. [As all the minerals of the group are, undoubtedly, decomposition products of other micas, the multiplication of names seems most undesirable.]

Vesbine. A name given by *Scacchi* to the material forming thin yellow crusts on the lava of 1631, Vesuvius, which is supposed to contain a new element called by him vesbium, Att. Accad. Napoli, Dec. 13, 1879.

VESUVIANITE, Min., p. 276; App. II., p. 59.—**Cryst.**, Albani Mts., showing variation in crystallographic constants, *Sella*, Z. Kryst., i., 251, 1877. Ural, *Tarassof*, Verh. Min. Ges. St. Pet., II., xiv., 139, 1879. *Groth* and *Bücking*, Min.-Samml. Strassburg, p. 199, 1878.

Thermo-electric character, *Hankel*, Pogg. Ann., clvii., 162, 1876.

According to *Mallard*, pseudo-tetragonal, and analogous to apophyllite (q. v., also App. III., p. 139), Ann. Min., VII., x., 133, 1876. See also *Brezina*, Min. Mitth., 1877, 98. *Dölter* finds, from a discussion of many measurements, no decisive evidence against the tetragonal character of species, that is, on the morphological side, Z. Kryst., v., 289, 1881.

Anal., Tschammendorf, near Strehlen, Silesia (1·77 p. c. TiO_2), *Schumacher*, J. Min., 1878, 817. Jordansmühl, Silesia (3·2–3·4 p. c. MnO, manganidocrase), *v. Lasaulx*, Z. Kryst., iv., 168, 1879.

VESZELYITE, App. II., p. 59.—*Schrauf*, Z. Kryst., iv., 31, 1879. Triclinic, monoclinic in habit. Incrusting, consisting of a granular aggregate of indistinct crystalline individuals. Occasionally in distinct crystals, combinations of the prisms and brachydomes; $I \wedge I' = 109° 15'$, $1\text{-}\breve{\imath} \wedge 1\text{-}\breve{\imath}' = 95° 10'$. H. = 3·5–4. G. = 3·531. Color and streak greenish blue. Analysis (on 0·1 gr.):

As_2O_5	P_2O_5	CuO	ZnO	H_2O		
10·41	9·01	37·34	25·20	17·05	=	99·01.

Formula: $2(Zn,Cu)_3As_2O_8 + 9(Zn,Cu)H_2O_2 + 9aq$; with Cu : Zn = 3 : 2, and $As_2O_5 : P_2O_5 = 1 : 1$; this requires: As_2O_5 12·13, P_2O_5 7·48, CuO 37·68, ZnO 25·62, H_2O 17·08 = 100. Closely related in form and composition to libethenite and adamite. Occurs as an incrustation on granite, and on limonite, at Morawitza, in the Banat.

VICTORITE.—App. II., p. 59 (18).

Vietinghofite.—See *Samarskite*, p. 106.

VILLARSITE.—Min., p. 409; App. II., p. 59.

VIRIDITE.—App. II., p. 59.

VIVIANITE, Min., p. 556; App. II., p. 59.—**Anal.**, white variety from Ámers, Belgium, *Dewalque*, Ann. Soc. Geol. Belg., iii., 3.

VOLBORTHITE, Min., p. 611.—Woskressenskoi, Perm in the Ural, Genth analyzed the coating on a quartzose rock, finding 85·55 p. c. insol., and 14·45 p. c. soluble, with 4·49 H_2O. The soluble portion yielded: V_2O_5 13·59, CuO 38·01, BaO 4·30, CaO 4·49, H_2O [31·60], SiO_2 1·36, Al_2O_3 4·78, Fe_2O_3 0·45, MgO 1·42 = 100. Neglecting the SiO_2,Al_2O_3,Fe_2O_3, MgO, and a part of the water as impurities, Genth calculates: $(Cu,Ba,Ca)_3V_2O_8 + 3CuH_2O_2 + 12aq$, requiring: V_2O_5 19·63, CuO 38·41, BaO 6·17, CaO 6·77, H_2O 29·02. A second analysis gave confirmatory results. Am. Phil. Soc. Philad., xvii., 122, 1877.

VOLTZITE, Min., p. 50.—Joachimsthal, optically uniaxial, positive, *Bertrand*, Bull. Soc. Min., iv., 59, 1881.

Vreckite.—See *Bhreckite*, p. 15.

WACKENRODITE.—App. II., p. 59.

WAD, Min., p. 181; App. II., p. 60.—**Anal.**, Londonderry, N. S., *Louis*, Trans. Nov. Sc. Inst., iv., 427, 1878. New Caledonia (asbolite), *Liversidge*, Proc. Roy. Soc. N. S. W., Sept. 1, 1880.

A mineral near some varieties of wad, from Kamsdorf, Thuringia, is called LEPIDOPHÆITE by *Weisbach* (J. Min., 1880, ii., 109). Structure fine fibrous and scaly. Very soft, soiling the fingers. G. = 2·89–3·04. Lustre silky, dull. Color and streak reddish brown, the latter shining. In closed tube becomes black. Soluble in HCl with evolution of chlorine. Analysis, Jenkins: MnO_2 58·77, MnO 9·59, CuO 11·48, H_2O 21·05 = 100·89, corresponding to $CuMn_6O_{12} + 9aq$, which requires: MnO_2 58·20, MnO 9·50, CuO 10·62, H_2O 21·68.

WAGNERITE, Min., p. 538; App. II., p. 60.—*Bauer* (ZS. G. Ges., xxvii., 230, 1875) suggests that KJERULFINE (App. II., p. 31) is probably identical with wagnerite, but more or less altered; later he shows that the identity is beyond question (J. Min., 1880, ii., 75). Analyses by *Pisani* (Bull. Soc. Min., ii., 43, 1879), *Rammelsberg* (ZS. G. Ges., xxxi., 107, 1879), *Friederici* (J. Min., 1880, ii., 77), agree in general with the wagnerite formula: $Mg_3P_2O_8 + MgF_2$. The form and optical characters have been studied by *Brögger* and *Reusch* (ZS. G. Ges., xxvii., 675, 1875), and *Brögger* (Z. Kryst., iii., 474, 1879), and a general correspondence with wagnerite finally proved.

Walkerite.—See *Pectolite*, p. 89.

WALPURGITE, App. I., p. 16; II., p. 60.—According to *Weisbach* (J. Min., 1877, 1) the crystals are triclinic, with pseudo-monoclinic symmetry, due to twinning. *Groth* confirms this by an optical examination, Z. Kryst., i., 93, 1877.

WALTHERITE.—See *Bismutite*, p. 15.

Waluewite.—See *Xanthophyllite*, p. 132.

WAPPLERITE, App. II., p. 60.—**Cryst.** and optical description, *Schrauf*, Z. Kryst., iv., 281, 1880.

WARWICKITE.—Min., p. 600; App. II., p. 60.

Wattevillite. *Singer*, Inaug. Diss. Würzburg, 1879, p. 18.

In very minute acicular crystals, orthorhombic or monoclinic; in part twins; forms fine fibrous aggregates. G. = 1·81. Color snow white. Lustre silky. Taste first sweet, then astringent. Analysis, after deducting 33·69 p. c. hygroscopic water:

SO_3	Al_2O_3	FeO	NiO	CoO	CaO	MgO	K_2O	Na_2O	H_2O	
44·01	0·24	0·88	1·05	1·30	16·87	2·49	4·74	10·46	17·73	= 99·77.

Calculated formula : $RSO_4 + 2aq$, very near polyhalite. B. B. swells up and fuses with difficulty to a white blebby enamel. Very soluble in water; from the concentrated solution, crystals of gypsum separate on standing, and still more quickly on warming. Found on lignite, associated with other related sulphates on the Bauersburg, near Bischofsheim vor dem Rhön, in Bavaria. Named after M. v. Watteville, of Paris.

WAVELLITE.—Min., p. 575; App. II., p. 60.

WERNERITE.—See *Scapolite*, p. 106.

Werthemanite. *Raimondi*, Min. Pérou, p. 244, 1878 (Domeyko, 5th Append. Min. Chili, 1876).

Massive, easily reduced to powder. G. = 2·80. Color white. Gives an argillaceous odor, and adheres to the tongue. Composition : $Al_2SO_6 + 3aq$. Analysis gave : SO_3 34·50, Al_2O_3 45·00, Fe_2O_3 1·25, H_2O 19·25 = 100. B. B. infusible. Soluble in acids. It differs from aluminite only in containing less water. Found in a bed of clay near the city of Chachapoyas, Peru. Pyr. as with aluminite. B. B. infusible; after ignition gives a blue color with cobalt solution. Insol. in HCl, HNO_3 and aqua regia.

WESTANITE.—App. I., p. 16.

WHEELERITE.—App. II., p. 60.

WHEWELLITE.—Min., p. 718; App. II., p. 61.

WHITNEYITE.—Min., p. 37; App. II., p. 61.

WILLCOXITE.—App. II., p. 61.

WILLEMITE.—Min., p. 262; App. II., p. 61.

WINKLERITE.—App. II., p. 61.

WINKWORTHITE.—App. I., p. 17.

WISERINE.—Min., p. 528; App. II., p. 61.—See *Octahedrite*, App. III., p. 85.

WITTICHENITE.—Min., p. 98; App. II., p. 61.

WÖHLERITE.—Min., p. 291; App. II., p. 62.

WOLFACHITE.—App. I., p. 17.

WOLFRAMITE, Min., p. 601; App. II., p. 62.—**Cryst.** description, Felsöbanya, *Krenner*, Min. Mitth., 1875, 9.

With tin-stone at Inverell, New South Wales, *Liversidge*, Proc. Roy. Soc. N. S. W., Nov. 3, 1880.

WOLLASTONITE, Min., p. 210; App. II., p. 62.—**Anal.**, Santorin, *Fouqué*, C. R., lxxx., 631, 1875.

WOLLONGONGITE, App. I., p. 17.—See *Torbanite*, p. 123.

WOODWARDITE.—Min., p. 666; App. II., p. 62:

WULFENITE, Min., p. 607; App. II., p. 62.—Occurrence in the silver district, Yuma Co., Arizona; sometimes in simple octahedral crystals, *B. Silliman*, Am. J. Sc., III., xxii., 203, 1881.

Schrauf has given the name CHROMOWULFENITE to some red wulfenite containing chromium, Ber. Ak. Wien, lxiii., 1871.

WURTZITE, Min., p. 59.—**Anal.**, Przibram, *Frenzel*, J. Min., 1875, 678.

Description of artifical crystals, hemimorphic, like greenockite, *Förstner*, Z. Kryst., v., 363, 1881.

See also *Erythrozincite*, p. 43.

XANTHIOSITE.—App. II., p. 62.

Xantholite.—See *Staurolite*, p. 114.

XANTHOPYLLITE, Min., p. 508.—A variety is called WALUEWITE by v. Kokscharof (*P. v. Jeremejef*, Verh. Min. Ges. St. Petersburg, II., xi., 341, 355, 1876; *N. von Kokscharof*, Z. Kryst., ii, 51, 1877 (Min. Russl., vii., 346)).

Monoclinic in symmetry. Axes, $c : b : \grave{a} = 3{\cdot}2728 : 1 : 0{\cdot}5768$. $\beta = 90° \; 0'$. Observed planes : O, $-\frac{1}{2}\text{-}i$, $\frac{1}{4}\text{-}i$, $i\text{-}\grave{3}$, $\frac{1}{8}$, $-\frac{1}{8}$, $\frac{3}{4}\text{-}\grave{3}$; $O \wedge -\frac{1}{2}\text{-}i = 109° \; 28'$; $O \wedge \frac{3}{4}\text{-}\grave{3} = 109° \; 28'$; $-\frac{1}{2}\text{-}i \wedge \frac{3}{4}\text{-}\grave{3} = 109° \; 28\frac{1}{2}'$: $O \wedge \frac{1}{4}\text{-}\grave{\imath} = O \wedge -\frac{1}{8} = -\frac{1}{8} \wedge \frac{3}{4}\text{-}\grave{3} = -\frac{1}{8} \wedge i - \frac{1}{2}\text{-}i = 140° \; 46'$; these angles correspond closely with the isometric system. Plane angle of the base 120°. Twins common, similar to those of mica; twinning-plane *I*. Cleavage: basal perfect. H. = 4·5. G. = 3·093. Lustre vitreous; on cleavage plane pearly. Color leek to bottle-green. Transparent to translucent. Strongly dichroic, parallel *c* (vert.) fine green, perpendicular to *c* (vert.) reddish brown. Optical properties (H. Bücking): axial plane the clinodiagonal section; bisectrix negative, inclined 32° to the normal (probable error not greater than 13'). Axial angle about 20½° (20°–40° Des Cloizeaux, $\rho < v$). Analysis, P. v. Nikolajef:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	H_2O		
16·90	43·55	2·31	0·33	17·47	13·00	5·07	=	98·63.

Found with perofskite and other species in chloritic schists in the mine Nikolaje-Maximilianowsk, near Achmatowsk, in the southern Ural. Named after the Russian Minister, P. A. von Waluew.

See also *Clintonite*, p. 28.

XENOTIME, Min., p. 528; App. II., p. 62.—**Cryst.**, Binnenthal, *Klein*, J. Min., 1875, 369; St. Gothard, ib., 1879, 536.

Occurrence at Königshayn, Görlitz, Silesia, *v. Lasaulx*, J. Min., 1877, 174. Crystals compounded with zircon from Alexander Co., N. C., *W. E. Hidden*, Am. J. Sc., III., xxi., 244, 1881.

Anal., Hitteröe, *Schiötz*, J. Min., 1876, 306.

Youngite. *Hannay*, Min. Mag., i., 152, 1877; ii., 88, 1878.

A coarsely crystalline, apparently homogeneous mineral. H. = 6. Lustre metallic, resembling fractured cast-iron. A specimen of unknown source yielded Hannay, analyses 1, 2, 3, 4; and a specimen from Bàllarat, Australia, gave Stewart and Hood, analyses 5 and 6 (mean of several):

		S	Pb	Zn	Fe	Mn	
1.	G. = 3·62	28·85	20·92	40·07	....	11·13	= 100·97.
2.	G. = 3·59	27·50	24·22	38·46	2·83	6·93	= 99·94.
3.		26·93	24·58	37·92	2·80	6·77	= 99·00.
4.		28·99	22·18	37·75	3·14	7·00	= 99·06.
5.		27·43	26·02	35·42	9·16	1·28, Sb 0·25, SiO_2 0·13	= 99·69.
6.	G. = 4·56	27·28	25·73	36·62	8·73	1·30, SiO_2 0·10	= 99·76.

Corresponds approximately to a simple sulphide containing lead and zinc, with varying quantities of iron and manganese. Named after Mr. John Young, of Glasgow.

[The description of "Youngite" is very incomplete (note the disparity in the determinations of the specific gravity), and the composition is improbable. Analyses 1 and 2, for which separate formulas are given by the author, were obtained from the same specimen! Beyond question a mechanical mixture.]

YTTROCERITE.—Min., p. 625; App. I., p. 62.

Yttrogummite.—See *Cleveite*, p. 27.

YTTROTANTALITE.—Min., p. 519; App. II., p. 62.

ZARATITE, Min., p. 710.—From the mines of Rapi, Province de la Mar, Peru, *Raimondi*, Min. Pérou, p. 206, 1878.

ZEPHAROVICHITE.—App. I., p. 62.

ZEUNERITE, App. II., p. 62.—**Cryst.**, and association with uranospinite, *Weisbach*, Jahrb. Berg.-Hütt., 1877, Abhandl., p. 45 (Z. Kryst., i., 394).

ZINC, Min., p. 17.—Reported as found in the native state in north-eastern Alabáma, *W. D. Marks*, Am. J. Sc. III., xi., 234, 1876.

Zincaluminite. *Bertrand* and *Damour*, Bull. Soc. Min., iv., 135, 136, 1881.

In minute crystals, forming very thin hexagonal plates. Optically uniaxial, negative, and hence hexagonal, or possibly orthorhombic with $I \wedge I = 120°$ nearly (Bertrand). H. = 2·5–3. G. = 2·26. Color white, or slightly bluish. Analysis, Damour, deducting a little clay associated with it:

SO_3	Al_2O_3	ZnO	CuO	H_2O	
12·94	25·48	34·69	1·85	25·04	= 100.

Formula: $2ZnSO_4 + 4ZnH_2O_2 + 3Al_2H_6O_6 + 5aq$, requiring: SO_3 12·48, Al_2O_3 24·12, ZnO 38·12, H_2O 25·28 = 100. B. B. in the closed tube gives off abundance of water. Slightly alkaline. With cobalt solution on strong ignition, gives a greenish-gray mass with blue at some points. On charcoal a zinc coating. Soluble in HNO_3, leaving 5 to 7 p. c. clay. From the zinc mines of Laurium, Greece.

ZINCITE.—Min., p. 135; App. II., p. 63.

ZINKENITE, Min., p. 88.—**Anal.**, *Sendtner*, from Adlersbach, near Hausach, Kinzigthal, Ann. Ch. Pharm., clxxxv., 205, 1877.

ZINNWALDITE.—See *Mica Group*, p. 77.

Zircarbite. *C. U. Shepard*, Contrib. Min., 1877. A massive, compact, or cellular, yellowish-brown, opaque mineral. H. = 2–2·5. B. B. infusible. Chemical nature unknown. With cyrtolite, at the granite quarries of Rockport, Mass.

ZIRCON, Min., p. 272; App. II., p. 63 —Supposed to occur in microscopic twin crystals, *Meyer*, ZS. G. Ges., xxx., 11, 352, 1878; *Stapff*, l. c., xxx., 138 ; xxxi., 405, 1879; *Riess*, Min. Petr. Mitth., i., 203, 1878; *Hussak*, Min. Petr. Mitth., i., 277, 1878; this conclusion questioned by *Sauer*, J. Min., 1879, 569; *Rosenbusch*, Att. Accad. Torino, June 19, 1881.

Large twin crystal (1-*i* as twinning-plane), from Renfrew, Canada, *W. E. Hidden*, Am. J. Sc., III., xxi., 507, 1881; same observed by *L. Fletcher*, Z. Kryst., vi., 80, 1881. The crystals from Renfrew occur with gigantic titanite crystals (p. 122), and are sometimes very large. From various Italian localities, *Uzielli*, Accad. Linc. Mem., II., iii., 862, 1876.

Mallard (Ann. Min., VII., x., 143, 1876) includes zircon among the pseudo-tetragonal minerals.

Specific gravity determination, *Church*, Geol. Mag., II., ii., 322, 1875.

Anal., El Paso, Colorado, *König*, Am. Phil. Soc. Phil., xvi., 518, 1877, or Z. Kryst., i., 432.

Color due to state of oxidation of iron, and varied in R. F. and O. F., *Spezia*, Att. Acc. Torino, xii., 37, 1876.

A variety of zircon from Ceylon is called BECCARITE by *Grattarola* (Att. Soc. Tosc., iv., 177, 1879). Color olive green. Optically biaxial, with apparently twinned structure; a basal section is divided into four sectors in polarized light. Form and other characters like zircon. Analysis : SiO_2 30·30, ZrO_2 62·16, Al_2O_3 2·52, CaO 3·62, ign. 0·30 = 98·92. Named for Dr. O. Beccari.

See also *Cyrtolite*, p. 33.

ZIRLITE.—App. II., p. 63.

ZÖBLITZITE, App. II., p. 34.—**Anal.** (a white serpentine), *Frenzel*, J. Min., 1875, 680.

ZOISITE, Min., p. 290; App. II., p. 63.—**Anal.**, Syra, *Lüdecke*, ZS. G. Ges., xxviii., 258, 1876. Leiperville, Delaware Co., Pa., *König*, Proc. Ac. Nat. Sc. Philad., 1878, 83.

Cryst. (thoulite), Souland, Norway, *Brögger*, Z. Kryst., iii., 471, 1879.

Crystallographically and chemically investigated by *Tschermak* and *Sipöcz* (Ber Ak. Wien, lxxxii., 141, 1880). The measurements (of crystals from Ducktown, Tenn., by Becke) confirm the accepted orthorhombic character. The optical characters are peculiar, in consequence of the presence of twin lamellæ. An analysis of transparent crystals from Ducktown, by Ludwig, gave : SiO_2 39·61, Al_2O_3 32·89, Fe_2O_3 0·91, Fe 0·71, MgO 0·14, CaO 24·50, H_2O 2·12 = 100 88. This corresponds to the already accepted formula : $H_2Ca_4[Al_2]_3Si_6O_{26}$, analogous to that epidote, in which $[Fe_2]$ takes the place of $[Al_2]$; between the two various intermediate compounds exist, according to the extent to which the iron and aluminum respectively replace each other.

ZONOCHLORITE.—See *Prehnite*, p. 96.

ZORGITE, Min., p. 43.—Analyses of related minerals $(Pb,Cu)Se$, and $(Cu,Pb)_3Se_2$, from the Andes, *Pisani*, C. R., lxxx., 391, 1879.