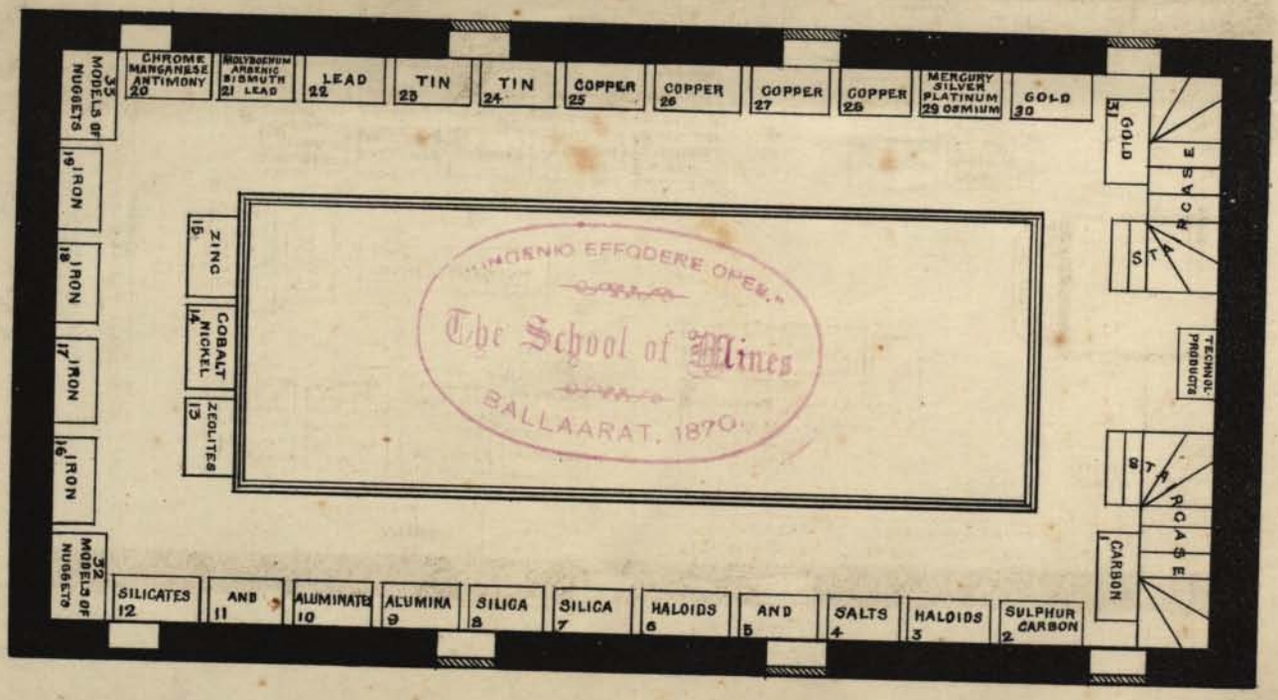
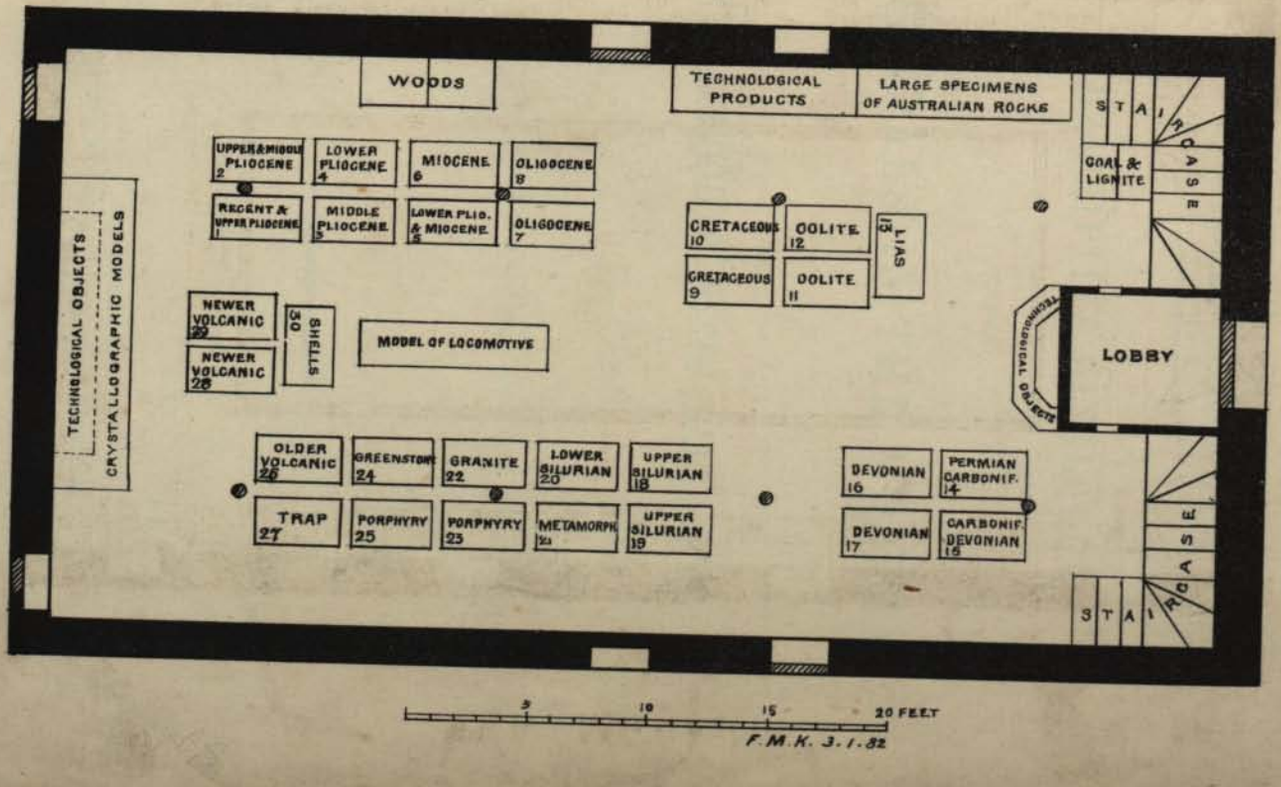
MUSEUM FOR GEOLOGY MINERALOGY
AND
TECHNOLOGY
SCHOOL OF MINES,
BALLAARAT.

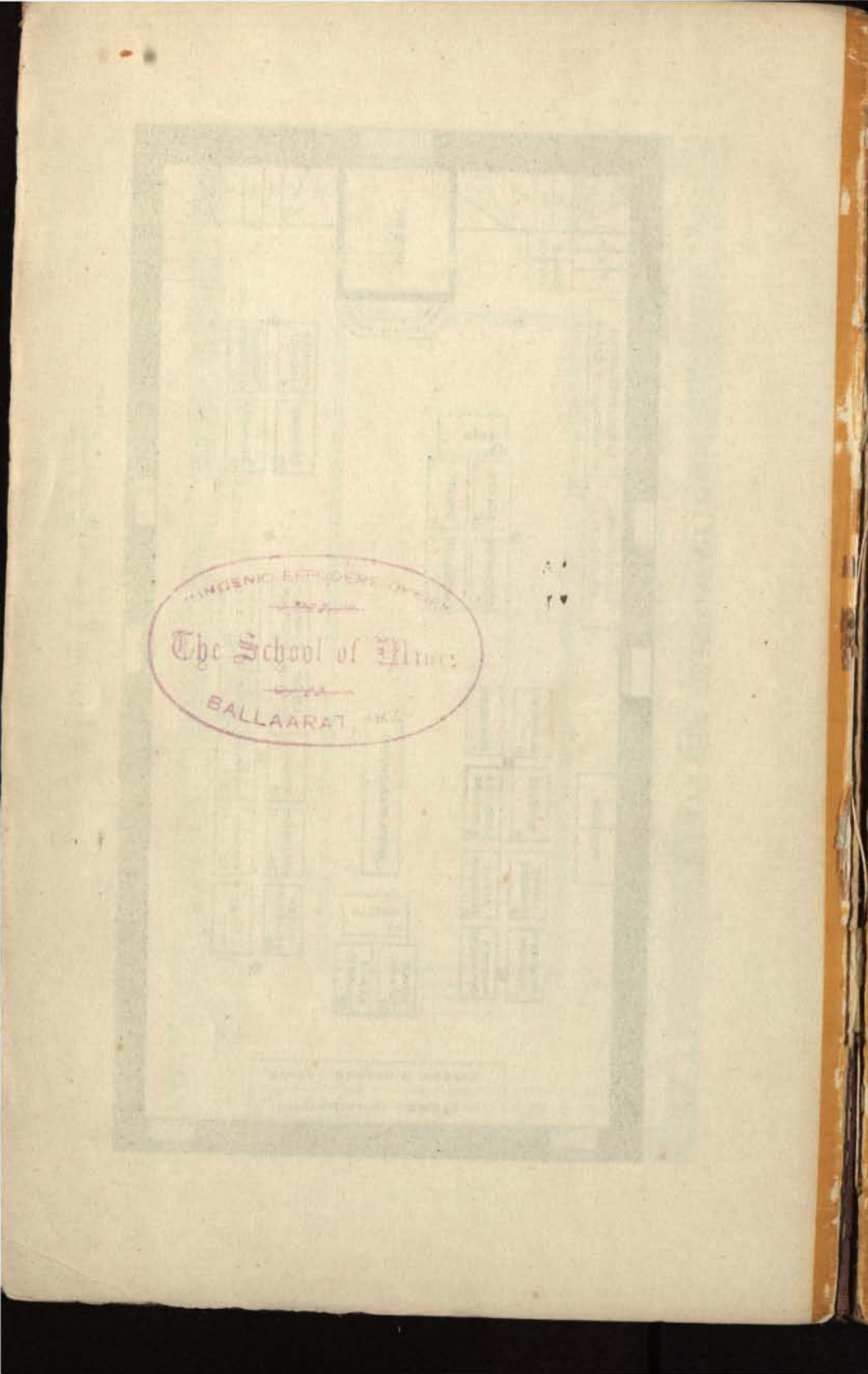
The Museum.

Plan of Gallery



Plan of Groundfloor





INGENIO EFFODERE OPES.

A DESCRIPTIVE CATALOGUE

OF THE

MINERALS IN THE MUSEUM

OF

THE SCHOOL OF MINES, BALLAARAT,

BY

F. M. KRAUSÉ, CURATOR.

BALLAARAT:
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1882.

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MINERALS IN THE MUSEUM

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THE SCHOOL OF MINES, BALLAARAT.

INTRODUCTION.

The collection is still in its early growth, and far from being a complete representation of the Mineral Kingdom; many varieties, species, and even whole groups are absent. This state of incompleteness will, no doubt, be adjusted in the sequence, and progressive lists issued from time to time. *Ad interim* the present catalogue will, be found useful to students and visitors of the school.

As far as practicable, the classification of the minerals accords with that adopted at the Royal School of Mines, London.

The numbers prefixed to the species in the catalogue agree with those on the descriptive labels which accompany each specimen, and also with those attached to the specimens themselves.

On the descriptive labels the chemical composition of the minerals is expressed in formulæ usually employed in standard mineralogical works. Students who have not paid attention to mineralogical chemistry will note that each dot over a symbol is equivalent to one atom of oxygen, thus $\dot{F} = FeO$; $\ddot{\ddot{P}} = PO^5$. A bar through a symbol denotes a double atom of the base, thus $\bar{F}e$ stands for 2 Fe, or Fe^2. For instance, sesqui-oxide of iron ($Fe^2 O^3$) is written $\dddot{\bar{F}}e$.

The cases are numbered and placed in the Museum, as shewn in the annexed diagram plan of the gallery. The arrangement is as follows:—

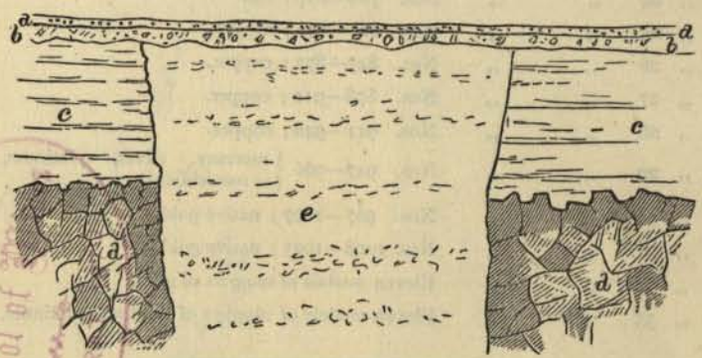
Case	1	contains specimens,	Nos.	1 to 30a; carbon group.
,,	2	,, ,,	Nos.	31—55; carbon, sulphur, and alkali.
,,	3	,, ,,	Nos.	55a—87 { alkali group; baryta, strontia, lime.
,,	4	,, ,,	Nos.	88—125; lime.
,,	5	,, ,,	Nos.	126—155; lime.
,,	6	,, ,,	Nos.	156—192c; lime, magnesia.
,,	7	,, ,,	Nos.	193—225; silica.
,,	8	,, ,,	Nos.	226—263; silica.
,,	9	,, ,,	Nos.	264—310a; silica, alumina; silicates.
,,	10	,, ,,	Nos.	311—344; silicates.
,,	11	,, ,,	Nos.	345—377; mica group; hornblende group.
,,	12	,, ,,	Nos.	378—407; serpentine group.
,,	13	,, ,,	Nos.	408—435; zeolite group.
,,	14	,, ,,	Nos.	436—469 { silicates, aluminates; cobalt; nickel; cadmium.
,,	15	,, ,,	Nos.	470—487; zinc.
,,	16	,, ,,	Nos.	488—523; magnetite; hematite.
,,	17	,, ,,	Nos.	524—557; limonite; chalybite.
,,	18	,, ,,	Nos.	558—590; chalybite, pyrite.
,,	19	,, ,,	Nos.	591—626; iron ores continued.

Case 20	contains	Specimens,	Nos. 627—672	chromium, uranium, manganese, antimony.
,, 21	,,	,,	Nos. 673—707	molybdenum, arsenic, bismuth, lead.
,, 22	,,	,,	Nos. 708—747	lead.
,, 23	,,	,,	Nos. 748—779	tin.
,, 24	,,	,,	Nos. 780—819	tin.
,, 25	,,	,,	Nos. 820—846	copper.
,, 26	,,	,,	Nos. 847—877	copper.
,, 27	,,	,,	Nos. 878—910	copper.
,, 28	,,	,,	Nos. 911—946	copper.
,, 29	,,	,,	Nos. 947—966	mercury, silver, platinum, osmiridium.
,, 30	,,	,,	Nos. 967—1007	native gold.
,, 31	,,	,,	Nos. 1008—1025	native gold.
,, 32	,,	,,	Eleven models of nuggets of gold.	
,, 33	,,	,,	Eleven models of nuggets of gold and platinum.	

Diamond, PURE CARBON, C.—Until comparatively recently the occurrence of diamonds in various parts of the world was noted only in pliocene and post-tertiary gravels, loose or cemented, similar to the "wash-dirt" of our goldfields. Although the mineral was known to affect regions where the country-rock is talcose, *i.e.*, rich in magnesia silicate, it was left to the South African "diamond hunters" to discover an actual matrix of the diamond. At Kimberley it is found in an intrusive greenstone, largely composed of hypersthene (silicate of magnesia and iron). The mode of occurrence is shewn on annexed diagram. The particulars were obtained from verbal descriptions and a series of rock specimens supplied by Mr. J. W. Stone, of Kimberley, during a visit to Ballarat in February, 1881. The origin of the South African "drift holes" is so far a problem, as nothing similar has been observed by geologists in other parts of the world. The "drift hole," of which a section is given, is nearly circular and upwards of 500 feet in diameter, but there are others

in the neighborhood of oval shape and less extent. The walls of the "drift hole" are nearly vertical and require shoring. The depth to which workings had reached in December, 1880, was 350 feet.

VERTICAL SECTION OF "DRIFT HOLE" KIMBERLEY MINE, SOUTH AFRICA.



a. Ferruginous sand	2 — 4 feet.
b. Clay, with calcareous concretions	3 — 12 feet.
c. Tertiary (Miocene ?) clay shales, red, yellow, and grey, with thin lignite seams and carbonaceous layers containing vascular cryptogams (locally called "carbonised moss"), and leaves of lauraceous plants.....	200 feet.
d. "Greenstone;" Gabbro (hypersthenite). The diamond matrix.	
e. Cavity, several hundred feet in depth, filled with "diamond earth," a drift of sand, gravel, and shingle, and containing, besides fragments of the bounding rocks, the following minerals:—Rock crystal, topaz, diallage, hypersthenite, ilmenite, garnet, and diamond.	

The diamonds inserted in the rock drills now so widely employed on our mining fields comes from Brazil. It is there found as *boart*, a black massive variety composed of almost pure carbon, and as "*carbon*," an anthracitic mineral with 97 per cent. of carbon. Both varieties are employed in the rock borers; the price of boart is 42s per carat, that of the "carbon" 26s per carat. A rock drill of 3-inch calibre requires £400 worth of diamonds per annum when in constant use.

Crystals of pure water, but oftener of a yellowish tinge, usually

of octahedral shape, and up to 2⅛ carats in weight, have been found in the auriferous post-tertiary drifts of Beechworth. The value of all diamonds unearthed in Victoria down to the year 1881 is estimated by the Mining Department at £108. Larger yields are reported from Mudgee and Bingera, in New South Wales, where the mineral occurs in older pliocene gravel beds, and also in beds younger but apparently derived from their abrasion. At Mudgee stones as large as 5⅝ carats have been found.

The value of brilliants, free from flaws and perfectly colorless, is as under :—

½ carat	in weight,	£6	0 0
¾ carat	,, ,,	£10	10 0
1 carat	,, ,,	£18	0 0
1¼ carat	,, ,,	£30	0 0
1½ carat	,, ,,	£38	0 0
1¾ carats	,, ,,	£48	0 0
2 carats	,, ,,	£65	0 0
3 carats	,, ,,	£125	0 0
4 carats	,. ,,	£200	0 0
5 carats	,, ,,	£320	0 0

1. DIAMOND.—Six-faced octahedron, transparent, with yellowish tinge. In gabbro, with hypersthene, garnet, hornblende, and mica. *Found at a depth of* 300 *feet at Kimberley, South Africa.*

1*a*. MODELS OF BRILLIANTS.

1. DUKE OF TUSCANY, 126 carats.
2. PASHA OF EGYPT, 40 carats.—Belongs to the Viceroy of Egypt.
3. SHAH OF PERSIA, 86 carats.—In possession of the Emperor of Russia.
4. SANCY, 53½ carats.—French Imperial jewels.
5. POLAR STAR, 58 carats.—Russian Crown jewels.
6. KOH-I-NOOR, 106 1-16th carats.—British Crown jewels.
7. REGENT, 136¾ carats.—French Crown jewels.
8. GREAT MOGUL, 279 carats.—Emperor of China.
9. NASSAC, 78⅝ carats.—Marquis of Westminster.
10. NEW KOH-I-NOOR, 118 carats.
11. SOUTH STAR, 125 carats.—Mr. Coster, Amsterdam.
12. HOPE, 44½ carats.—The only existing blue diamond of value. It is the property of a private gentleman in England.

13. ORLOFF, 194¼ carats.—In the sceptre of the Czar of Russia.

14. EUGENIE BRILLIANT, 51 carats.—The property of the late Empress of the French, after whom it is named.

15. PIGGOTT, 82¼ carats.—Sold to the Viceroy of Egypt for the sum of £30,000.

Graphite (plumbago); carbon, with generally an admixture of silica, clay, and iron. Itself the product of complete metamorphism, it chiefly occurs in crystalline rocks, either in distinct layers (Stawell, Nelson, N.Z.) or disseminated through the rock, as plumbaginous mica schist, granite, &c. (Queensland), or in bands and seams through and adjoining metalliferous lodes (auriferous quartz veins, Ballaarat, Steiglitz). The pure graphite is employed for "lead" pencils, while that containing silicious, argillaceous, or ferruginous matter finds application as "black lead," and in the manufacturing of assay crucibles (see the exhibits of the Battersea Company on the ground floor of the hall).

2. GRAPHITE.—Foliated.—*South Australia.*

3. GRAPHITE.—Granular.—*Cowra, Murrumbidgee, New South Wales.*

4. GRAPHITE.—Earthy with quartz; from marine miocene beds.—*Murray Flats.*

5. GRAPHITE.—Massive.—*Between Maryborough and Gympie, Queensland.*

5*a*. GRAPHITE.—Highly ferruginous.—*Northern Queensland.*

5*b*. GRAPHITE.—Coating on metamorphic slate.—*Stawell.* (Lower Silurian).

6. GRAPHITE.—Kidney-shaped concretion.—*Collingwood, New Zealand.* (Cretaceous).

7. GRAPHITE.—Foliated. *Buckingham, Canada.* (Palæozoic).

8. GRAPHITE.—Massive.—*Cumberland.* (Palæozoic).

Coal; carbon, with oxygen, nitrogen, and hydrogen (bitumen) and earthly impurities. According to the proportion of bitumen, we distinguish *anthracite, mineral coal, brown coal,* and *lignite*—the last containing most bitumen, anthracite the least. Mineral coal

8ª Graphite; laminar; Ceylon

10ª Anthracite; laminar; Pennsylvania, North America.
Analysis C 90·45, H 2·03, O 2·45, Ash 4·67 = 100·00

may be briefly classed into *caking coal* (brittle, readily fuses into clinkers), *cannel coal* (compact, burns freely owing to large amount of hydro-carbons), *splint coal* (dense, little-caking), and *cherry coal* (soft, easily fractured, non-caking). Mineralogically, it is often difficult to draw a line between mineral coal and brown coal. Geologically speaking, all phytogenic rocks older than tertiary are true coal, while those above the chalk are classed as brown coal, lignite, and peat.

9. ANTHRACITE.—Fissile, with shale; palæozoic.—*Tasmania.*

10. ANTHRACITE.—Conchoidal; palæozoic.—*Reading, North America.* Analysis: Carbon 92·80, hydro-carbons 5·68, ash 1·52, = 100·00,

11. CAKING COAL.—Laminated, palæozoic.—*Wallsend, Newcastle, New South Wales.* Analysis: Hygroscopic moisture 2·75, volatile hydro-carbons 34·17, sulphur 1·22, fixed carbon 57·22, ash 4·64 = 100·00.

12. CAKING COAL.—Laminar; mesozoic.—*Kilcunda, Western Port.* Analysis: Moisture 2·52, volatile 36·74, carbon 54·60, ash 6·14 = 100·00.

13. CAKING COAL.—Laminar; mesozoic.—*Traralgon, Gippsland.* Analysis: Moisture 1·85, volatile 35·98, carbon 53·45, ash 8·72 = 100·00.

14. SPLINT COAL.—Shaley; mesozoic.—*Traralgon, Gippsland.* Analysis: Moisture 1·12, volatile 35·62, carbon 42·68, ash 20·58 = 100·00.

15. CAKING COAL.—Laminated, conchoidal; mesozoic.—*Cape Patterson.* Analysis: Moisture 2·43, volatile 36·83, carbon 54·37, ash 6·36 = 100·00.

16. CHERRY COAL.—Brittle, earthy; mesozoic.—*Loutit Bay.*

17. SPLINT COAL.—Shaley; mesozoic.—*Latrobe River, Gippsland.* Analysis: Moisture 5·78, volatile 26·31, carbon 42·12, ash 25·69 — 100 00.

18. WOLLONGONGITE (Silliman), CANNEL COAL ("Kerosene Shale.")—Massive, conchoidal; yields 160 gallons of crude oil

to the ton.—*Hartley, New South Wales.* Analysis: Volatile 82·24, carbon 4.97, ash 12·79 = 100·00.

19. CANNEL COAL.—Massive; mesozoic.—*Westport, Nelson, New Zealand.* Analysis: Moisture 2·72, volatile 41·81, carbon 51·21, ash 4·21 = 100·00.

20. SPLINT COAL.—Laminar, sub-conchoidal; mesozoic.—*South of Colac.*

21. SPLINT COAL.—Laminar; mesozoic.—*Coleraine.*

22. BROWN COAL.—Brittle, conchoidal; miocene.—*Crossover Creek, Gippsland.* Analysis: Moisture 17·73, volatile 41·25, carbon 35·17, ash 3·85 = 100·00.

23. BROWN COAL.—Massive, conchoidal; miocene.—*Tuscany, Italy.*

24. JET (Lignite).—Conchoidal; tertiary.—*Italy.*

25. BROWN COAL.—Laminar; miocene.—*Zurich, Switzerland.*

26. BROWN COAL.—Cuboidal, brittle; miocene.—*Lal Lal.* Analysis: Moisture 48·20, volatile 20·70, carbon 29·30, ash 1·30 = 100·00.

27. LIGNITE.—Woody structure distinct; miocene.—*Lal Lal.*

28. LIGNITE.—Woody, fibrous; middle pliocene.—*Napoleons, Ballarat.*

29. BROWN COAL.—Brittle, earthy, in part laminar; pliocene.—*Emu Creek, Skipton.* Analysis, Moisture 28·60, volatile 27·90, carbon 16·27, ash 27·23 = 100·00.

30. LIGNITE.—Resinous, sub-conchoidal; miocene.—*Horsham.* Analysis: Moisture 6·88, volatile 46·93, carbon 40·75, ash 4·41, sulphur 1·03 = 100·000. Specific gravity, 1·185.

Bitumen; C, O, H, N, in varying proportions; includes asphalte, mineral pitch, naphtha, and petroleum (kerosene). These substances are apparently the result of distillation of vegetable or other organic matter, and occur either *per se*, or permeating clay and shale (bituminous shale).

31. ASPHALTUM.—Amorphous, conchoidal.—*Kangaroo Island,*

19ª Cannel Coal; dense, Conchoidal.- Wigan, Lancashire.
Analysis: C80·07, H 5·71, O 7·82, Ash 2·40 = 100·00

24ª Jet. massive, Conchoidal; from alum shale (Upper Lias) Whitby, Yorkshire.

26ª Brown Coal.- Laminar, Bovey Tracey Devon, (probably Oolitic).
Analysis: C 66·31, H 5·63, O 22·86, N 0·57, S 2·36, Ash 2·27 = 100·00

32ª Asphaltum. Massive - Pitchlake, Trinidad. - Composition: - C 65, H 9, O 8, Ash 18 = 100.

33ª Elaterite. Elastic, spongy. Castleton, Derbyshire Composition: C 85, H 12·5, O 2·5 = 100·00

South Australia. Composition: C 75·50; H 9·31; O 10·42; N 2·11; ash, 2·66 = 100·00.

32. Asphaltum.—Amorphous, on selenite.—*Sicily.* Composition: C 67·43; H 7·22; O 23·98; N 1·37; ash trace = 100·00.

33. Coorongite (var. Elaterite).—Elastic bitumen.—*North of Coorong, South Australia.* Composition: C 86, H 12, O 2 = 100.

34. Pyropyssite (var. Zietrisikite).—Wax coal; earthy, friable.—*Voldarno, Tuscany, Italy.* Composition: C 84·60, H 15·31, = 99·91.

35. Copalite.—Translucent.—*Kangaroo Island, South Australia.* Composition: C 86, H 11, O 2·7, ash 0.3 = 100·00.

36. Copalite (Retinite).—Transparent, in coal.—*East India.* Composition: C 86.67, H 11.47, O 2·84, ash 0·02 = 100·00.

37. Copalite.—Resinous.—*From Brown Coal Basin, Lal Lal.* Composition; C 85, H 11, O 2·8, ash 1·2 = 100.

38. Ambrite.—Amorphous, amber-like in color and transparency.—*Auckland, New Zealand.* Composition: C 76·53, H 10·58, O 12·70, ash 0·19 = 100·00.

39. Tasmanite.—Resiniferous shale; disseminated in scales through grey shale.—*Mersey River, Tasmania.*

40. Tasmanite.—Similar to 39. Composition: C 79·34, H 10·41, O 4·93, S 5·32 = 100.00.

40*a*. Bituminous Shale.—Laminar.—*Welshpool.*

40*b*. Bituminous Shale.—Laminar.—*Orepuki, New Zealand.* Composition: Moisture 2·509, hydro-carbons, volatile 52·005, fixed carbon 15·389, ash 30·097 = 100 000.

Sulphur; occurs in nature, *firstly*, as a sublimate, the result of igneous agency, in the proximity of points of volcanic eruption (White Island, in the Bay of Plenty, New Zealand), or of burning coal seams (Tasmania), and, *sccondly*, as chemical products, such as are yielded by the decomposition of metallic sulphides (antimony lode, Costerfield; auriferous quartz reefs at Maldon and Castle-

maine), or of hepathic spring waters (Ohæawai, Auckland, N.Z)

41. NATIVE SULPHUR.—Scales in calcareous clay.—*Murcia, Spain.*

42. NATIVE SULPHUR.—Rhombic prisms and pyramids on quartz.—*Cesina, Italy.*

43. NATIVE SULPHUR.—Crystalline.—*Crater of Vulcano Island, Mediterranean.*

44. NATIVE SULPHUR.—Disseminated through limestone, with celestite.—*Circenti, Sicily.*

44*a*. NATIVE SULPHUR.—Massive on celestite.—*Circenti, Sicily.*

45. NATIVE SULPHUR.—Efflorescent on alum.—*Italy.*

46. NATIVE SULPHUR.—Disseminated through limestone.—*Jorli, Middle Italy.*

47. SELEN-SULPHUR.—Massive.—*Circenti, Sicily.*

48. NATIVE SULPHUR.—Crystalline, with celestite in limestone.—*Circenti, Italy.*

49. NATIVE SULPHUR.—Massive, partly pulverulent.—*Solomon Islands, South Seas.*

50. NATIVE SULPHUR.—Stalagmitic.—*Borneo.*

Boron, B; occurs in nature as sassolite (hydrated boric acid) and as borax (hydrated borate of soda). The latter is a valuable flux in metallurgical processes. Sassolite is manufactured into borax.

51. SASSOLITE.—Crystalline scaly, with native sulphur.—*Vulcano Island, Mediterranean.*

Potash Alum; is rarely found in large quantities in nature. The alum of commerce is made from clays and shales (silicates of alumina).

52. KALINITE (Sulphate of alumina, 36 2 ; sulphate of potash, 18·4 ; water, 45·4 = 100·0).—Maccled octahedra.—*Montioni, Tuscany, Italy.*

53. KALINITE.—Fibrous.—*Spain.*

54. KALINITE (?).—Sulphate of alumina without the potash, efflorescent.—*Shoalhaven River, New South Wales.*

50ª Native Sulphur.—Acute rhombic pyramids; with Calcite.
Brook Lodge, County Galway, Ireland.

51ª Sassolite.—White scaly powder with native sulphur.
Lipari Isles.

54ª Alunite.- Small obtuse rhombohedra; partly massive. Mussy, Hungary.

55ᵇ Wavellite; phosphate of alumina. Acicular rhombic prisms, arranged in hemispheric form, on Clay slate. Barnstable, Devonshire.
55ᶜ Halite.- Crystalline. Wieliczka, Poland.

60ª Barite. Rhombic prisms. Ofen, Hungary.

61ª Barite.- Flat rhombic prisms, with galena. Cumberland, England.
61ᵇ Barite.- Large, detached, transparent rhombic prism.- Dufton, Westmoreland.

66ª Barytocalcite; Carbonate of Baryta with Carbonate of lime. Oblique rhombic prisms. Alston Moor, Cumberland.

55. ALUNITE (Alum-stone).—Alumina, 39·65; sulphuric acid, 35·50; potash, 10·02; water, 14·83 = 100·00; minute rhombohedra on limestone.—*Tolfa, near Civita Vecchia, Italy.*

55*a*. HALITE (Rock Salt). — Chloride of sodium 91·63, chloride of potassium 0·21, chloride of magnesium 2·40, sulphate of magnesia 4·86, sulphate of lime 0·81, organic matter 0·09 = 100·00; crystalline granular mass.—*St. Mary's Lake, Mt. Arapiles, west of Horsham.* One gallon of water contains 1½ lb. of salt.

Barite (heavy spar), Sulphate of Baryta; occurs generally in metalliferous veins, *e.g.*, in auriferous quartz reefs at Maldon, in copper lodes at Merinoo, N.S.W. Barite finds its principal application in pyrotechny, owing to the green coloration it imparts to the flame when ignited; it is also used as a pigment. Its commercial value in Europe is about 20s. a ton.

56. BARITE —Massive —*Bairnsdale, Gippsland.*

57. BARITE.—Rhombohedral tables on heulandite, encrusting clay slate —*Maldon.*

58. BARITE.—Globular concretions, with columnar structure, with calcite —*Saxony.*

59. BARITE.—Rhombic prisms on calcite —*Clausthal, Hartz.*

60. BARITE.—Crested, massive aggregation of rhombic tables. —*Saxony.*

61. BARITE.—Radiating, banded, artificially polished.—*Durham, England.*

62. BARITE.—Large rhombohedral plates.—*Cornwall.*

63. BARITE.—Granular, encloses galena.—*Nova Scotia.*

64. BARITE.—Lamellar.—*Landsdowne, Canada.*

65. BARITE.—Tabular crystals.—*Buckingham, Canada.*

66. BARITE.—Massive.—*Canada.*

67. WITHERITE.—Carbonate of baryta; columnar, fibrous.—*Lancashire.*

68. WITHERITE.—Fibrous, with barite, galena, and chalcopyrite.—*New South Wales.*

Strontia, SrO; of Salts of Strontia the nitrate is employed in pyrotechny for its red color; the sulphate found in nature is artifically converted into nitrate.

69. CELESTITE.—Sulphate of strontia; crypto-crystalline, with native sulphur.—*Circenti, Sicily*

70. CELESTITE.—Rhombic prisms on native sulphur.—*Pernice, Racculmuto, Sicily.*

71. CELESTITE.—Rhombic prisms on native sulphur.—*Sicily.*

72. CELESTITE.—Columnar crystals, of light blue color.—*Sicily.*

73. CELESTITE.—Fibrous; from new red marl.—*Bristol, England.*

Lime, CaO, forms one of the principal constituents of the earth's crust. For the most part, however, it enters into composition of rock masses, the consideration of which belongs to the petrographical branch of geology. As minerals, account is taken only of such calcium salts as occur either crystallised or crystalline;

Marble, crystalline granular carbonate of lime.

74. MARBLE.—Brown, cross-banded; locally calted "Pæsina" fine grained.—*Firenze, Italy.*

75. MARBLE.—White statuary, with rock crystal.—*Carrara Italy.*

76. MARBLE.—White coarse-grained, with rock crystal.—*Carrara, Italy.*

77. MARBLE.—White with dark veins, fine grained.—*Carrara, Italy.*

78. MARBLE.—Dove-colored, veined, locally called "Bardiglio".—*Massa, Apuan Alps, Italy.*

79. MARBLE.—Grey with dark veins.—*Luchera near Strazzana, Apuan Alps.*

80. MARBLE.—White, statuary fine grained.—*Polvaccio quarry, Carrara.*

81. MARBLE.—White, statuary, fine grained.—*Grestola quarry, Carrara.*

82. MARBLE.—White with faint veins.—*Massa, Apuan Alps.*

73ª Strontiarite; Carbonate of Strontia.. Massive, stellated Strontian, Argyleshire, Scotland.

83. MARBLE.—White, statuary, fine grained; *Campaccio, Apuan Alps.*

84. MARBLE.—Red, colored by ferric oxide, locally called "Rossoné di Silva"; slightly veined; *Santo Ambrogio, Verona, Italy.*

85. MARBLE.—Dappled reddish-brown, locally called "Corna Bianca;" *Lubiara, Verona, Italy.*

86. MARBLE.—Yellow with darker veins; *Cerbaia near Sovicille, Siena, Italy.*

87.—MARBLE.—Black with faint lighter veins; *Gazzaniga, Bergamo, Italy.*

Calcite; carbonate of lime, with hexagonal crystallisation.

88. CALCITE.—Obtuse rhombohedra studded with cubic pyrite, on metamorphic slate; *Stawell.*

89. CALCITE.—Orange-colored globules with acicular crystals, on basalt; *Richmond, Victoria.*

90. CALCITE; druse in basalt, coated with zeolite; *Richmond.*

90*a*. CALCITE; tapering prisms on basalt; *Collingwood, Melbourne.*

91. CALCITE; curved rhombohedra; *Philip Island.*

92. CALCITE; crystalline mass; *Benalla.*

93. CALCITE; rhombohedra; *Moe, Gippsland.*

94. CALCITE; mammillæ bristling with hexagonal pyramids; *Limeburners' Point, Geelong.*

95. CALCITE; large rhombohedron; *Rapid Bay, South Australia.*

96. CALCITE; druse of minute rhombohedra, with carbonate of copper; *South Australia.*

97. SATINSPAR (var. Calcite); fibrous: *Pekina, South Australia.*

98. CALCITE; rhombohedral, on blue limestone; *Ilfracombe, Tasmania.*

99. CALCITE; rhombohedra; *Queensland.*

100. CALCITE; columnar; *New Zealand.*

101. CALCITE; columnar, divergent; *New Zealand.*

102. CALCITE; obtuse rhombohedra; *North Cornwall, England.*

103. CALCITE; rose colored, combined hexagonal prism and pyramid; *Wales, Britain.*

104. CALCITE; scalenohedra; *Cornwall.*

105. CALCITE; hexagonal prisms; *Derbyshire.*

106. CALCITE; combined form of hexagonal prism and pyramid, with rock crystal; *Traversella, Italy.*

107. CALCITE; rhombohedra, with rock crystal and chalcopyrite; *Hartz.*

108. CALCITE; hexagonal prisms, with galena; *Hartz.*

109. CALCITE; scalenohedra, with ferruginous quartz; *Hartz.*

110. CALCITE; rhombohedra, with pyrite; *Freiberg, Saxony.*

111. CALCITE; hexagonal prisms; *Freiberg.*

112. ICELAND SPAR (var. Calcite); colorless, double-refracting; *Iceland.*

113. DOGTOOTH SPAR (var. Calcite); acute scalenohedra on basalt; *Degraves' Mill, Malmsbury.*

114. DOGTOOTH SPAR; scalenohedra on basalt; *Richmond, Victoria.*

115. DOGTOOTH SPAR; scalenohedra on basalt; *Richmond.*

116. DOGTOOTH SPAR; aggregation of small scalenohedra; *Liskeard, Cornwall.*

117. DOGTOOTH SPAR; acute scalenohedra; *Hartz.*

118. STALACTITE (var. Calcite); crystalline, concretionary; *New South Wales.*

119. STALACTITE; fibrous; *from caves at Cape Otway.*

120. STALAGMITE (var. Calcite); granular, botryoidal; *from caves at Yering, near Lillydale.*

121. STALAGMITE; banded, concretionary; *Back Creek, Gippsland.*

Limestone; carbonate of lime, cryptocrystalline.

122. LIMESTONE; dentitric on satinspur; *from a well 236 feet deep, 50 miles north of Willandra, New South Wales.*

123. LIMESTONE; crystalline with chlorite schist; *Campbell's Reef, Moyston.*

105ª Calcite.- Obtuse rhombohedral - Derbyshire.

108ª Calcite.- Hexagonal prisms - Andreasberg, Hartz.

119ª Stalactites.- Internally Crystalline - Bridgewater Caves near Portland, Victoria.

135-a Aragonite.- Detached pink crystal, six sided prism. Molina, Spain.

135-b Aragonite.- Aggregation of fibrous acicular crystals of Coralloid shape. Lorbay, Devonshire.

124. LIMESTONE; fossiliferous; *Kakawrie Quarry, Omaru, New Zealand.*

125. LIMESTONE; oolitic; *Bryants, Loddon River.*

Aragonite; carbonate of lime, with rhombic crystallisation.

126. ARAGONITE; acicular crystals, with ferro-calcite on basalt; *Richmond.*

127. ARAGONITE; fibrous, with siderite on basalt; *Richmond.*

128. ARAGONITE; radiating group of acicular crystals on basalt; *Richmond.*

129. ARAGONITE; radiating prisms on basalt; *Richmond.*

130. ARAGONITE; acicular crystals on basalt; *Richmond.*

131. ARAGONITE; fibrous, columnar divergent, on basaltic clay; *City of Ballaarat mine, Ballaarat.*

132. ARAGONITE; divergent columnar, in vesicular basalt; *Hardies' Hill, Durham Lead, Buninyong.*

133. ARAGONITE; acicular divergent in basalt; *Mt. Pleasant, Ballaarat.*

134. ARAGONITE; diverging bundles of rhombic prisms; pink colored, in basalt; *Philip Island, Western Port.*

135. ARAGONITE; divergent groups of rhombic prisms on basalt; *Tasmania.*

Ferro-Calcite; carbonate of lime with from 4 to 20 per cent. of carbonate of iron, and a small per centage of carbonate of magnesia and manganese.

136. FERRO-CALCITE; globular, on basalt; *Richmond, Victoria.*

137. FERRO-CALCITE; globules, with crystalline surface on basalt; *Richmond.*

138. FERRO-CALCITE; brush-like bundles of acicular crystals, on basalt; *Richmond.*

139. FERRO-CALCITE; globular on basalt; *Richmond.*

140. FERRO-CALCITE; yellowish-white globules with crystallised surface, on basalt; *Richmond.*

141. FERRO-CALCITE; orange colored globules, bristling with acicular crystals, on basalt; *Richmond.*

142. FERRO-CALCITE; globular, coated with ferric oxide, on basalt; *Richmond.*

143. FERRO-CALCITE (Ankerite?); composition: carbonate of lime 72.43, carbonate of iron 20 65, carbonate of magnesia 5.00, carbonate of manganese 1.92 = 100.00; globular, drusiform in basalt; *Barfold Falls, Campaspie River.*

144. FERRO-CALCITE; small rhombohedra investing the faces of large hexagonal crystals now removed; *Running Creek, Ovens.*

Dolomite; carbonate of lime 54·35, carbonate of magnesia 45·65 = 100 00.

145. DOLOMITE; small rhombohedra investing crystals of milky quartz; *Cornwall, England.*

146. DOLOMITE; crystalline granular; *Rapid Bay, South Australia.*

146*a*. DOLOMITE; crystalline with pyrite; *Buchan, Gippsland.*

147. DOLOMITE (Brossite); rhombohedra on chalybite; *Brosso, Piedmont, Italy.*

148 DOLOMITE (Brownspar); minute rhombohedra with chalco-pyrite and galena; *Freiberg, Saxony.*

149. DOLOMITE (Brownspar); rhombohedra on fluorite; *Freiberg, Saxony.*

Apatite (Phosphorite); composition: phosphate of lime 92·26, fluoride of calcium 7·74 = 100·00.

150. APATITE; amorphous with quartz; *Estramadura, Spain.*

151. APATITE; with scheelite on quartz; *from an auriferous quartz reef, at a depth of* 450 *feet, Maldon.*

152. APATITE; granular; *North Burgess, Canada.*

153. APATITE; hexagonal, acicular prisms; with quartz and chalcopyrite; *Bohemia.*

154. APATITE; granular, enclosing biotite; *North Ulmsley, Canada.*

155. APATITE; hexagonal prisms with fluorite and rock crystal; *Freiberg, Saxony.*

Gypsum; sulphate of lime, occurs crystallised and trans-

149ª Dolomite (Pearl Spar).- Rhombohedral, Aleton, Cumberland.

152ª Apatite.- Granular, massive. Snarum, Norway.

155ª Hydro-apatite; hydrous phosphate of lime. Botryoidal Limburg, Nassau.

172a Satinspar; fibrous Melbourne, Italy.

parent (sparry gypsum, selenite), crystalline translucent (alabaster), fibrous silky (satin spar) or opaque, amorphous and pulverulent. It is found in the miocence calcareous beds of the coastlands of Victoria and South Australia, and of the Murray basin. Calcined gypsum is "plaster of Paris." Selenite is employed for the finer plaster castings; the amorphous varieties are used for stucco and manure. The value of plaster of Paris is from £4 to £6 per ton according to quality; a small parcel of South Australian selenite plaster was disposed of at the rate of £20 per ton.

156. SELENITE; twin crystals, oblique prisms; *Jan Juc, Geelong.*

157. SELENITE; filling cavities in miocene limestone; *Portland, Victoria.*

158. SELENITE; lenticular crystals; *Batman's Swamp, West Melbourne.*

159. SELENITE; right rhomboidal prisms; *South Australia.*

160. SELENITE; right rhomboidal prisms; *South Australia.*

161. SELENITE; laminar; *South Australia.*

161*a*. SELENITE; oblique prisms; *Yorktown, South Australia.*

162. SELENITE; right rhomboidal prisms; *Northamptonshire, England.*

163. SELENITE; lamellar; *Nova Scotia.*

164. SELENITE; twin crystals, right rhomboidal prisms; *Sicily.*

165. SELENITE; tabular oblique prisms; *Canale, Rome, Italy.*

166. ALABASTER; grey; *Volterra, Pisa, Italy.*

167. ALABASTER; white; *Volterra, Pisa, Italy.*

168. ALABASTER; veined; *Volterra, Pisa, Italy.*

169. GYPSUM; lenticular crystals, from miocence clay; *Swanhill Road, Echuca.*

170. GYPSUM; pulverulent; *Clovelly Farm, Bridgewater on Loddon.*

171. GYPSUM; fibrous; *New South Wales.*

172. SATINSPUR; fibrous; *Monte Donato, Bologna, Italy.*

173. SCHEELITE, tungstate of lime; crystalline on quartz; from an auriferous quartz reef, depth 450 feet, *Maldon.*

174. SCHEELITE; crystalline in quartz; *Maldon.*

175. SCHEELITE; square octahedra and prisms; *Fürstenberg, Saxony.*

176. SCHEELITE; amorphous, with fluorite and blende; *Hartz.*

176*a*. TITANITE (Sphene), titanate and silicate of lime; oblique rhombic prisms, with calcite on gneiss; *Freiberg, Saxony,* (see TITANIUM, page ...)

Fluorite (fluorspar), fluoride of calcium (Ca. 51·3, F. 48·7 = 100·0) occurs crystallised in metallic veins, and massive in metamorphic rocks. It has been but sparingly discovered in Australia (*e. g.* New England, N.S.W.; Mt. Heemskirk, Tas.) In Derbyshire, England, it is found in masses sufficiently bulky to serve as a material for vases and other ornaments turned in the lathe. Its chief use, however, is its conversion intro hydro-fluoric acid applied in etching on glass.

177. FLUORITE; massive, with galena; *Woolgarlo Lead Mine, Yass, N.S.W.*

178. FLUORITE; massive, with azurite in fissures; *Woolgarlo Lead mine, Yass, New South Wales.*

179. FLUORITE; cubes, invested by quartz; on chalybite; *Cornwall.*

180. FLUORITE; divergent columnar; *Derbyshire, England.*

181. FLUORITE; macled cubes; *Northumberland, England.*

182. FLUORITE; amorphous; *Bohemia.*

183. FLUORITE; macled cubes; *Freiberg, Saxony.*

184. FLUORITE; macled cubes with barite; *Kurprinz mine, Freiberg.*

185. FLUORITE; macled cubes investing octahedra; *Stolberg, Hartz.*

186. FLUORITE; octahedra; *Altenberg, Saxony.*

187. FLUORITE; macled cube, with barite; *Freiberg, Saxony.*

Magnesium, Mg., a metal which does not occur native. It is silver white but tarnishes in moist air; it finds application in technical electricity.

175ª Scheelite .. Small four-sided pyramids on quartz. Zinnwald, Bohemia.

181ª Fluorite .. Macled cubes. Cumberland.

187a Brucite.. Foliated on Chlorite. Texas, Lancaster Co., Pennsylvania.

Brucite (hydrated magnesium oxide), has not yet been discovered in Australia.

Magnesite, carbonate of magnesia (carbonic acid 52·4, magnesia 47·6 = 100·0) constitutes a valuable cement mortar; is employed in the purification of varnish oils; and, as a sub-carbonate, forms the well-known drug.

188. Magnesium; foil.

189. Magnesite; globular; *Loddon River, near Newstead.*

189*a*. Magnesite; massive, granular; *Collingwood, Victoria.*

190. Magnesite; amorphous; *Guildford.*

191. Magnesite; vesicular; *Will-Will-Rook, Moonee Ponds.*

192. Magnesite; amorphous; *Sandhurst.*

192*a*. Magnesite; globular concretion; *Majorca, Victoria.*

192*b*. Magnesite; oolitic concretion; *Majorca.*

192*c*. Magnesite; concretions; *Majorca.*

Silica, SiO^2, **Quartz**. Amorphous and crystalline quartz is found in Victoria in rockmasses of every age: in the miocene beds south of Geelong; in the permian rocks of the Grampians and Sierra; it forms the matrix of auriferous lodes in upper and lower Silurian, and the principal constituent of granite, felsite, and porphyry. The crystallised variety, *Rockcrystal*, abounds more or less in all our quartz reefs. *Amethyst* and *Cairngorm* are limited to the lode qartz in granite country (Maldon, Beechworth, Skipton); *chalcedony*, *agate* and *cornelian* are found chiefly in igneous rocks or in drifts derived from these (at Beechworth in granite, at Western Port in basalt); *chert*, *jasper* and *lydian stone* in connection with porphyry dykes (Heathcote, Ararat); also in river-drift, (Beechworth); *silicified* wood in tertiary rocks (Daylesford, Bacchus Marsh).

193. Rockcrystal; hexagonal prism and pyramid, clouded; *Mopoke Gully, Ballaarat.*

194. Rockcrystal; cluster of crystals stained by oxide of iron; *Postoffice Reef, Ballaarat.*

195. Rockcrystal; hexagonal prisms and pyramids, partly feruginous; *Talbot.*

196. ROCKCRYSTAL; cluster of crystals, partly stained by oxide of iron; *Pyrenees, Victoria.*

197. ROCKCRYSTAL; colorless crystal enveloping an opaque nucleus; the internal crystal can be more readily seen when the specimen is immersed in water; *Jewsharp Creek, Langley.*

198. ROCKCRYSTAL; druse; *Blacksmiths' Gully Reef, Fryerstown.*

199. ROCKCRYSTAL; minute hexagonal pyramids, stalagmitic; *Angaston, South Australia.*

200. ROCKCRYSTAL; with calcite on slate; *Cornwall.*

201. ROCKCRYSTAL; with calcite rhombohedra and pyrite; from the Fintagel slate quarries, *Cornwall.*

202. ROCKCRYSTAL; in marble; *Carrara, Italy.*

203. ROCKCRYSTAL; irregular prisms and pyramids; *Colle Palombaja, Elba.*

204 ROCKCRYSTAL; hexagonal pyramids almost wholly displacing the prisms; encloses magnetite, on hematite; *Elba.*

205. ROSEQUARTZ; long six-sided prisms; *Chemmitz, Hungary.*

206. FERRUGINOUS QUARTZ; group of crystals; *Foley's Reef, Peel River, New South Wales.*

207. MILKY QUARTZ; group of crystals; *Burra Mine, Redan, Ballaarat.*

208. MILKY QUARTZ; prismal planes have a rough crystalline surface, the surmounting pyramids being smooth; *Foley's Reef, Peel River, New South Wales.*

209. MILKY QUARTZ; group of crystals, the prismal faces invested by smaller crystals; *Foley's Reef, Peel River, New South Wales.*

210. MILKY QUARTZ; group of crystals, with chalcopyrite; *Cornwall.*

211. CAIRNGORM (smoky quartz); fragmentary crystal; *Bradford Lead, Maldon.*

212. SMOKY QUARTZ; fragments of crystal; *Talbot.*

201ª Rockcrystal.. Group of hexagonal prisms with pyramids; the latter shewing planes of growth. Schemnitz, Hungary.

205ª Rosequartz.. Crystalline, lamellar. Rabenstein, Bavaria.

230ª Chalcedony.- Banded, Mt. Cudgewa, Upper Murray, Victoria.

231ª Chalcedony.- Rounded pebbles; with agate, quartz etc. Warrego River, Queensland.

233ª Chalcedony.- Mammillated. Faroe Isles.

213. SMOKY QUARTZ; imperfect crystals with quartz grit; *King's Plains, Bathurst, New South Wales.*

214. SMOKY QUARTZ; group of hexagonal pyramids on amorphous quartz; *Cornwall.*

215. QUARTZ; crystalline, massive; *Freiberg, Saxony.*

216. QUARTZ; granular in basalt; *Mt. Franklin, Victoria.*

217. QUARTZ; rounded pebbles of transparent and milky quartz; from recent gold drift; *Eldorado, Beechworth.*

218. QUARTZ; radiating crystals; *South Australia.*

219. GREEN QUARTZ; granular, colored by chromic oxide; *New Caledonia.*

220. SILICIFIED WOOD; finely-fibred; *Daylesford.*

221. SILICIFIED WOOD; fine grained, part jasper; *N. S. W.*

222. SILICIFIED WOOD; has the fibre of a conifer; *Macquarie Plains, Tasmania.*

223. SILICIFIED WOOD; laminar, finely-fibrous; *New Zealand.*

224. SILICIFIED WOOD; pseudomorph after tree-bark; *Calistoga, Napa Co., California.*

225. ITACOLUMITE (Flexible sandrock); a mass of fine quartz grains in a matrix of mica and talc which renders the mineral elastic; *Danbury, North Carolina.*

226. CHALCEDONY; rolled pebbles, in part drusiform; *Philip Island.*

227. CHALCEDONY (enhydros); reddish-brown pseudo crystals, enclosing liquid (silicic acid?) in cavities; *Beechworth.*

228. CHALCEDONY; drusiform, with malachite on cuprite; *South Australia.*

229. CHALCEDONY; with malachite and cuprite; *South Australia.*

230. CHALCEDONY; botryoidal; *Angaston, South Australia.*

231. CHALCEDONY; massive; *Queensland.*

232. CHALCEDONY; amorphous; *Cape Blomidon, Nova Scotia.*

233. CHALCEDONY; stalactite; *Pednandrea mine, Redruth, Cornwall.*

234. CARNELIAN; waterworn fragment; *Beechworth.*

235. CARNELIAN; waterworn pebbles; *Beechworth.*

236. CARNELIAN; artificially polished; *Saxony.*

237. CARNELIAN; rolled pieces; *Queensland.*

238. AGATE; rolled fragments of "fortification" agate; *Eldorado, Beechworth.*

239. AGATE; rolled fragment, breccia; *Eldorado, Beechworth.*

240. AGATE; waterworn pebbles, banded; *Eldorado, Beechworth.*

241. AGATE; pebbles of brecciated and "fortification" agate; *Beechworth.*

242. AGATE; pebbles of banded agate and polished piece of milky agate; *Cooper's Creek, Barcoo, South Australia.*

243. AGATE; mottled; *Scotland.*

244. AGATE; "fortification," polished face; *Saxony.*

245. JASPER; rolled fragment; *Cape Otway.*

246. JASPER; rolled fragment; *Beechworth.*

247. JASPER; fine grained, massive; *Eldorado, Beechworth.*

248. JASPER; upper silurian breccia, with chert and quartz; *Heathcote.*

249. JASPER; upper silurian breccia, with chert; *Heathcote.*

250. JASPER; massive; in upper silurian, *Mt. Cooper, Victoria.*

251. JASPER; massive; *Back Creek, Buchan, Gippsland.*

252. JASPER; "ribbon" jasper; massive, banded; *Angaston, South Australia.*

253. JASPER; banded, with chalcedony; *Carnley Harbour, Auckland, New Zealand.*

254. JASPER; chalcedony and malachite; *South Australia.*

255. JASPER; with chrysoprase; massive, conchoidal; *New Zealand.*

246. AMETHYST; rolled pebbles; *Bradford Lead, Maldon.*

257. AMETHYST; waterworn crystals; *Bradford Lead, Maldon.*

258. AMETHYST; perfect hexagonal crystals; *Eldorado, Beechworth.*

255a Heliotrope (Bloodstone). var. Jasper. Massive. Cambay, India.

257a Amethyst.. Dark purple, hexagonal prisms and pyramids. Schemnitz, Hungary.

257b Amethyst.. Pale purple, hexagonal prisms. Oberstein, P

265ª Noble Opal.. Milky white with prismatic colours; amorphous in trachyte. Verespatak near Eperies, Hungary.

259. BASANITE (LYDIAN STONE); rolled fragment; *Ovens River*.

260. BASANITE; Fibrous, massive; *Gippsland*.

261. FLINT; partly transmuted felspar; *Dandenong, Ranges*.

262. FLINT; massive; *Perseverance Harbour, Campbell's Island, South Sea*.

263. FLINT; concretion in chalk; *Kent, England*.

Hydrous Silica, $SiO^2 + H^2O$; *Opal* occurs almost solely in volcanic rocks. The *noble opal* at Beechworth (rare) Angaston, South Australia, and Abercrombie River, New South Wales, affords fine gem stones; *Hyalite* (Muller's Glass) fills cavities of recent volcanic rocks, *e.g.* Ballaarat, Smeaton, Ararat; *Randanite* (tripolite), misnamed "infusorial earth," used in the preparation of Dynamite, is found at Talbot.

264. NOBLE OPAL; amorphous, milky white with play of colors, *Angaston, S. A.*

265. NOBLE OPAL; massive; *Angaston, South Australia*.

266. FIRE OPAL; veins in concretionary ironstone, *New South Wales*.

267. COMMON OPAL; massive; *Angaston*.

268. COMMON OPAL; micaceous; *Angaston*.

269. COMMON OPAL; massive; *Uralla, New South Wales*.

270. COMMON OPAL; crystalline, botryoidal; *St. Ilario, Elba*.

271. RESIN OPAL; massive; *Telkebanya, Hungary*.

272. RESIN Opal; massive; *Glenthorpe station, Gippsland*.

273. WOOD OPAL; coarsely fibrous; *Pentland Hills, Bacchus Marsh*.

274. WOOD OPAL; fibrous, with efflorescence of glaubersault; *New South Wales*.

275. WOOD OPAL; pseudomorph after plant stems; *Hobart, Tasmania*.

276. WOOD OPAL; form and texture of a conifer wood; *Kremnitz, Hungary*.

277. WOOD OPAL; fine grained; *Bohemia*.

278. SEMI OPAL; massive; *Beechworth.*

279. SEMI OPAL; with felspathic clay in basalt; *Deep Creek, Sunbury.*

280. RANDANITE, earthy TRIBOLITE, full of diatomaceæ; composition: silica 79, water 12, alumina 5, iron sesquioxide 3 = 99; *Mount Amiata, Italy.*

281. HYALITE; botryoidal crust lining cavities in dolerite; *Miners' Race Course, Ballaarat.*

282. HYALITE; globular concretions in dolerite; *Miners' Race Course, Ballaarat.*

283. HYALITE; botryoidal crust on vesicular lava; *McDonald's Hill, Smeaton.*

Aluminum, Al, a greyish-white, malleable, specifically light metal, is not found native, but is metallurgically extracted from beauxite (hydrated alumina and peroxite of iron) and cryolite (fluoride of alumina and soda). **Alumina** (aluminum 53·4, oxygen 46·6 = 100·0) occurs in *corundum* under which name are included *corundum* proper, *adamantine spar*, *sapphire*, *ruby* and *emery*. The species is but rarely found in situ, and then always in plutonic and metamorphic rocks; but it generally occurs as rolled pebbles in drifts derived from these rocks. The finest sapphires and rubies come chiefly from Ceylon and Burmah. Blue sapphires, without cloud or flaw command about half the price of diamonds, they are found of very large size; the King of Burmah is said to be in possession of one weighing 950 carats. Ruby of good fire and color is of the same value as a diamond of equal size up to 2 carats; above that weight it is held in considerably higher estimation owing to the rarity of *perfect* stones.

Rubies of 1 carat are worth £17.
Rubies of 1½ carat are worth £30.
Rubies of 2 carats are worth £75.
Rubies of 3 carats are worth £225.
Rubies of 5 carats are worth £500.

279ª Menelite (Var. Opal).. Nodular in tertiary limestone. Montmartre near Paris, France.

286ª Corundum.. Waterworn fragments. Mysore, India.

293ª Topaz.. Yellow rhombic prisms. Villa Rica, Brazil.

The largest pure ruby is in possession of the East India Company, London. The ruby in the French museum weighs 132 carats, and was purchased for £6,800, but is not free from defects.

Of Australian localities may be mentioned Daylesford, Beechworth, Mt. Eliza in Victoria, and Mudgee and New England in New South Wales.

Other gem stones: *topaz*, *zircon*, *garnet*, etc. although not strictly belonging to this group, are ranged in this place because of their allied mode of occurrence in the same localities.

284. ALUMINIUM; plate; a metallurgical product from Europe. Aluminium has of late years found considerable application in the art-manufacture both in its pure state, and as an alloy with silver and copper; it is also employed by the metallurgist, especially in blow pipe analysis. The value of aluminium in England is 10s. an ounce.

285. CORUNDUM; rolled pebbles passing into diaspore (hydrated alumina); *Beechworth.*

286. CORUNDUM; rolled fragments, ferruginous; *Beechworth.*

287. SAPPHIRE; washed pebbles; *Cope's Creek, New England, New South Wales.*

288. SAPPHIRE; sub-angular pieces showing the edges of an hexagonal prism; *Woolshed, Beechworth.*

289. SAPPHIRE; washed pebbles; *Full Moon Co.'s Mine, Tasmania.*

290. RUBY; waterworn pebbles; *Cope's Creek, New England, New South Wales.*

291. TOPAZ; silicate of alumina with fluoride of aluminium; rolled pebbles; *Beechworth.*

292. TOPAZ; rhombic prisms and pyramids, also washed grains in a sand of zircon, pleonaste, quartz, and native lead; *Daylesford.*

293. TOPAZ; rounded grains; *Eldorado, Beechworth.*

294. PYCNITE (var. Topaz); columnar with mica; *Altenberg, Saxony.*

295. ZIRCON; silicate of zirconia, (zirconia 66·23, silica 33·37 = 100·00) waterworn grains; *Blackwood.*

296. ZIRCON; waterworn crystals and rounded grains; *Latrobe River, Gippsland.*

297. ZIRCON; washed pebbles; *Cope's Creek, New England, New South Wales.*

298. HYACINTH (red zircon); obtuse dimetric octahedra; *Blackwood.*

299. JARGON (yellow zircon); waterworn grains, in part showing planes of the dimetric octahedron; *Blackwood.*

300. GROSSULARITE (calcareous alumina-garnet); composition: silicate of alumina 64·89, lime 32·98, sesquioxide of iron 10·90, magnesia 1·23 = 100·00; washed grains; *Beechworth.*

301. GROSSULARITE; fine sand; *New Zealand.*

302. GROSSULARITE; semi-rounded dodecahedra and washed pieces; *Queensland.*

303. ANDRADITE (calcareous iron-garnet); composition; silicate of alumina 40·4, line 33·0, sesquioxide of iron 26·5 = 99·9; rhombic dodecahedra, with chlorite; *Ala, Piedmont, Italy*

304. COMMON GARNET (iron-alumina-garnet); composition: silicate of alumina 56·7, protoxide of iron 43·3 = 100·0; crystals in granite; *Eldorado, Beechworth.*

305. COMMON GARNET; rhombic dodecahedra; *Eldorado, Beechworth.*

305*a*. COMMON GARNET; crystalline, with calcite and quartz in hornblende rock; *Maldon.*

306. COMMON GARNET; crystal in quartz; *Mt. Babbage, South Australia.*

307. COMMON GARNET; rhombic dodecahedron with deltohedron; *Mt. Babbage, South Australia.*

308. ALMANDINE (precious garnet); rounded grains, partly with perfect edges of the dodecahedron; *from the diamond drift, South Africa.*

309. PISTACITE (iron-lime-epidote); composition: silicate of

297ª Zircon.. Obtuse octahedra and rounded grains.
Expailly, France.

305ᵇ Common Garnet.- Rounded grains. Grey River, N.Z.

307ª Common Garnet.. Large detached rhombic dodecahedra.
Suversella, Piedmont

308ª Colophonite (Iron-lime garnet). Lamellar partly Crystalline. Arendal, Norway.
308ᵇ Pyrope (Iron garnet var.). Sub-angular Crystals. Ceylon.
308ᶜ Essonite (Cinnamon stone) var: lime garnet.. Rhombic dodecahedra
in quartz. Piedmont, Italy.

309a Arendalite (Lime-iron Epidote). Monoclinic prisms in granular hornblendic rock. Arendal, Norway.

311a Tourmaline.—Columnar prisms.—Kilmore.

318a Tourmaline.—Aggregate of slender columnar prisms. Montagne Lin Co., Tasmania.

alumina 64, sesquioxide of iron 17, lime 14 = 95; monoclinic prisms on serpentine; *Ala Valley, Piedmont, Italy.*

310 VESUVIANITE (Idocrase); composition: silicate of alumina 56·00, sesquoxide of iron 6.25, lime 33.71, magnesia 3·10 = 99.16; tetragonal prisms on chlorite schist; *Ala, Piedmont, Italy.*

310*a*. ILVAITE (lievrite); composition: silica 28.2, sesquioxide of iron 25.0, protoxide of iron 33.7, lime 13·1 = 100.0; rhombic prisms longitudinally striated; *Rio, Elba.*

Tourmaline (schorl) composed of silicate of alumina 70.5, boric acid 3 to 7.5, oxides of iron 1.5 to 15.5; magnesia 0.5 to 15, and small portions of lime, soda, potash, phosphoric acid and fluorine. The common black variety occurs in Victoria wherever granite rocks crop out: from the finest acicular crystals enclosed within quartz crystal (Linton) to the massive schorl rock (St. Arnaud). Transparent varieties of green and brown colors, fit for gem stones, have been occasionally met with at Beechworth and the Upper Yarra.

311. TOURMALINE; divergent columnar; *Reedy Creek, Kilmore.*

312. TOURMALINE; waterworn prisms; *Eldorado, Beechworth.*

313. TOURMALINE; massive and columnar; *Mt. Singapore, Corner Inlet.*

314. TOURMALINE; divergent columnar; *Baynton's, Coliban River.*

315. TOURMALINE; acicular, hexagonal prisms in quartz; from granite; *Linton.*

316. TOURMALINE; acicular hexagonal prisms grown-through and investing quartz crystals; *Point Ulrich, Maldon.*

317. TOURMALINE; hexagonal prisms within quartz crystals; *Maldon.*

318. TOURMALINE; massive in quartz; *Angaston, South Australia.*

319. TOURMALINE; hexagonal prisms in quartz; *Albury, New South Wales.*

320. TOURMALINE; hexagonal prisms in chlorite schist; *Piedmont, Italy.*

321. TOURMALINE; green hexagonal prisms, with black schorl, orthoclase, and quartz on granite; *Elba.*

322. TOURMALINE; red and brown prisms in granite; *Elba.*

323. RUBELLITE (Red Tourmaline); columnar with lepidolite; *Rozena, Moravia.*

324. RUBELLITE; aggregated columnar crystals; *Elba.*

325. HELVITE (Helvine), composed chiefly of silicate of glucina 45, oxide of manganese 42, and oxide of iron 6; tetrahedra, with fluorite, calcite, galena, etc.; *Schwartzenberg, Saxony.*

326. BERYL; composition: silica 66·90, alumina 18·15, glucina 12·20, sesquioxide of iron 2·75 = 100·00; hexagonal prisms, with quartz and albite; *Dalkey, Co. Dublin, Ireland.*

Felspar.—*Orthoclase* (potash felspar) silica 64·8, alumina 18·4, potash 16·8=100·0; forms one of the constituents of granite and felsite, in which it also occurs porphyistic in larger or smaller crystals (Mt. Emu), or in veins (Lal-Lal).—*Oligoclase;* silica 62·3, alumina 23.5, soda 14·2=100·0; is found in colorless or white translucent plates in many dolerites (Spring Hill, Creswick).—*Labradorite;* silica 53·69, alumina 20·68, Lime 12·13, soda 4·50=100·00; is abundant in thin chatoyant plates in the dolerite of Sebastopol, south of Ballaarat.—*Albite* (soda felspar); silica 68·7, alumina 19·5, soda 11·8=100·0; occurs sparingly in triclinic twin crystals in some of our auriferous quartz reefs (Steiglitz). All felspars decompose to a light-colored friable clay *(Kaolin)* which is largely used in the manufacture of proclain and the finer class of pottery.

327. ORTHOCLASE; massive with quartz; *from a vein in granite, Lal Lal.*

328. ORTHOCLASE; fragment of large crystal; *Lal Lal,*

329. ORTHOCLASE; oblique twin prisms; *Nuggetty Reef, Maldon.*

330. ORTHOCLASE; showing well-marked monoclinic cleavage; with quartz and muscovite; *Maldon.*

322[a] Tourmaline .. Rhombohedra with angles and edges replaced. St. Just, Cornwall.

322[b] Tourmaline .. Hexagonal prisms in schistaxous granite. Norway.

326[a] Spodumene; Composition: Silica 65, alumina 29, Lithia 5, soda 1 = 100. Rhyne crystalline; with mica, quartz and triphylite. Norwich, Massachusetts

326[b] Petalite; Composition: Silica 77·87, alumina 17·20, soda 2·30 Lithia 2·69 = 100·00. Diverged lamellar. Uto, Sweden.

339ª Adularia .. Monoclinic prism. St. Gothard.

340ª Orthoclase .. Oblique lamellar. Ytterby, Sweden.

342ª Pericline (var. Albite) .. Triclinic prisms .. Pfitsch, Tyrol.

343ª Labradorite .. Polished face showing Chatoyant colours. Labrador.
343ᵇ Sanidine (var. Orthoclase) .. Glassy Felspar .. Tabular Oblique prisms in trachyte. Drachenfels, Rhine.

344ª Oligoclase .. Massive with triclinic cleavage. Ytterby, Sweden.

331. ORTHOCLASE ; massive, lamellar ; *Anakies, Geelong.*

332. ORTHOCLASE ; large oblique rhombic prism invested by schorl ; *Beechworth.*

333. ORTHOCLASE; prisms in quartz; *Bradford Lead. Maldon.*

334. ORTHOCLASE (ADULARIA) ; complex crystals ; with beryl quartz and schorl in granite ; *Elba.*

335. ORTHOCLASE (ADULARIA) ; prisms with rock crystal on schorlaceous granite ; *Elba.*

336. ORTHOCLASE ; prisms from granite-porphyry ; *Elba.*

337. ORTHOCLASE ; prisms with large rock crystal ; from Baveno granite ; *Lago Maggiore, Italy.*

338. ORTHOCLASE ; oblique prisms with quartz ; *Baveno, L. Maggiore, Italy.*

339. ORTHOCLASE (ADULARIA) ; oblique prism with quartz ; *Elba.*

340. ORTHOCLASE ; massive ; *Angaston, South Australia.*

341. ALBITE ; oblique rhomboidal prisms with orthoclase and quartz in granite ; *Elba.*

342. ALBITE ; massive in quartz, partly decomposed ; *Baveno, Lago Maggiore, Italy.*

343. ALBITE ; large loose crystals ; *Blacksmith's Gully Reef, Fryerstown.*

344. OLIGOCLASE ; tabular crystals ; *from basalt, Anakies, Geelong.*

The essentially volcanic products **Obsidian** and **Pumice** are, considering the vast extent of lava sheets, relatively sparsely represented in Victoria. *Obsidian (volcanic glass)* is a glassy orthoclase composed of silica 69·5, alumina 2·6, sesquioxide of iron 2·6, lime 7·5, magnesia 2·6, soda 5·1, potash 7·1, water 3·0 = 100·0 ; it occurs in button-shaped pieces in the newer pliocene clay drifts, bordering upon volcanic rocks in many parts of Victoria (Ararat, Daylesford, Winchelsea). *Pitchstone*, similar to obsidian, but with a fatty lustre, is rather abundant in the basalts of Ballaarat. *Pumice (vesicular obsidian)*, silica 70·0,

alumina 16·0, sesquioxide of iron, 0·5, lime 2·5, soda and potash 6·5, water 4·5 = 100·0, appears to be limited to Western Australia. The scoriae of some points of eruption (Warrenheip, Forest Hill) although chemically allied to pumice, differs in structure, and on that account makes it unfit to be used, like the European species, for polishing, etc.

345. Obsidian; stalagmitic; *Sebastopol, Ballaarat.*

346. Pitchstone; stalagmitic; *Ballaarat.*

347. Pitchstone; stalagmite on vesicular basalt; *City of Ballaarat mine, Ballaarat.*

348. Pumice; rolled fragment; *Cape Sidmouth, W. Australia.*

349. Pumice; fibrous; *Coblentz, Rhine.*

Mica; Potash Mica (Muscovite); silica 47·5, alumina 37·3, sesquioxide of iron 3·2, potash 9·6, water 2·4 = 100·0; this is a common constituent of all our granites and of many metamorphic rocks, in the form of thin scales or hexagonal plates; the size of the latter is in some localities several square inches (Maldon).

Lithia Mica (Lepidolite); silica 50·8, alumina 21·3, sesquioxide of iron 9·1, potash 9·9, lithia 4·1, hydrofluoric acid 4·8 = 100·0; does not appear to have been met with in Victoria or New South Wales, but has been noticed in a binary granite at Port Cygnet, Tasmania.

Iron-Potash-Mica (Lepidomelane); silica 37·4, alumina 11·6, iron oxides 40·1, lime 0·3, potash 9·2, water 0·6 = 99·2; is limited to some kinds of porphyritic granite (*e.g. Spring Creek, Beechworth*).

Magnesia Mica *(Biotite);* silica 38.4, alumina 15.7, iron oxides 14·3, magnesia 17·3, potash 11.5, water 2.8 = 100.0; occurs both in plutonic and volcanic rocks. In Victoria it is occasionally found in granite (Eastern Gippsland), in diorite (Woods Point), and in basalt (Eureka Reef, Castlemaine). *Rubellane*, an altered biotite, occurs in the decomposed basalt of Saltwater River, near Melbourne.

345-a Obsidian. - Massive, Conchoidal. - Lipari Isles.

352a Muscovite.. Large plate.. From wall of a quartz vein in mica schist Geographe Bay, W.A.

354a Rubellane; probably altered biotite.. Composition: Silica 45, alumina 10, oxide of iron 20, lime 10, soda and potash 10, volatile matter 5 = 100 Hexagonal plates with obsidian in basalt. Laach, Rhine.

356a Lepidolite.. Granular mass made up of fine scales.. Rozena, Moravia.

357b Chlorite.. Compact, slaty. Tyrol.

359a Lapis Lazuli.. Massive with calcite and pyrite. Chili.
359b Leucite; Composition: Silica 55.1, alumina 23.4, potash 21.5 = 100.0. Trapezohedra in lava. Mt. Vesuvius.

360a Kyanite; Composition: Silica 45, alumina 50, peroxide of iron 2.5, potash 1.5 = 100.0. Broad oblique prisms, with quartz and garnet. Pfitsch, Tyrol.
360b Andalusite; Composition: Silica 39.24, alumina 59.49, peroxide of iron 0.63, lime and magnesia 0.64 = 100.00. Four-sided rhombic prisms Lasna Valley, Innspruck, Tyrol.

363a Coccolite (var: Diopside).. Irregularly shaped grains mixed with calcite. Arendal, Norway.

350. MUSCOVITE; on granite; *Beechworth.*

351. MUSCOVITE; on granite; *Victoria Plains Road, Western Australia.*

352. MUSCOVITE; large plates; *Northampton, Champion Bay, Western Australia.*

353. MUSCOVITE; large plate; *New Zealand.*

354. MUSCOVITE; large plates on laminar quartz; *Adam Bay, Western Australia.*

355. LEPIDOMELANE, large plates on quartz; *Spring Creek, Eldorado, Beechworth.*

356. LEPIDOLITE; on quartz; *Zinnewald, Bohemia.*

357. LEPIDOLITE; with tourmaline, albite, orthoclase and quartz; *Elba.*

357*a*. CHLORITE; silica 32·1, alumina 18·5, magnesia 36·7, sesquioxide of iron 0·6, water 12·1 = 100·0; granular, schistose; *Maldon, Victoria.*

358. RIPIDOLITE (clino-chlorite); tabular crystals with diopside and garnet; *Ala, Piedmont, Italy.*

359. LAPIS LAZULI; silicate of soda, lime, and alumina, with a sulphide of iron and sodium; massive with pyrite; *Russia.*

360. ANDALUSITE; silica 40·3, Alumina 59·7 = 100·0; divergent columnar; *Aberdeenshire, Scotland.*

Pyroxene: silicate of lime and magnesia with protoxide of iron and magnesia; sometimes part of the silica replaced by alumina. The minerals of this group are essentially constituents of volcanic rocks.

361. AUGITE; acicular crystals in druse of dolerite; *Miners' Race Course, Ballaarat.*

362. AUGITE; oblique prisms in basalt; *Bohemia.*

363. MALACOLITE; monoclinic prisms with chlorite and garnet on chlorite schist; *Ala Valley, Piedmont, Italy.*

364. DIALLAGE; waterworn pebble; *Tanunda Creek, South Australia.*

364*a*. DIALLAGE; lamellar; *Nelson, New Zealand.*

Amphibole : HORNBLENDE occurs both in volcanic and plutonic rocks, *e.g.*, in the basalt of Spring Hill, Creswick, and in the granite of Warrenheip. TREMOLITE and ACTINOLITE in crystalline rocks (Maldon); ASBESTOS in serpentine rocks in Queensland, New South Wales, and New Zealand. Amphibole minerals consist of silicate of magnesia and lime, and protoxide of iron ; the silica at times partly replaced by alumina.

365. HORNBLENDE ; oblique prisms in dense basalt ; *Philip Island, Western Port.*

366. HORNBLENDE ; oblique prisms from basalt ; *Mt. Anakies, Geelong.*

367. HORNBLENDE ; fibrous with quartz, felspar, etc. ; *Saxony.*

368. ACTINOLITE ; fibrous on amphibolite; *Yudunamutana mine, South Australia.*

369. ACTINOLITE ; columnar on calcite ; *Yudunamutana mine, South Australia.*

370. ACTINOLITE ; asbestiform (actinolite schist) ; *Lucknow, New South Wales.*

371. ACTINOLITE ; long-bladed crystals in pink calcite ; *Italy.*

372. TREMOLITE ; with garnet and calcite in hornfels ; *Maldon.*

372*a*. TREMOLITE ; divergent fibrous, with calcite and quartz ; *Maldon.*

373. TREMOLITE ; fibrous on quartz ; from vein in granite ; *East of Mount Macedon, Victoria.*

374. TREMOLITE ; fibrous ; *Yudunumatana Mine, South Australia.*

375. NEPHRITE *(Jade);* tough, fine grained, massive; *New Zealand.*

376. AMPHIBOLITE (hornblende schist); foliated mass of hornblende, quartz and mica with calcite. *Yudunamutana Mine, South Australia.*

377. AMPHIBOLITE ; foliated mass of hornblende, quartz, mica, garnet, etc. ; *Saxony.*

378. ASBESTUS ; long flexible fibres stained by iron oxide ; *Gulgong, New South Wales.*

367ª Hornblende .. Irregular prismatic Crystals .. Longban, Sweden.

371ª Actinolite .. Long slender prisms in talc . Salzburg, Tyrol.

387a Talc.- Italy. Greiner, Tyrol.
387b Talc.- Foliated, greenish-white. Pyrenees, Spain.

379. ASBESTUS; coarse flexible fibres; *New South Wales.*

379*a*. AMIANTHUS; silky fibrous; *Gundagai, New South Wales.*

380. AMIANTHUS; silky fibrous, partly twisted into chord; *Valtellina, Alps, Italy.*

381. ASBESTUS; massive, fibrous; *Gulgong, New South Wales*

382. ASBESTUS; coarsely fibrous; *Switzerland.*

383. ASBESTUS; short fibres on calcareous sandstone; *Angaston, South Australia.*

384. MOUNTAIN BARK; laminar, on chalcedony; *Angaston, South Australia.*

Cryolite, a fluoride of sodium and aluminium, has been observed only in one or two localities in Greenland, whence it is exported and used for the manufacture of soda, and the metal aluminium (*vide* aluminium).

385. CRYOLITE; massive with chalybite and chalcopyrite; from a large vein in gneiss at Evigtok, in the Danish colony Arksut, in *West Greenland.*

586. CRYOLITE; partly discolored by ferric oxide; *Greenland.*

Talc; silicate of magnesia (silica 62·8, magnesia 32·4, alumina 1·0, protoxide of iron 1·6, water 2·2 = 100) occurs sparingly in hexagonal plates near Bathurst; also near Heathcote in thin veins in a dyke of chromiferous felsite ("Selwynite," *which see*). The commercial article comes chiefly from Sweden and Tyrol; it is used as tailors' "chalk," shoemakers' "powder," and in the preparation of cosmetics. STEATITE or SOAPSTONE is an indurated talc with 5 to 8 per cent. of iron; it is generally found in veins or layers in serpentine (New Zealand) and affords material for firebricks, porcelain, and ornamental carvings.

387. TALC; massive; *Almeria, Spain.*

388. STEATITE; slatey; *Gulgong, New South Wales.*

389. STEATITE; massive; *New Zealand.*

389*a*. STEATITE; massive, with veins of brown ochre; *Nelson, New Zealand.*

Serpentine; hydrous silicate of magnesia (silica 43·64, magnesia 43·35, water 13·01 = 100), generally with 1 to 4 per cent. of iron, and the magnesia at times partly replaced by alumina. Serpentine occurs rarely crystallised, and then only in pseudomorphs; some varieties have a silky fibrous structure (crysotile), but in general the mineral is massive. It composes rockmasses of considerable extent in New South Wales, Queensland, New Zealand, and New Caledonia, and also of a lesser compass at Mt. Wellington in Gippsland. Some serpentine constitutes a valuable ornamental building stone (serpentine marble).

390. CHRYSOTILE *(fibrous serpentine);* silky veins in common serpentine rock; *Yorktown, Tamar River, Tasmania.*

391. CHRYSOTILE; seams in massive serpentine; *Saxony.*

392. COMMON SERPENTINE; mottled; *Murrumbidgee, New South Wales.*

393. COMMON SERPENTINE; dense, massive; *Bingera, New South Wales.*

394. SERPENTINE MARBLE; foliated; polished slab; *Villa Collemandina, Apuan Alps, Italy.*

395. SERPENTINE MARBLE; veined, turned into buttons; *Impruneta, near Florence, Italy.*

Olivine (CHRYSOLITE); anhydrous silicate of magnesia (silica 40.1, alumina 0.1, magnesia 44.8, oxide of iron 15 0 = 100.0), is an essential constituent of the basalt of Ballaarat, occurring in minute grains, as well as filling nests and druses.

396. OLIVINE; crystalline on basalt; *Mt. Shadwell, Mortlake.*

397. OLIVINE; crystalline on basalt; *Napoleons, Ballaarat.*

Pholerite and **Kaolinite,** hydrated silicates of alumina, are generally the product of transmuted felspar. Pholerite occurs in scales and matted layers in several auriferous quartz veins (Egerton, Sandhurst), and is apparently derived from the decomposition of albite. The Sandhurst specimen is composed of silica 44.92, alumina 42.69, water 12.79 = 100.00. Kaolin consists of silica 40.0, alumina 44.5, water 15.5 = 100.0. At

394ª Precious Serpentine .. Massive, granular . Saasum, Norway.
394ᵇ Common Serpentine .. Green and red mottled . Lizard Point, Cornwall.

395ª Meerschaum; Composition: Silica 60·87, magnesia 27·80, water 11·33 = 100·00 . Compact. Natolia, Asia Minor.

397ª Olivine .. Crystalline granular mass . Mt Franklin.
397ᵇ Olivine .. Crystalline grains in basalt .. Eifel, Rhine.

407a Agalmatolite (Figure Stone). – Composition: Silica 52·50 alumina 34·00, potash 6·25, protoxide of iron 0·75, water 4·00 = 99·50: Ornamental Carving. China.

Bulla Bulla, near Sunbury, extensive beds of a pure white kaolinitic clay occur overlying a quaternary granite. The highly felspathic granite of Lal Lal yields a rather silicious kaolin which has been for several years utilised at the local pottery works. The finest kaolin is found in China, Saxony, Devonshire, in England, Halle, in Prussia, and Limoges, in France. Porcelain is made of kaolin, ground flint, and lime. Pottery clay contains in addition to the constituents of kaolin some metallic oxides (chiefly iron), besides a large proportion of silica. Ordinary brick clay is rendered fit for use in pottery ware by admitting ground felspar into the paste.

398. PHOLERITE; scales on quartz; *from the depth of* 730 *feet in the Golden Fleece Co.'s mine, Sandhurst.*

399. KAOLINITE (*Nacrite of Breithaupt*); rhombic scales on granite; *Brand, near Freiberg, Saxony.*

400. KAOLINITE; silicious, with ferruginous bands; *Lal Lal.*

401. KAOLINITE; stained by ferric oxide; *Beechworth.*

402. KAOLINITE; from syenitic granite; *Cape Woolamai, Philip Island.*

403. KAOLINITE; laminar; *Ti Tree Gully, South Australia.*

404. KAOLINITE; quite pure; *Tolfa near Vita Vecchia, Italy.*

405. KAOLINITE; massive, ferruginous; *Gong Gong Reservoir, Bungaree.*

406. PORCELAIN JASPER; massive; *New South Wales.*

406*a*. TILE CLAY; plastic, with grains of quartz; *Selangor, Malayan Peninsula.*

406*b*. FIRE CLAY; scaley kaolin, with grains of quartz; *Bethanga.*

407. "SELWYNITE;" a name given by Mr. Ulrich, during the progress of the late geological survey, to a green felspathic dykestone occurring at Heathcote. It is not, however, a mineral, but a *felsite* colored by chromic iron; massive, traversed by thin veins of talc; *Mt. Ida, Heathcote.*

Zeolites; Zeolites are a group of colorless or faintly colored minerals consisting of hydrous silicate of alumina with an alkali.

They are essentially secondary products, *i.e.*, products of transmutation of the parent rock, filling clefts and vesicles therein, but never disseminated as constituent parts. They are generally found in volcanic and trappean rocks, exceptionally also in metalliferous veins, or on joints of metamorphic rocks (Mt. Tarrengower). Stilbite is said to have been recently discovered in the mesozoic sandstones of the Barabool Hills, but, if so, its formation is probably due to the percolation of the zeolite-fluid through overlying volcanic rock—possibly now entirely denuded.

408. ANALCITE (Analcime); silica 55, alumina 23, soda 14, water 8 = 100; druses in basalt; *Philip Island.*

409. ANALCITE; icosi-tetrahedral crystals, with calcite on basalt; *Philip Island.*

410. ANALCITE; with natrolite on basalt; *Philip Island.*

411. PHILLIPSITE (Lime-Harmotome); silica 48·5, alumina 21·5, potash 6·5, lime 6, water 17·5, with traces of iron = 100·0; macled crystals on basalt; *Richmond, Victoria.*

412. PHILLIPSITE; with ferro-calcite on basalt; *Richmond.*

413. PHILLIPSITE; with phacolite, drusiform on basalt; *Richmond*

414. PHILLIPSITE; twin crystals on basalt; *Richmond.*

415. PHILLIPSITE; twin crystals on basalt; *Richmond.*

416. PHILLIPSITE; with phacolite on basalt; *Richmond.*

417. PHILLIPSITE; twin crystals on basaltic scoria; *Richmond.*

418. PHACOLITE; (var. Chabazite); silica 45·5, alumina 19·5, lime 13·5, soda 2·0; potash 1·5, water 18·0, with traces of iron and magnesia = 100·0; with calcite on basalt; *Collingwood, Victoria.*

419. PHACOLITE; with phillipsite, mesolite and calcite on basalt; *Collingwood.*

420. PHACOLITE; on basalt; *Richmond, Victoria.*

421. PHACOLITE; with aragonite on basalt; *Richmond.*

422. PHACOLITE; with phillipsite and siderite on basalt; *Richmond.*

423. PHACOLITE; on basalt; *Richmond.*

424. PHACOLITE; on basalt; *Richmond.*

410ª Analcite.. Cubical Crystals in basalt .. Fassa. Tyrol.

424ª Zeolite Liquor.. Composition: Chloride of soda, lime and alumina, silica and ammonia. Colorless liquid from cavities in basalt. Depth 60 feet. Collingwood, Victoria.

431a Natrolite . Radiating fibres . Hohentwiel, Germany .

432a Prehnite .. Acicular stellated bundles of rhombic prisms .
Rd Kilpatrick, Dumbartonshire, Scotland .

425. CHABAZITE; silica 48·0, alumina 20·0, lime 8·5, soda 3·0, potash 0·5, magnesia 0·5, water 19·5 = 100·0; druses in basalt (older volcanic); *Ballan.*

426. CHABAZITE; obtuse rhombohedra on basalt (newer volcanic); *Malmsbury.*

427. CHABAZITE; obtuse rhombohedra; *Nova Scotia, Canada.*

428. GMELINITE (Soda Chabazite); silica 48·5, alumina 18·0, lime 5·0, soda 4·0, potash 0·5, water 22·0, with trace of iron = 100·0; flesh-red, rhombohedral prisms, with phacolite on basalt; *Philip Island.*

429. NATROLITE; silica 47·0, alumina 27·0, soda 13·0, lime 3·5, water 9·5 = 100·0; acicular crystals on analcite encrusting basalt; *Philip Island.*

430. NATROLITE; radiating acicular crystals on basalt; *Philip Island.*

431. NATROLITE; right rhombic prisms; *Aussig, Bohemia.*

432. PREHNITE; silica 44·0, alumina 24·5, lime 26·5, water 4·5 = 100·0; closely aggregated rhombic prisms; with native copper, calcite, and rock crystal on trap; *Lake Superior, North America.*

433. STILBITE; silica 58, alumina 16, lime 9, water 17 = 100; rhombic prisms, in part massive, with limonite and malachite; *Nova Scotia.*

434. STILBITE; rhombic prisms on calcite; *Andreasberg, Hartz.*

435. STILBITE; rhombic prisms, with malachite; *Fahlun, Sweden.*

436. APOPHYLLITE; a silicate of lime and potash with some fluorine: silica 55·5, lime 23·0, potash 4.8, water 16·7 = 100·0; square prisms with deeply-replaced angles; *Andreasberg, Hartz.*

437. APOPHYLLITE; crystalline, lamellar, *from the Blore Ghaut incline tunnel, G.I.P. Railway, between Bombay and Poonah.*

438. MESOLITE (Haidinger); silica 42·5, alumina 28, lime 11, soda 6, water 12·5 = 100·0; implanted globules, with phacolite and ferro-calcite on basalt; *Richmond.*

439. MESOLITE; spheroids, with phillipsite on basalt; *Richmond.*

440. MESOLITE; spheroids, with phacolite on basalt; *Richmond.*

441. ZEOLITE (undetermined); coating on calcite; druse in basalt; *Richmond.*

442. HEULANDITE; silica 59·6, alumina 16·3, lime 8·0, soda 1·2, water 14·9 = 100·0; with barite and chalybite on metamorphic sandstone; *Beehive Reef, depth 400 feet, Maldon.*

443. HEULANDITE; rhombic prisms on basalt; *Philip Island.*

444 BREWSTERITE; silica 53·0, alumina 16·5, baryta 6·0, strontia 9·0, lime 0·8, water 14·7 = 100·0; oblique rectangular prisms on calcite; *Strontian, Argyleshire.*

445. BREWSTERITE; oblique rectangular prisms in basalt; *Giants' Causeway, Ireland.*

Spinel; composed principally of alumina and magnesia, has several varieties depending upon the presence of subordinate ingredients, such as silica, lime, iron, chrome or copper. It occurs chiefly in recent and tertiary drifts derived from the denudation of volcanic and metamorphic rocks, but also in situ in these rocks. Red spinel, or *spinel ruby*, is found in small, regular octahedrons at Bingera, New South Wales; the black variety, *pleonaste*, is frequently met with in gravel drifts at Blackwood, Healesville and Ballaarat, where it occurs in black, shining, more or less waterworn pieces, often showing distinct octahedral faces.

446. PLEONASTE (black spinel); alumina 66·9, silica 1·2, magnesia 23·6, protoxide of iron 8·3; grains partly waterworn, partly as octahedra; *Blackwood.*

447. PLEONASTE; washed grains with octrahedral faces; *Daylesford.*

445[a] Datholite. - Borate and silicate of lime and water. Oblique rhombic prisms with replaced solid angles and lateral edges. Bergen Hill, New Jersey, N. America.

Cobalt, Co., has been found native in meteorites; it is of reddish grey color, magnetic, brittle but malleable, and fuses at a very high temperature. It finds no practical application in its metallic state, but the oxide is highly valuable as affording the beautiful blue *smalt*, used in oil or water colors, and especially in painting on glass and porcelain; and *saflor* (or saffre), a less brilliant color for painting on earthenware. These colors are prepared by fusion of silica, potash, and oxide of cobalt, forming a colored glass, which is a silicate of potash and cobalt. This glass is ground to an inpalpable powder. The quality of the smalt depends on the fineness of the powder, and the quantity and purity of cobalt used. Of the various cobalt ores found in nature, asbolite, earthy cobalt, is the only one that has been met with in Australia. Asbolite is a cobaltiferous wad, *i.e.*, oxide of manganese with 12 to 32 per cent. of protoxide of cobalt.

448. ERYTHRITE (Cobalt bloom); arsenic acid 38·43, oxide of cobalt 37·55, water 24·02 = 100·00; radiating oblique prisms on quartz; *Schneeberg, Saxony.*

449. ERYTHRITE; acicular prisms, with wad; *Mt. Calamita, Elba.*

449*a*. COBALTITE; cobalt 14, iron 12, nickel 2, arsenic 72; macled cubes, the faces of the cube are striated; *Tunaberg, Sweden.*

450. ASBOLITE (earthy cobalt); soft earthy; *Walhalla, Gippsland.*

451. ASBOLITE; laminar; *Walhalla, Gippsland.*

452. ASBOLITE; slickenside in serpentine rock; *Kanala, East Coast, New Caledonia.*

453. LINNÆITE (Cobalt pyrites); sulphur 42·52. cobalt 53·35, iron 2·30, copper 0·97, nickel 0·86 = 100.00; with tetrahedrite, chalcopyrite and calcite; *Müsen, Siegen, Westphalia.*

Nickel, Ni., like cobalt occurs native in meteorites. Until the discovery of the New Caledonia mineral, the nickel of com-

merce was almost exclusively obtained from Sweden and North Germany. It was there extracted from ores containing cobalt, a circumstance which made the separation an extremely laborious one. The metal is of silver-white colour, highly ductile, and is chiefly employed in the manufacture of argentane (German Silver), an alloy of copper, nickel, and zinc. The price of nickel in England is 16s. per pound. The New Caledonia species—Sarmerite and Noumeaïte occurs in brecciated veins and nests in serpentine rock, and yield from 8 to 25 per cent. of regulus.

454. NICKEL; regulus from New Caledonia ore, obtained by the Société Anonyme, Paris.

455. NICCOLITE (copper nickel); nickel 42·21, arsenic 54·73, sulphur 0.9 = 99·84; massive; *Freiberg, Saxony.*

456. GERSDORFFITE (Nickel glance); nickel 32·66, arsenic 46·02, sulphur 18·94, iron 2·38 = 100·00; with calcite; *Müsen, Siegen, Westphalia.*

457. GARNIERITE. A name given by Professor Liversidge to a halloysite-like mineral, colored by oxide of nickel, and very variable in composition: protoxide of nickel 24, magnesia 22, silica 47, alumina 1, sesquioxide of iron 1, water 5 = 100; hardness 2·0 — 2·5, specific gravity 2·27; amorphous; *New Caledonia.*

458. GARNIERITE; amorphous, with veins and druses of minutely crystallised quartz; *New Caledonia.*

459. GARNIERITE; breccia composed of garnierite talc, (colored by nickel oxide) and nodules of chromite; *New Caledonia.*

460. GARNIERITE; similar to 459; *New Caledonia.*

461. GARNIERITE; in quartzite; *Kanala, New Caledonia.*

462. NOUMEAÏTE; like garnierite, a hydrated silicate of magnesia and nickel in variable proportions: protoxide of nickel 31, magnesia 12, silica 39, water 18; massive, changing into serpentine; *Ouailou, East Coast, New Caledonia.*

463. NOUMEAÏTE; hard nodules used for ornaments; *Ouailou, New Caledonia.*

464. NOUMEAÏTE; in purple serpentine; *Nakety, East Coast, New Caledonia.*

465. NOUMEAÏTE; stalagmitic, botryoidal; *New Caledonia.*

466. NOUMEAÏTE; coated with hydrous ferric oxide; *Kanala, east coast New Caledonia.*

467. NOUMEAÏTE; amorphous; *New Caledonia.*

468. NOUMEAÏTE; traversed by quartz veins, and enclosing fragments of serpentine; *Mt. Ouazangon, west coast, New Caledonia.*

468*a*. PENTLANDITE (niccoliferous magnetic pyrites); ($\frac{1}{3}$ Ni. + $\frac{2}{3}$ Fe.) S.; massive with cubical cleavage, contains chalcopyrite; *Ringerige, Norway.*

Cadmium, Cd., occurs in nature as a sulphide (Greenockite), but is chiefly extracted from certain cadmiferous zinc ores in Silesia. The metal is of tin-white color, ductile, fuses at quite a low heat, and when ignited in the atmosphere burns away with the evolution of a brown smoke. It has no technical use. The sulphide is of a beautiful orange color; it is employed in ophthalmic surgery, and as a pigment.

469. CADMIUM; regulus, extracted from zincite; *Silesia.*

Zinc. Zn., has never been found native in any part of the world; it has indeed been stated (*vide* Transactions Philosophical Institute, Victoria, 1856) that rolled fragments of native zinc were found in the gold drift of the Mitta Mitta River, and that a lump, many ounces in weight, was taken out of the basalt (!) at Collingwood near Melbourne, but it has not been shown beyond any doubt that the specimens were not accidentally dropped by workmen into the places from where they were subsequently removed. The greater part of the zinc of commerce is extracted from the carbonate (smithsonite), the lesser from the sulphide (blende) and silicate (calamine). The uses of this metal are numerous: as a sheet zinc, as a coating on iron (galvanized iron), as brass (an alloy with copper), as a pig-

ment (white zinc), etc. The price of zinc, in ingots, is £24 per ton.

470. ZINCITE; oxide of zinc, colored by manganese; with Franklinite and Tephroite; *Franklinite* is composed of oxide of zinc 25, peroxide of iron 63, peroxide of manganese 12 = 100; *Franklin, New Jersey, North America.*

471. WILLEMITE; silicate of zinc: oxide of zinc 68·06, sesquioxide of iron and manganese 6·50, silica 25·44 = 100·00; forms a breccia with franklinite, calcite and quartz.

472. SMITHSONITE; carbonate of zinc; granular; *Barcelona, Spain.*

473. SMITHSONITE; massive; *New Zealand.*

474. SMITHSONITE; with galena; *New Zealand.*

475. MARMATITE; ferriferous blende; zinc 50, sulphur 33, iron 17 = 100; laminar, with pyrite, chalcopyrite, and quartz; *Saratoga mine, Ravenswood, Queensland.*

476. SPHALERITE (Zinc Blende, "Black Jack"), sulphide of zinc: zinc 67, sulphur 33 = 100, part of zinc frequently replaced by iron or cadmium; massive with galena; *Wheal Ellen mine, South Australia.*

477. SPHALERITE; crystals combining the cube, octahedron, and dodecahedron; druse with galena and pyrite; *Hungary.*

478. SPHALERITE; fibrous radiated; *Przibram, Bohemia.*

479. SPHALERITE; on quartz; *Italy.*

480. SPHALERITE; tetrahedral crystals with rock crystal; *Freiberg, Saxony.*

481. SPHALERITE; granular; *Ammeberg mine, Doerebro, Sweden.*

482. SPHALERITE; macles, with chalybite and calcite on milky quartz; *North Cornwall.*

483. SPHALERITE; macles, druse in quartz, with pyrite, chalybite, and dolomite; *Cornwall.*

484. SPHALERITE; with chalybite, dolomite, and pyrite; *Cornwall.*

471ª Hemimorphite (Var. Calamine); Silicate of Zinc .. Rhombic prisms on Calcite .. Aix La Chapelle, Prussia.

478ª Sphalerite. Tetrahedral, invested by pyrite. Bohemia.

481ª Sphalerite, Rhombic dodecahedron, enclosing Chalcopyrite Sahla, Sweden.

487ª Sphalerite .. Group of macled tetrahedra .. St. Agnes. Cornwall.

485. SPHALERITE; druse in quartz, with pyrite, dolomite, and chalybite; *North Cornwall.*

486. SPHALERITE; with chalybite, pyrite, and dolomite; *North Cornwall.*

487. SPHALERITE; granular, with galena and chalcopyrite in metamorphic slate; *Cornwall.*

Iron, Fe., occurs native under various conditions: in meteorites (*e.g.*, those found at Cranbourne, Victoria), in scales and grains in many volcanic rocks (Ballaarat) in massive beds (Siberia). The ores from which iron is chiefly extracted are *chalybite* (carbonate); argillaceous iron ore, "black band" (an impure carbonate); *magnetite* (protoxide); *hematite* (sesquioxide); and *limonite* (hydrated oxide). *Sulphide of iron* (pyrites) is not used for the iron but for the sulphur it contains, a large quantity of the sulphur and sulphuric acid of commerce being prepared from this ore.

The principal iron ores of the Australian colonies are magnetite, hematite, limonite, and pyrite. *Magnetite* forms veins in metamorphic schist at Wallerawang, New South Wales; it occurs in washed grains in many of our gold drifts (Daylesford). A fine sample of *micaceous iron* (a variety of hematite), containing from 55 to 70 per cent. of metallic iron, comes from Roses Gap, Grampians, but the exact mode of its occurrence has not yet been ascertained. *Limonite* occurs in rocks of all ages: rarely in veins in silurian (Creswick); often composing extensive fossiliferous beds (marine miocene) on the coasts of Victoria and Tasmania; very abundant as surface deposits of post-tertiary age (Lal Lal); as nodules and stalactites on the shores of Port Philip and Western Port.

IRON PYRITES occurs crystallized in silurian slates and sandstones, and in the porphyry dykes (Ararat) and quartz veins traversing them; as nodules in upper, middle, and older tertiary beds, as pseudomorphs after stems, leaves and fruit in the middle pliocene gold drift (Haddon), and as the matrix of an auriferous

quartz breccia (Smythesdale), it is found abundantly in Victoria.

ARSENICAL PYRITES occurs in the quartz reefs of nearly all our goldfields, where it, as well as the iron pyrites, is generally auriferous, and is accordingly treated for the extraction of gold (Port Philip Co., Clunes; Band and Albion Co., Ballaarat).

488. MAGNETITE (magnetic iron ore); protoxide of iron 31, sesquioxide of iron 69 = 100; contains 72 per cent. of iron; octahedra, with calcite on talc schist; *Traversella, Italy.*

489. MAGNETITE; octahedra in chlorite schist; *Switzerland.*

490. MAGNETITE; massive, granular; *Blanka mine, Ramberg, Sweden.*

491. MAGNETITE; octahedra in chlorite schist; *New Caledonia.*

492. MAGNETITE; massive, partly decomposed; *West Australia.*

493. MAGNETITE; massive; *Mt. Cone, South Australia.*

494. MAGNETITE; fibrous; *Lempuire, Tasmania.*

495. MAGNETITE; fibrous, *Tasmania.*

496. MAGNETITE; washed grains from gold drift; *Daylesford.*

Hematite; sesquioxide of iron, contains 70 per cent. of iron. Varieties: *Specular iron*, generally crystallised and of marked metallic lustre; *micaceous* iron, metallic lustre, scaly structure; *red hematite*, amorphous or pseudomorphous, submetallic lustre; *red ochre, reddle*, amorphous, earthy.

497. SPECULAR IRON; rhombohedral crystals with quartz; *Elba.*

498. SPECULAR IRON; rhombohedra; *Elba.*

499. SPECULAR IRON; rhombohedra; *Elba.*

500. SPECULAR IRON; rhombohedra with rock crystal; *Elba.*

501. SPECULAR IRON; massive; *Hull, Canada.*

502. SPECULAR IRON; seams in quartz; *east of Lancefield, Victoria.*

503. SPECULAR IRON; massive in quartz; *O'Connells Plains, Bathurst, New South Wales.*

504. SPECULAR IRON; tabular crystals, with labradorite in dolerite; *Redan, Ballaarat.*

521a Red Hematite. Kidney-shaped with concretionary structure. Barrow, Lancashire.

505. Specular Iron; with chromic oxide, on quartz; *Mt. Korong.*

506. Specular Iron; granular, *Bathurst.*

507. Specular Iron; with magnetite, chalcopyrite, dolomite and rock-crystal; *Traversella, Italy.*

508. Micaceous Iron; sand; *Levuka, Fiji.*

509. Micaceous Iron; with chalcopyrite on sphalerite; *Angaston, South Australia.*

510. Micaceous Iron; massive; *Novra mine, Groengeobeg, Fahlun, Sweden.*

511. Micaceous Iron; enclosing quartz; *South Australia.*

512. Micaceous Iron; partly converted into limonite; *Roses Gap, Grampians.*

513. Micaceous Iron; massive, *Angaston, South Australia.*

514. Micaceous Iron; efflorescent on rock-crystal on dolomite; *Traversella, Piedmont, Italy.*

514*a*. Micaceous Iron; acute rhombohedra; *Whitehaven, Cumberland.*

515. Micaceous Iron; very fine grained; *Grove Creek, Abercrombie River, New South Wales.*

516. Red Hematite; fibrous; *Grampians.*

517. Red Hematite; massive; *King Island, Bass' Strait.*

518. Red Hematite; fibrous; *Angaston, South Australia.*

519. Red Hematite; massive; *Yudunamutana mine, South Australia.*

520. Red Hematite; fibrous; *Cumberland, England.*

521. Red Hematite; reniform; *Devon, England.*

Limonite; hydrated sesquioxide of iron: peroxide of iron 85, water 15 = 100. The pure mineral contains 59 per cent. of iron, but this percentage is generally much less, owing to the presence of silica, alumina, phosphoric acid, etc. Varieties: *Brown hematite, bog iron ore, arenaceous iron ore, pisolitic iron ore, brown ochre.*

522. Brown Hematite; massive; *Corindhap, Rokewood.*

523. LIMONITE; oolitic; *Victoria.*

524. LIMONITE; massive; *Snake Valley, Carngham.*

525. LIMONITE; concretionary and botryoidal; *Bacchus Marsh.*

526. LIMONITE; massive with quartz; *Mt. Major, near Benalla.*

527. LIMONITE; botryoidal crust on chert; *Heathcote.*

528. LIMONITE; massive crust on volcanic scoria; *Campaspe River.*

529. LIMONITE; arenaceous, banded; *Western Port.*

530. LIMONITE; stalactitic, concretions; *Mordialloc.*

531. LIMONITE; concretionary; *Western Beach, Geelong.*

532. LIMONITE; dense; highly auriferous; *Inkermann Gold Mining Company, South Australia.*

533. LIMONITE; scoriaceous, auriferous; *near Adelaide, South Australia.*

534. LIMONITE; granular, auriferous; *Ironhill, Angaston, South Australia.*

535. LIMONITE; disseminated in quartz, with pyrite; *Alma, South Australia.*

536. LIMONITE; vesicular; *Mt. Cone, South Australia.*

537. LIMONITE; arenaceous, concretionary; *Ilfracombe, Tasmania.*

538. LIMONITE; massive; *Tamar iron works, Tasmania.*

539. LIMONITE; concretionary; chromiferous; *Georgetown, Tasmania.*

540. LIMONITE; botryoidal; *Tasmania.*

541. LIMONITE; concretionary layer on ferruginous grit; *Yokonup, Western Australia.*

542. LIMONITE; oolitic; *New South Wales.*

543. LIMONITE; massive; *Thames, New Zealand.*

544. LIMONITE; macled cubes, pseudomorphs after pyrite; *Rio mine, Elba.*

545. LIMONITE; macled cubes, pseudomorphs after pyrite; *Helfors, Sweden.*

545a. LIMONITE; compact stalactitic; *Forest of Dean, Gloucester,*

536a Limonite ("Gossan", "Iron Hat"). - Laminar. Prince Alfred Copper Lode, Moonta, S. Australia.

545*b*. LIMONITE; compact, radiating fibrous; *Lostwithiel, Cornwall.*

546. LIMONITE; argillaceous, banded; *Wladimir mine, Russian Poland.*

547. LIMONITE (Reddle), earthy; *New Zealand.*

547*a*. REDDLE; earthy; *Rotherberg, Saxony.*

548. GOETHITE; peroxide of iron 90, water 10 = 100; divergent columnar on quartz; *Restormel mine, Lostwithiel, Cornwall.*

Chalybite; carbonate of iron: protoxide of iron 62, carbonic acid 38 = 100; part of the iron frequently replaced by manganese and lime. Varieties: Ordinary chalybite *(siderite,* or *spathic iron),* and *spherosiderite;* the latter is apparently confined to volcanic rocks, and is frequently met with at Ballaarat and Creswick.

549. CHALYBITE; stalagmitic; *Ballaarat.*

550. SPHEROSIDERITE; botryoidal; *"Working Miners'" shaft, Ballaarat.*

551. SPHEROSIDERITE; on basalt; *Ballaarat.*

552. SPHEROSIDERITE; on basalt; *Sebastopol, Ballaarat.*

553. SPHEROSIDERITE; botryoidal on amygdaloidal basalt; *Geelong.*

554. CHALYBITE; rhombohedra on metamorphic slate; *from a depth of 400 feet, Great Western Reef, Maldon.*

555. CHALYBITE; botryoidal with crystalline surface, on basalt; *Richmond, Victoria.*

556. CHALYBITE; botryoidal on basalt; *Richmond.*

557. CHALYBITE; tabular, with chalcopyrite; *Oratunga mine, South Australia.*

558. CHALYBITE; saddle-shaped rhombohedra, invested by dolomite. With galena and pyrite on milky quartz; *Cornwall.*

559. CHALYBITE; small complex rhombohedra, investing quartz crystals; *North Cornwall.*

560. CHALYBITE; saddle-shaped rhombohedra; *Carn Brea mine, Cornwall.*

561. CHALYBITE; saddle-shaped rhombrohedra, investing milky quartz; *Treburget mine, Cornwall.*

562. CHALYBITE; lenticular twin rhombohedra; with dolomite on quartz; *Treburget mine, Cornwall.*

363. CHALYBITE; botryoidal crust, with calcite on quartz; *Cornwall.*

564. CHALYBITE; lamellar; *Lælling, Carinthia, Austria.*

565. CHALYBITE; saddle-shaped rhombohedra with pyrite; *Brosso, Piedmont, Italy,*

566. PYRITE (Iron pyrite, cubical pyrites), bisulphide of iron: iron 45·77, sulphur 54·23 = 100; large cubes; from silurian slate; *New Kohinoor mine, Ballaarat.*

567. PYRITE; cubical; *Black Hill, Ballaarat.*

568. PYRITE; crystalline concretion in silurian sandstone; *Black Hill, Ballaarat.*

569. PYRITE; nodule; from sub-basaltic gold drift; *Nelson claim, Sebastopol, Ballaarat.*

570. PYRITE; crystalline, stalactite on quartz; *Sebastopol, Ballaarat.*

571. PYRITE: crystalline stalagmite on limestone; from a fissure in quartz vein; *Maldon.*

572. PYRITE; macled cubes; *Back Creek, Buchan, Gippsland.*

573. PYRITE; cubes in clay slate; *Castlemaine.*

574. PYRITE; small cubes in clay slate; *Catherine Reef, Sandhurst.*

575. PYRITE; concretions, partly altered into limonite; *Western Port.*

576. PYRITE; octahedra; *South Australia.*

577. PYRITES; pentagonal faces imperfectly developed; *Nairne, South Australia.*

578. PYRITES; cubes, pentagonal dodecahedra and rounded grains; *South Australia.*

579. PYRITE; cubes; changing into limonite; *South Australia.*

580. PYRITE; auriferous veinstone, partly converted into limonite; *Wankaringa, South Australia.*

583a Pyrite.- Cubes with blende and calcite. Cornwall.

598a Pharmacosiderite.- Composition: peroxide of iron 41, arsenic acid 38, water 21 = 100. Small cubes on quartz.- Königsberg in Schemnitz, Hungary.

581. PYRITE; cubes with curved edges; *Weardale, Durham, England.*

582. PYRITE; crystalline crust on mammillary ankerite; *Cornwall.*

583. PYRITE; curved cubes with blende and dolomite on quartz; *Cornwall.*

584. PYRITE; small cubes with replaced edges, on dolomite; *Hartz.*

585. PYRITE; pentagonal dodecahedra, on quartz; *Hartz.*

586. PYRITE; fibrous layers intercalated with galena and dolomite; *Freiberg, Saxony.*

587. PYRITE; botryoidal; *Kremnitz, Hungary.*

588. PYRITE; pentagonal dodecahedra; *Prosso, Italy.*

589. PYRITE; pentagonal dodecahedra; *Rio, Elba.*

590. PYRITE; massive; contains carbonate of iron and lime; and is coated by carbonate of copper; *Orolinto, Spain.*

591. MARCASITE; (Radiated pyrites); bisulphide of iron: iron 46·7, sulphur 63·3 = 100; distinguished from pyrite by its rhombic crystallisation; rhombic prisms in limestone; *Shakespear's Cliff, Dover.*

592. MARCASITE (Spear pyrites); twin pyramids with re-entering angles; on calcite; *Freiberg, Saxony.*

593. ARSENOPYRITE; (Arsenical pyrites, Mispickel); arsenide and sulphide of iron: iron 34, arsenic 46, sulphur 20 = 100; diseminated in quartz; argentiferous; *Beechworth.*

594. ARSENOPYRITE; right rhombic prisms on clay slate; auriferous; *Sandhurst,*

595. ARSENOPYRITE; radiating, crystalline, on calcite; yields 100 ounces of gold per ton according to laboratory assay; *Lucknow mine, Bathurst, New South Wales.*

596. ARSENOPYRITE; right rhombic prisms on mica schist; *Freiberg, Saxony.*

597. ARSENOPYRITE; rhombic prisms with chalybite and blende; *Freiberg.*

598. ARSENOPYRITE; crystalline in quartz; *Toronto, Canada.*

599. CHLOROPAL (variety Fettbol); hydrated silicate of iron:

silica 47. sesquioxide of iron 24, alumina 3, water 26 = 100; earthy, conchoidal; on trap; *Halsbrücke, Freiberg, Saxony.*

600. PYRRHOTITE (Magnetic pyrites); sulphide of iron: iron 61, sulphur 39 = 100; massive; *New Zealand.*

600*a*. PHYRRHOTITE; massive in amphibolite; *Mt. Ramsey, near Mt. Bischoff, Tasmania.*

601 SCORODITE; hydrated arseniate of iron: arsenic acid 51·1, sesquioxide of iron 32 7, water 16·2 = 100 0; crystalline crust on arsenopyrite; *St. Day, Cornwall.*

602. SCORODITE; radiating groups of prismatic crystals on limonite; *Liskeard, Cornwall.*

603. VIVIANITE; phosphate of iron: protoxide of iron 42·27, phosphoric acid 28·75, water 28·98 = 100·00; nodule, divergent fibrous; from sub-basaltic gold drift; *Corinella, Daylesford.*

604. VIVIANITE; coloring quartz; *Maldon.*

605. VIVIANITE; oblique prisms in sandstone; *Bairnsdale.*

606. VIVIANITE (blue iron earth); earthy on magnetite and hematite; *Cornwall.*

607. COPIAPITE; basic sulphate of iron; sulphuric acid 42·7, sesquioxide of iron 34·2, water 23·1 = 100·0; the specimen represents auriferous iron pyrites in various stages of transmutation, from hydrated ferric sesquioxide to hydrated proto-sulphate, and basic sulphate of iron; *Wankaringa mine, South Australia.*

608. MELANTERITE (Copperas); hydrated proto-sulphate of iron: sulphuric acid 28·9, protoxide of iron 25·7, water 45·4 = 100·0; pale greenish coating on auriferous iron pyrites; *Wankaringa mine, South Australia.*

609. VITRIOLITE (Iron vitriol); sulphate of iron with sulphate of copper: oxide of copper 15·36, protoxide of iron 11·00, sulphuric acid 28·08, water 45,06 = 100·00; oblique prisms; partly ochreous; *Roumelia, Turkey.*

610. TANTALITE; tantalic acid 83·5, protoxide of iron 14·5, oxide of tin 2, oxide of manganese trace = 100; rhombic prisms in orthoclase on quartz; from a dyke in granite, near the cemetery, *Maldon.*

611. COLUMBITE; columbate of iron: columbic (niobic) acid 78·74, protoxide of iron 16·40, protoxide of manganese 5·12 = 100·26; rhombic plates in quartz matrix; *Gippsland.*

611*a*. COLUMBITE; flattened grains; *Barossa, near Gawler, South Australia.*

Wolfram, W., tungstate of iron and manganese: tungstic acid 76, protoxide of iron 19, protoxide of manganese 5 = 100. The metal tungsten is extracted from scheelite and wolfram; its alloy with iron produces a material of exceeding hardness, used in the manufacture of fine-edged tools ("wolfram steel"). Tungstate of soda is employed in rendering woven materials fireproof; tungstate of baryta is white pigment; tungstate of potash a purple bronze; other tungstates yield yellow and blue pigments. Wolfram frequently accompanies tin ore in granite (Beechworth, Tasmania); also occurs in quartz veins through the altered silurian rock in the neighborhood of granite (Linton, Maldon).

612. WOLFRAM; rhombic tables in quartz; *Flagstaff Hill, Linton.*

613. WOLFRAM; tabular crystals in quartz; *Sandy Creek, Maldon.*

614. WOLFRAM; plates and rolled fragments; *Upper Yarra.*

615. WOLFRAM; rhombic prisms, with cassiterite in quartz; *Mt. Bischoff, Tasmania.*

TITANIUM, Ti., is a metal combining extreme lightness (specific gravity = 5·3) with extraordinary hardness (= 7·5) which scratches steel. It is found in several iron ores, the origin of which can, as a rule, be traced to basaltic rocks (Smeaton, Skipton). There has not been, as yet, any practical use found for this metal.

616. OCTAHEDRITE (Anatase); titanic acid: titanium 60·29, oxygen 39.71 = 100·00; octahedron with square base; with calcite and chlorite on mica slate; *Grison, Switzerland.*

616*a*. RUTILE; massive; *Arendal, Norway.*

617. MENACCANITE; a hematite with 20 to 25 per cent. of the iron replaced by titanium: sesquioxide of iron 28·7, pro-

toxide of iron 27·9, titanic acid 43·4 = 100 ; rhombic plates in a sand of quartz, zircon, topaz and native gold; *Gembrook, Pakenham.*

618. MENACCANITE ; tabular crystals with rhombohedral replacement ; *Berwick.*

619. MENACCANITE ; washed grains in "heavy sand," which contains zircon, sapphire, quartz and native gold ; *Gembrook, Pakenham.*

620. MENACCANITE ; rhombohedral tables ; *Yackandandah.*

621. MENACCANITE ; fine sand ; *Port Lincoln, Franklin Harbour, Tasmania.*

622. MENACCANITE ; fine sand ; *Hokitika, New Zealand.*

623. ISERINE ; a hematite with 25 to 30 per cent. of the iron replaced by titanium : sesquioxide of iron 48, protoxide of iron 18, titianic acid 31, silicate of alumina 3 = 100 ; magnetic sand ; *Lake Burrumbeet.*

624. ISERINE ; fine grains with zircon, topaz and quartz ; highly magnetic ; *South Australia.*

625. ISERINE ; small cube-octahedral crystals ; magnetic ; *Roses Gap, Grampians.*

626. ILMENITE ; hematite with 26 to 30 per cent. of titanium, and a small amount of manganese : sesquioxide of iron 11·7, protoxide of iron 37·4, titanic acid 46·7, protoxide of manganese 4·2 = 100 ; rounded grains, in part showing rhombohedral faces ; *from the diamond drift, Kimberley, South Africa.*

Chromium, Cr., is a metal whose oxides and salts are very extensively applied as coloring agents in the arts : chromic acid is used in calico printing ; green oxide as an enamel for porcelain, the bichromate of potash as a dye ; chromate of lead as a yellow pigment, etc. It is found in nature chiefly as an oxide in conjunction with iron, either massive (chromite, chromic iron) or finely disseminating and coloring quartz, quartzite or felsitic rocks (Chrome stone, chrome ochre).

627. CHROMITE (Chromic Iron) ; oxide of chromium 60, pro-

toxide of iron 20, alumina 12, magnesia 8 = 100 ; tetrahedra in auriferous quartzsand ; *Heathcote.*

628. CHROME OCHRE (Chrome Stone) ; intimately mixed with felsite ; *Benalla.*

629. CHROMITE ; granular ; *New Caledonia.*

630. CHROMITE ; granular, in serpentine ; *New Caledonia.*

631. CHROMITE ; nodules enclosed in niccoliferous talc ; *New Caledonia.*

632. CHROMITE ; massive, hackly ; *Tasmania.*

633. CHROMITE ; part limonite ; granular ; *Mt. Bischoff, Tasmania.*

634. CHROMITE ; granular ; *Rockhampton, Queensland.*

635. CHROMITE ; with serpentine ; *New Zealand.*

635*a*. CHROMITE ; granular, massive ; *Texas, Lancaster, Co., Pennsylvania.*

Uranium, U., is a metal extracted from uranite and torbernite in the form of a black powder, which suffers no change in ordinary temperature, but burns with a brisk flame when heated with access of air. The oxide of uranium, a yellow powder, is used in porcelain and glass painting, producing a deep black. The oxide fused with glass renders the latter dichroic, viz., yellowish by transmitted light, and emerald green by reflected light. The green coloration is only caused by certain chemically-active rays of light, such as blue, violet and purple. In this respect uranium glass constitutes a delicate re-agent.

636. TORBERNITE (Chalcolite, Copper-Uranite) ; oxide of uranium 61·2, phosphoric acid 15·1, oxide of copper 8·4, water 15·3 = 100·0 ; eight-sided tables ; *Providence, Cornwall.*

637. TORBERNITE ; square prisms ; *Wheal Basset mine, Redruth, Cornwall.*

638. TORBERNITE ; dimetric plates ; with ferruginous quartz on mica schist ; *Wheal Basset mine, Redruth, Cornwall.*

639. URANINITE ; (Pitch blende) ; protoxide and peroxide of

uranium: uranium 84·78, oxygen 15·22 = 100·00; massive with chalcopyrite; *Cornwall.*

640. AUTUNITE (Yellow Uranite); phosphate of uranium and lime: peroxide of uranium 62·69, lime 6·10, phosphoric acid 15·54, water 15·67 = 100·00; stellar groups of oblique prisms, on earthy psilomelane; *Wheal Basset mine, Redruth, Cornwall.*

Manganese, Mn.; ores containing this metal are of common occurrence in Australia; but *pyrolusite* is the only ore which is of practical use. On account of the large amount of oxygen this mineral contains, it serves as a material for the manufacture of chlorine, chloride of lime, etc. It is largely employed as a purple color for glass and enamel of pottery ware, as well as for the removal of the greenish tint given to ordinary glass by iron, The value of the ore depends upon the quantity of peroxide of manganese it contains. The 70 per cent. ore is worth about £6 10s. per ton.—Psilomelane occurs frequently as the cementing matrix of an auriferous quartz pebble conglomerite (Smythesdale, Lintons) of upper pliocene age; it also forms a black coating on grains and nuggets of gold found in the older pliocene (marine) gold drifts of Hard Hill, Creswick; Argyle, Linton; Great Western, near Stawell.

641. PSILOMELANE (ferro-manganese); oxides of manganese 50, sesquioxide of iron 18, silicate of alumina 14, water 12 = 94, the remainder lime, baryta and cobalt; quartz breccia; *Linton.*

642. PSILOMELANE; botryoidal; *Sandhurst.*

643. PSILOMELANE; veins in silurian slate; *M'Kenzie's Diggings, Goulburn.*

644. PSILOMELANE; mammillary, cobaltiferous; *Walhalla, Gippsland.*

645. PSILOMELANE; massive, conchoidal; *Gladstone, Queensland.*

646. PSILOMELANE; indurating sandstone; *New Zealand.*

647. PSILOMELANE; botryoidal, quartz breccia; *Spain.*

647*a*. PSILOMELANE; concretionary; *Siegen, Westphalia.*

646ª Psilomelane .. Botryoidal . Russel, N.Z.

(Rhodocrosite)
651a Diallogite; Carbonate of manganese; protoxide of manganese 46·35
lime 7·28, iron oxide 3·10, magnesia 3·33, Carbonic acid 39·94 = 100·00
Rhombic Crystals with brown tarnish. Herneisen, Nassau.

648. PYROLUSITE; manganese 63·64, oxygen 36.36 = 100·00; botryoidal, cobaltiferous; *Gippsland.*

648*a*. PYROLUSITE; botryoidal, granular; *Andalusia, Spain.*

649. MANGANITE; hydrated peroxide of manganese: peroxide of manganese 89·79, water 10·21 = 100·00; laminar; *Superb Co.'s mine, Linton.*

650. MANGANITE; botryoidal, enclosing quartz; *Murcia, Spain.*

650*a*. MANGANITE; fine grains in resin opal; *North-east coast, Tasmania.*

650*b*. MANGANITE; solid dentrites in semi opal; *North-east coast, Tasmania.*

650*c*. MANGANITE; bundles of columnar prisms, vertically striated; *Ihlefeld, Hartz.*

651. BRAUNITE; binoxide of manganese: manganese 69·68, oxygen 30·32 = 100·00; granular, with quartz and calcite; *St. Marcel, Aostra Valley, Italy.*

652. RHODONITE; protoxide of manganese 54·1, silica 45·9 = 100·0; botryoidal crust on psilomelane; *Clunes.*

652*a*. RHODONITE; crystalline granular; *Black Down, Devonshire.*

See also 470—TEPHROITE; silicate of protoxide of manganese: protoxide of manganese 70·2, silica 29·8 = 100·0; *Franklin, New Jersey, North America.*

Antimony, Sb., occurs rarely native; its oxide and sulphide are of common occurrence in Australia. Antimony mining in Victoria is carried on principally at Costerfield, near Heathcote, at Whroo, and Ringwood, where 334 tons of ore were produced in the year 1880. The total quantity of antimony ore raised in the colony to the end of 1880 was 21,240 tons, valued at £10 10s. per ton. The natural sulphide finds application in pyrotechny; antimonic acid is used as a yellow pigment in enamel painting; "antimony vermilion," consisting mainly of antimony and sulphur, is a scarlet oil and water

color. As an alloy with lead it forms *type metal*; with tin and lead *Britannia metal*. It also finds diverse application in medicine.

653. NATIVE ANTIMONY; contains 97 per cent. of antimony, with iron, silver, and arsenic; crystalline; *Sarawak, Borneo.*

654. STIBNITE (Antimony Glance); tersulphide of antimony: antimony 72·88, sulphur 27·12 = 100·00; granular; *Costerfield.*

655. STIBNITE; massive with rhombic structure; *Costerfield.*

656. STIBNITE; columnar; *Ringwood.*

657. STIBNITE; fibrous; *Ringwood.*

658. STIBNITE; disseminated and fibrous; *Whroo.*

659. STIBNITE; with pyrite in quartz; *Band and Albion Consols mine, Ballaarat.*

660. STIBNITE; disseminated in auriferous quartz; *Steiglitz.*

661. STIBNITE; disseminated in quartz; *Elaine.*

662. STIBNITE; columnar; *Mile Creek, Sofala.*

663. STIBNITE; disseminated with chalcopyrite in quartz; *Aclau mine, Kanmantoo, South Australia.*

664. STIBNITE; massive with cervantite and quartz; *Glenreef Run, Grafton, New South Wales.*

665. STIBNITE; rhombic prisms on quartz; *Pereta, Tuscany, Italy.*

666. STIBNITE; radiating, fibrous; *Freiberg, Saxony.*

667. STIBNITE; with cervantite and quartz; *Sarawak, Borneo.*

668. CERVANTITE (Antimony oxide); antimony 80·1; oxygen 19·9 = 100·0; interlaminated with limonite; *Ringwood.*

669. CERVANTITE; concretionary; with stibnite, limonite and galena; *Ringwood.*

670. CERVANTITE; with stibnite; *Costerfield.*

671. JAMESONITE; sulphantimonite of lead; antimony 36·2, lead 43·6, sulphur 20·2 = 100·0; acicular, fibrous; *Cornwall.*

672. ZINKENITE (var. Jamesonite); vesicular, with stibnite; *New Zealand.*

Molybdenum, Mo., occurs chiefly in nature as sulphide.

670[a] Kermesite; Oxi-sulphide of Antimony: Antimony 76·33, Sulphur 18·93, oxygen 4·74, = 100·00. Tufts of acicular prisms with rock crystal. Brünnsdorf near Freiberg, Saxony.

670[b] Senarmontite; Trioxide of antimony: Antimony 84·32, Oxygen 15·68 = 100·00. Octahedra, partly granular. Constantina, Algeria.

679a Molybdenite.- Hexagonal plates on lithomarge. From stanniferous granite Lottah Tin Mine, Gould's New Country, Tasmania.

In a metallic state it is silver-white with strong lustre, malleable; specific gravity 8·6, hardness 3. Molybdate of ammonia is an important re-agent for the detection of phosphoric acid in chemical analysis; by reduction of molybdic acid with tinsalt is obtained a beautiful blue color, valuable as a pigment. The sulphide is found disseminated in granite and metamorphic rocks, or in quartz veins through granite, in many Victorian localities.

673. MOLYBDENITE; bisulphide of molybdenum: molybdenum 60, sulphur 40 = 100; grains in quartz; *Maldon.*

674. MOLYBDENITE; scales in mica schist; *Yea, Goulburn, Victoria.*

675. MOLYBDENITE; scales in hornblende schist; *Maldon.*

676. MOLYBDENITE; foliated with chalcopyrite; *Yelta Copper mine, York Peninsula.*

677. MOLYBDENITE; scales in granite; *Crooked River, Gippsland.*

678. MOLYBDENITE; with pyrite in granite; *Darling Range, Guildford, Western Australia.*

679. MOLYBDENITE; on quartz in granite; *Buffalo Range, Myrtleford.*

Arsenic, As., in a metallic state occurs native in but few localities. The chief source of the arsenic of commerce are cobalt and iron ores. Many tons are annually obtained by the treatment of arsenical pyrites for gold in reverberatory furnaces on our goldfields, and destroyed, as having no satisfactory market value. The imported article is worth £12 10s. per ton. Arsenic is chiefly employed in the preparation of green colors; it is also used by the furrier, and as a drug.

680. NATIVE ARSENIC; concretionary with barite; *Saxony.*

681. NATIVE ARSENIC; massive; *Chili.*

682. REALGAR; bisulphide of arsenic: arsenic 70·07, sulphur 29·93 = 100·00; artificial product; *Bethanga.*

682*a*. REALGAR; effloresent on calcite; *Andreasberg, Hartz.*

682*b*. ORPIMENT ; tersulphide of arsenic : arsenic 61, sulphur 39=100 ; massive, with perfect rhombic cleavage ; *Persia*.

Bismuth. Bi., is found native in several Victorian localities (Upper Yarra, Eastern Gippsland), New England, New South Wales, in South Australia, and in Queensland. In its pure state it is brittle and non-malleable, and is little used except in certain thermo-electrical apparatus. Its alloys are distinguished by their easy fusibility. While bismuth fuses at 476°, lead at 612°, and tin at 442°, an alloy of 2 parts bismuth, 1 part lead, and 1 part tin melts at 212° F. Such alloys are useful for taking printers' casts of woodcuts, stereotype, etc. By adding a small amount of mercury to this alloy the fusibility is still further increased ; this compound is used by dentists for the stopping of teeth. The carbonate is found in rolled pebbles in several auriferous "leads" in Victoria (Maldon, Beechworth) ; in New England, N.S.W., and in Northern Queensland it occurs in the stanniferous sand.

683. NATIVE BISMUTH ; with stibnite on calcite ; *Balhannah mine, South Australia.*

684. NATIVE BISMUTH ; hexagonal prisms ; *Bunawing, South Australia.*

685. NATIVE BISMUTH ; with carbonate of copper ; *Bunawing, South Australia.*

686. NATIVE BISMUTH ; with erubescite, chalcopyrite and rock crystal ; *Balhannah mine, South Australia.*

687. NATIVE BISMUTH ; hexagonal prisms on quartz ; *Altenberg, Saxony.*

688. BISMUTHINITE (Bismuth Glance) ; bismuth 81·6, sulphur 18·4 = 100·0 ; tarnished ; with chalcopyrite on barite ; *Balhannah mine, South Australia.*

688*a*. BISMUTHINITE ; disseminated in amphibolite, with fluorite, chalcopyrite, pyrhotite, and decomposed pyrite ; *Mt. Ramsey, near Mt. Bischoff, Tasmania.*

689. AIKENITE (Bismuth-needle ore) ; sulphide of bismuth

with sulphide of copper and lead: bismuth 35, lead 36, copper 11, sulphur 17 = 99; acicular crystals on quartz; *Eastpool mine, Cornwall.*

690. BISMUTITE; carbonate of bismuth: oxide of bismuth 90·28, carbonic acid 6·29, water 3·43 = 100·00; rolled pebbles; *Spring Creek, Ovens, Victoria.*

691. BISMUTITE; rolled fragments; *Broughton, near Charters Towers, Queensland.*

Lead, Pb., occurs native in rolled fragments in some of our gold drifts (Ballaarat, Daylesford). The chief source of the lead of commerce is *galena*, a mineral which also yields a considerable portion of the silver produced throughout the world. In Durham and Northumberland, the greatest silver-producing districts of Great Britain, the refining of lead ore is profitably carried on with as low a yield as 3 oz. of silver per ton; in Saxony this minimum standard is still lower. Compared to this we have lead ore in Victoria which contains upwards of 40 oz. of silver per ton (Percydale), in New Zealand 50 oz. and in Queensland 180 oz. per ton (Ravenswood). The present price of pig lead is £16 15s. per ton.

692. NATIVE LEAD; rolled pieces; from the middle pliocene gold drift; *Park Company's mine, West Ballaarat.*

693. GALENA; protosulphide of lead: lead 86·6, sulphur 13·4 = 100·0; with quartz and pyrite; highly argentiferous; *Percydale, near Avoca,*

694. GALENA; cubical in fluorite; *Yass, New South Wales.*

695. GALENA; granular; *New South Wales.*

696. GALENA; finely cubical; *New South Wales.*

697. GALENA; granular, with pyrite and blende; *Moruya, South Australia.*

698. GALENA; dodecahedral; *Narra Tarra, Champion Bay, Western Australia.*

699. GALENA; in quartz rock; *Champion Bay, Western Australia.*

700. GALENA; granular in metamorphic slate; *Mt. Right, Ravenswood. Queensland.*

701. GALENA; with pyrite in quartz; *Charters Towers, Queensland.*

702. GALENA; granular with pyrite; yields 146 oz. of silver per ton; *Ravenswood, Queensland.*

703. GALENA; cubical, yields 163 oz. of silver per ton; *Ravenswood.*

704. GALENA; in vesicular hematite; *Ravenswood.*

705. GALENA; tabular, yields 162 oz. of silver per ton; *Ravenswood.*

706. GALENA; cubical crystals in calcite; *Ravenswood.*

707. GALENA; cubical, coated with earthy carbonate of lead; yields 180 oz. of silver per ton; *Ravenswood.*

708. GALENA; cubical with chalcopyrite on quartz; *Old Treburget mine, North Cornwall.*

708*a*. GALENA; groups of macled octahedra, having replaced solid angles; with chalybite and rock-crystal; *North Cornwall.*

709. GALENA; tetrahedral; with chalybite, calcite and rock-crystal; *Treburget mine, North Cornwall.*

710. GALENA; dodecahedral, with fluorite and calcite; *Alston Moore, Cumberland.*

711. GALENA; tabular on quartz; *Derbyshire.*

712. GALENA; cubes on fluorite; with blende and quartz; *Derbyshire.*

713. GALENA; with fluorite and chalcopyrite; *Iceland.*

714. GALENA; granular, with chalcopyrite and blende; *Cacedes, Spain.*

715. GALENA; granular with cerussite; *Almeria, Spain.*

716. GALENA; cubical with hematite; *Fernel, Spain.*

717. GALENA; massive with cerussite; *Almeria, Spain.*

718. GALENA; minutely-cubical; with chalybite; *Vilvassera, Como, Italy.*

719. GALENA; dodecahedra on granular mass; *Bottino mine, Serraverra, Apuan Alps, Italy,*

720. GALENA; cubical on barite; *Canada.*

721. GALENA; tabular with barite; *Buckingham, Canada.*

722. GALENA; perfect cubes; *Freiberg, Saxony.*

723. GALENA; with rock crystal on mica schist; *Freiberg, Saxony.*

723*a*. GALENA, pseudomorph after pyromorphite. (This is the *plumbeine* of Breithaupt.) Hexagonal prisms, partly converted into cerussite; *Kautenbach, Berncassel, Moselle.*

724. STEINMANNITE (Zinciferous galena); sulphide of lead with zinc and antimony; granular; *Gippsland.*

725. CERUSSITE (White Lead); carbonate of lead: oxide of lead 83·58, carbonic acid 16·42 = 100·00; acicular rhombic prisms on limonite; *Monterecchio mine, Italy.*

726. CERUSSITE; crystalline, partly earthy; *Almeria, Spain.*

727. CERUSSITE; bundles of acicular crystals on limonite; *Sardinia.*

727*a*. CERUSSITE; rhombic prisms; *Leadhills, Scotland.*

728. CERUSSITE; earthy; *Talisker mine, Cape Jervis, South Australia.*

729. CERUSSITE; earthy; *Quedong, Bombala, New South Wales.*

730. CERUSSITE; rhombic prisms; *New South Wales.*

731. CERUSSITE; crystalline, with blue carbonate of copper; *Buchan River, Gippsland.*

732. CERUSSITE; crystalline, with green carbonate of copper; *Buchan River, Gippsland.*

733. CERUSSITE; rhombic prisms; *Geraldine mine, Western Australia.*

734. CERUSSITE; transmuted galena; *Geraldine mine, Western Australia.*

735. MIMETITE; arseniate of lead 82·74, chloride of lead 9·60, phosphate of lead 7·50 = 99·84; with cerussite on quartz; *St. Arnaud, Victoria.*

736. MIMETITE; (var. Kampylite); hexagonal barrel-shaped prisms; with wad and barite on quartz; *Cumberland.*

737. PYROMORPHITE; chloro-phosphate of lead: oxide of lead 82·29, phosphoric acid 15·73, chlorine 1·98 = 100·00; with cerussite and quartz on galena; *Ravenswood, Queensland.*

738. PYROMORPHITE; massive with cerussite; *Champion Bay, Western Australia.*

739. PYROMORPHITE; hexagonal prisms on limonite; *Przibram, Bohemia.*

740. PYROMORPHITE; finely crystallised on quartz; *Hofsgrand, Baden.*

741. PYROMORPHITE; acicular, partly reniform; *Cumberland.*

742. PYROMORPHITE; hexagonal prisms; *Braubach, Nassau.*

742*a*. ANGLESITE; sulphate of lead: oxide of lead 72, sulphuric acid 25, water 2 = 99; long rhombic prisms, with galena and cerussite; *Lead Hills, Scotland.*

743. BOULANGERITE; sulphide of lead and sulphide of antimony: lead 58·0, antimony 24·1, sulphur 17·9 = 100·0; disseminated in auriferous quartz; *Steiglitz.*

744. BOULANGERITE; with chalcopyrite on quartz; *St. Clare mine, Kainantoo, South Australia.*

745. BOULANGERITE; oblique plates; *St. Clare mine, Kainantoo, South Australia.*

746. BOULANGERITE; massive with calcite; *Müsen, Siegen, Westphalia.*

747. BOURNONITE; sulphide of lead, copper, and antimony; lead 42·88, copper 13·06, antimony 24·34, sulphur 19·76 = 100·00; with chalcopyrite; *Siegen, Westphalia.*

Tin, Sn., is rarely found native (Siberia); more frequent, but still limited to few localities, is the sulphide of tin (tin pyrites). The metal of commerce is, however, produced from the oxide (cassiterite) which is so abundant in most granite areas of Australia. The ore occurs mainly in veins in quartz, felspar, granite or porphyry traversing granitic or metamorphic rocks *(lode tin)*. As the result of denudation of the matrix rock it is also found in

more or less waterworn fragments among the sand and gravel deposits of pliocene and post-tertiary age (*stream tin*). During the year 1880 there were raised in Tasmania 5844 tons of ore, yielding 4154 tons of melted tin. New South Wales produced in the same year 5885 tons of tin in ingots; and Victoria 97 tons of ore. The London price of Australian tin is at present (February 1882) £114 per ton.

748. CASSITERITE; tin 78·38, oxygen 21·62 = 100·00; disseminated in granite; *Beechworth.*

749. CASSITERITE; grains in regenerated granite; *Sebastopol, Beechworth.*

750. CASSITERITE; crystals and semi-rounded fragments; *Three-mile Creek, Beechworth.*

751. CASSITERITE; massive in quartz matrix; *Ingellac Creek.*

752. CASSITERITE; massive; *Deep Sinkers' mine, New England, New South Wales.*

753. CASSITERITE; crystallised; with quartz in granite detritus; *Inverill, New South Wales.*

754 CASSITERITE; four-sided prisms, terminating in pyramids, in decomposed eurite; *Copes Creek, New England, New South Wales.*

755. CASSITERITE; in granite; *Elsmore, Inverill, New South Wales.*

756. CASSITERITE; massive in quartz; *Spring Creek mine, New South Wales.*

757. CASSITERITE; in granite and felsite; *New England, New South Wales.*

758. CASSITERITE; quadrangular pyramids in granite; *New England, New South Wales.*

759. CASSITERITE; macled crystals in granite; *Glen Creek, Armidale, New South Wales.*

760. CASSITERITE; crystallised in decomposed felsite; *Gould's Country, Tasmania.*

761. CASSITERITE; massive; *Mt. Bischoff, Tasmania.*

762. CASSITERITE; twin crystals; *Tasmania.*

763. CASSITERITE; in crystalline quartz matrix; *Mt. Bischoff, Tasmania.*

764. CASSITERITE (Wood Tin); striated; *Tasmania.*

765. CASSITERITE; porphyritic in felsite; *Mt. Bischoff, Tasmania.*

766. CASSITERITE; crystallised, partly waterworn; *Mt. Bischoff, Tasmania.*

767. CASSITERITE; crystalline with pyrite in quartz; *Mt. Bischoff, Tasmania.*

768. CASSITERITE; granular in felsite; *Mt. Bischoff, Tasmania.*

769. CASSITERITE; crystalline, massive; *Mt. Bischoff, Tasmania.*

770. CASSITERITE; crystalline granular, in felsite; *Mt. Bischoff, Tasmania.*

771. CASSITERITE; massive, with crystalline quartz; *Mt. Bischoff, Tasmania.*

772. CASSITERITE; in crystalline quartz; *Mt. Bischoff, Tasmania.*

773. CASSITERITE; square prisms surrounded by four-sided pyramids; *Dolcoath mine, Cornwall.*

774. CASSITERITE; crystallised with quartz and chalcopyrite; *St. Agnes, Cornwall.*

775. CASSITERITE; granular in quartz; *West Basset mine, Cornwall.*

776. CASSITERITE; crystalline in quartz; *Mulberry mine, St. Austel, Cornwall.*

777. CASSITERITE; crystalline with quartz in felspathic dyke rock; *Mulberry mine, St. Austel, Cornwall.*

778. CASSITERITE; crystalline with quartz; *Cornwall.*

779. CASSITERITE; square pyramids: with fluorite and lepidolite on quartz; *Altenberg, Saxony.*

Stream Tin—

780. CASSITERITE; black sand with zircon, quartz, etc.; *Sebastopol, Beechworth.*

781. CASSITERITE; semi-rounded crystals; *Eldorado, Beechworth.*

782. CASSITERITE; sub-angular fragments; *Spring Creek, Beechworth.*

783. CASSITERITE; with quartz and zircon; *Koeting Creek, Beechworth.*

784. CASSITERITE; with zircon, quartz, etc.; *Pennyweight Flat, Beechworth.*

785. CASSITERITE; fine sand with topaz and zircon; *Beechworth.*

786. CASSITERITE; sub-angular crystals; *Madden's Creek, Woolshed, Beechworth.*

787. CASSITERITE; sub-angular crystals; *Eldorado, Beechworth.*

788. CASSITERITE; fine grains with garnet and topaz; *Eldorado, Beechworth.*

789. CASSITERITE; with quartz, topaz, and zircon; *Chiltern.*

790. CASSITERITE; sub-angular grains; *Upper Yarra.*

791. CASSITERITE; fine sand with menaccanite, zircon, topaz, garnet and quartz; *Gippsland.*

792. CASSITERITE; with magnetite, quartz and garnet; *Albury.*

793. CASSITERITE; coarse sand; *Elsmore Company, New England, New South Wales.*

794. CASSITERITE; fine sand with zircon; *New England, New South Wales.*

795. CASSITERITE; small pebbles; *New England, New South Wales.*

796. CASSITERITE; coarse sand with zircons; *New England, New South Wales.*

797. CASSITERITE; coarse sand; *New England, New South Wales.*

798. CASSITERITE; coarse sand with garnets; *Victoria mine, Back-hut Creek, New England, New South Wales.*

799. CASSITERITE; well-rounded grains with garnet; *Palmer District, Queensland.*

800. CASSITERITE; coarse sand; *Cairns, Queensland.*

801. CASSITERITE; fine sand; *Cape York Peninsula, Queensland.*

802. CASSITERITE; with garnet, quartz, and topaz; *Granite Creek, Queensland.*

803. CASSITERITE (Resin tin); sub-angular crystals; *Tasmania.*

803*a*. CASSITERITE; crystalline grains; *North-east Coast, Tasmania.*

804. CASSITERITE; coarse sand; "*Marie Louise*" *Company, Gould's Country, Tasmania.*

805. CASSITERITE; medium sand; "*Marie Louise*" *Company, Gould's Country, Tasmania.*

806. CASSITERITE; fine sand; "*Marie Louise*" *Company, Gould's Country, Tasmania.*

807. CASSITERITE; coarse pebbles; *Tasmania.*

808. CASSITERITE; coarse pebbles; "*Full Moon*" *Company, Tasmania.*

The following specimens, numbered 808*a* to 808*z*, illustrate the strata in which stream tin is found at Mt. Bischoff, Tasmania:—

808*a*. Coarse angular fragments with ferruginous coating.
808*b*. Coarse, sub-angular and crystallised.
808*c*. Waterworn grains in yellow felsite sand.
808*d*. Waterworn grains in felsite sand.
808*e*. Coarse black sand.
808*f*. Medium black sand.
808*g*. Fine black sand.
808*h*. Very fine black sand.
808*i*. Coarse red ferruginous sand.
808*j*. Medium red ferruginous sand.
808*k*. Fine red ferruginous sand.
808*l*. Medium mottled sand.
808*m*. Fine mottled sand.
808*n*. Coarse brown sand.
808*o*. Medium brown sand, silicious.
808*p*. Medium brown sand, felspathic.
808*q*. Coarse brown felspathic sand.
808*r*. Fine brown felspathic sand.
808*s*. Fine silicious sand.
808*t*. Very fine sand (tin-slime).
808*u*. Fine tin sand (tin-slime).
808*v*. Fine brown sand.

818ª Cassiterite. Square octahedra. Trevannance, Cornwall.

808*w*. Fine black sand.
808*x*. Fine brown sand.
808*y*. Fine white sand from decomposed eurite.
808*z*. Tin ore in pyritous sand.

809. CASSITERITE; coarse sand with zircon; *Flinders Island.*

810. CASSITERITE; angular fragments in granitic detritus; *Selangon, Malayan Peninsula, Straits Settlement.*

811. CASSITERITE; waterworn pebbles; *Relou Tejoe, Straits Settlement.*

812. CASSITERITE; with fine quartz sand; *Perak, Straits Settlement.*

813. CASSITERITE; fine sand and quartz; *Perak, Straits Settlement.*

814. CASSITERITE; angular gravel; *Perak, Straits Settlement.*

815. CASSITERITE; with medium quartz sand; *Perak, Straits Settlement.*

816. CASSITERITE; coarse sand with quartz; *Malacca, Straits Settlemcnt.*

817. CASSITERITE; sub-angular fragments; *Perak, Straits Settlement.*

818. CASSITERITE; coarse sand; *Cornwall.*

819. STANNITE (Stannine, Tin pyrites): sulphur 29·6, tin 27·2, copper 29·3, iron 6·5, zinc 7·5 = 100·0; on calcite; *East Pool mine, Cornwall.*

Copper, Cu.; native copper is found in the form of rounded grains in the sub-basaltic gold drifts at Ballaarat and Spring Hill, and in crystalline scales disseminated in quartz in the Armagh Reef north of Creswick; in neither case is the occurrence of econimical importance. At Keelbottom, Queensland, it is found in considerable deposits. The principal ores are the blue and green copper ores (carbonates), and the yellow copper ore (copper pyrites), all more or less extensively present in the various Australian provinces. Copper mining in Victoria is carried on at Bethanga, on the Mitta Mitta River, and at Cooper's Creek, near Walhalla.

The annual copper production in the world is estimated at 66,160 tons, to which Europe contributes 29,500 tons, America 24,000 tons, Africa 610 tons, Asia 3050 tons, and Australia 9000 tons. Victoria produced in the year 1880, 270 tons of copper (from 3938 tons of ore); New South Wales, in the same year, 5328 tons of copper, and Queensland 600 tons.

In addition to its manifold employment in the form of plate, wire, and coin, copper is chiefly of technical importance as an alloy with zinc (brass, pinchbeck), with tin and zinc (bronze, gun-metal), with zinc and nickel (german silver), and with the royal metals (jewellers' silver and gold). Sub-oxide of copper (red), and the oxide (black) are used in the coloration of glass and enamel. Copper vitriol (sulphate of copper) occurs abundantly in nature, the result of decomposition of copper pyrites, but is also largely manufactured. Electricity decomposes solutions of this salt, and copper in the highest state of purity is precipitated. On this principal rests the art of galvanoplastic, by means of which engraved steel or copper plates may be multiplied. The blue and green carbonates are widely used as pigments. Several copper salts are valuable therapeutic agents.

820. NATIVE COPPER; rolled fragments; from the middle pliocene gold drift; *Park Company's mine, Ballaarat West.*

821. NATIVE COPPER; rolled fragments; *Lothair Company's mine, Clunes.*

822. NATIVE COPPER; washed grains; *St. Arnaud.*

823. NATIVE COPPER; massive with cuprite and quartz; "*South Australian and Victorian Copper and Gold Mining Company's*" *mine, South Australia.*

824. NATIVE COPPER; dendritic, in part showing octahedral planes; *Moonta mine, South Australia.*

825. NATIVE COPPER; dentrites; *Lady Alice mine, South Australia.*

826. NATIVE COPPER; octahedral; *North Australia.*

827. NATIVE COPPER; massive; 100 *miles north-east of Perth, Western Australia.*

824a Native Copper. - Shiny seams through black oxide. Spence Alfred shaft, Moonta, S. Australia.

824b Native Copper. - Mass of cubical crystals. Moonta, S.A.

843[a] Cuprite. Twin Octahedra. Moonta, South Australia.

828. NATIVE COPPER; dentrites in quartz; *Queensland.*

829. NATIVE COPPER; with cuprite and carbonate of copper; *Keelbottom, Dotswood, Queensland.*

830. NATIVE COPPER; massive; *Keelbottom, Dotswood, Queensland.*

831. NATIVE COPPER; with cuprite, chrysocolla and ferric oxide in mica schist; *East coast, New Caledonia.*

832. NATIVE COPPER; dentrites, with earthy sulphide of copper and mica on quartz; *New Caledonia.*

833. NATIVE COPPER; massive and dentritic, with calcite; *Pewabic mine, Houghton Co. Lake Superior, North America.*

834. NATIVE COPPER; massive, enclosed in calcite crystals; with prehnite in trap rock; *Pewabic mine, Houghton Co., Lake Superior, North America.*

835. NATIVE COPPER; massive, partly octahedral; *Lake Superior, North America.*

836. NATIVE COPPER; minutely octahedral, enclosing quartz; *Capetown, South Africa.*

837. NATIVE COPPER; invested by octahedral cuprite; *Carnbrea mine, Cornwall.*

Cuprite (Red Copper Ore); dioxide of copper: copper 88·9, oxygen 11·1 = 100·0.

838. CUPRITE; granular on native copper; *Sliding Rock mine, South Australia.*

839. CUPRITE; massive, with carbonate of copper; *Sliding Rock mine, South Australia.*

840. CUPRITE; octahedral crystals on native copper; *Burra Burra mine, South Australia.*

841. CUPRITE; with veins of malachite and limonite; *Burra Burra mine, South Australia.*

842. CUPRITE; cube and octahedra; druse with rock crystal in tile ore; *Spring Creek mine, South Australia.*

843. CUPRITE; twin octahedra; *Moonta mine, South Australia.*

844. CUPRITE; quartz breccia with malachite; *Burra Burra, South Australia.*

845. CUPRITE; granular, with malachite on serpentine; *New Zealand.*

846. CUPRITE; octahedral, with native copper and quartz; *Liskeard, Cornwall.*

847. CUPRITE (var. Tile ore); earthy, with chalcopyrite; *Wheal Blinman, South Australia.*

848. CUPRITE (var. Tile ore); vesicular; *Stanthorpe, New Zealand.*

Melaconite (Black Copper ore); oxide of copper; copper 79·85, oxygen 20·15 = 100.

849. MELACONITE; earthy with crystals of smoky quartz; *Doora mine, Kadina, South Australia.*

850. MELACONITE; transmuted cuprite; *South Australia.*

851. MELACONITE; earthy, with chalcopyrite and magnetite; *Currie's mine, Angaston, South Australia.*

Malachite; green carbonate of copper: protoxide of copper 71·9, carbonic acid 19·9, water 8·2 = 100·0.

852. MALACHITE; earthy; *Thompson River, Gippsland.*

853. MALACHITE; coating on clay slate; *Gippsland.*

854. MALACHITE; acicular crystals on limonite; *Mt. Lyndhurst, South Australia.*

855. MALACHITE; botryoidal on quartz grit; *Burra Burra, South Australia.*

856. MALACHITE; acicular crystals in cellular quartz; *Beltuna mine, South Australia.*

857. MALACHITE; reniform stalagmite; *South Australia.*

858. MALACHITE; banded, quartz breccia; *Burra Burra, South Australia.*

859. MALACHITE; macled form of oblique prisms; coated with silica; *South Australia.*

860. MALACHITE; nodules with botryoidal surface; *Kapunda, South Australia.*

855[a] Malachite. Globular, reniform. Burra Burra, S.A.
855[b] Malachite. Polished face shewing banded globular structure. Burra Burra, South Australia.

868 a Azurite. Earthy. Nymagee near Cobar, New South Wales.

861. MALACHITE; banded; *South Australia.*

862. MALACHITE; earthy; ore prepared for smelting; *Burra Burra, South Australia.*

863. MALACHITE; dressed ore; *Burra Burra.*

864. MALACHITE; dressed ore; *Burra Burra.*

865. MALACHITE; dressed ore; *Burra Burra.*

866. MALACHITE; dressed ore; *Burra Burra.*

867. MALACHITE; layers in clay slate; *Mt. Browne, New South Wales.*

868. MALACHITE; divergent fibrous; *Peelwood, New South Wales.*

869. MALACHITE; disseminated with *chrysocolla* in quartz; *New Caledonia.*

870. MALACHITE; earthy; with melaconite, cuprite, limonite and coating of silica in mica schist; *New Caledonia.*

871. MALACHITE; radiating acicular crystals on quartz in semi-opal; *New South Wales.*

872. MALACHITE; earthy, in auriferous clay-ironstone; *Armstrong's Gold Mining Company, New South Wales.*

873. MALACHITE; disseminated in auriferous diorite; *Brown's Creek, Carcoar, New South Wales.*

874. MALACHITE; massive, divergent, fibrous; *Queensland.*

875. MALACHITE; disseminated with cuprite in quartz; *Blackall, Queensland.*

876. MALACHITE; disseminated with *atacamite* (muriate of copper) and magnetite in slate; *Niguera; Chili.*

877. MALACHITE; banded, polished; *Siberia.*

Azurite (Chessylite); blue carbonate of copper: oxide of copper 69·08, carbonic acid 25·46, water 5·46 = 100·00.

878. AZURITE; oblique prisms on limonite; *Burra Burra. South Australia.*

879. AZURITE; lamellar, oblique prisms on malachite; *Burra Burra.*

880. AZURITE ; macled oblique prisms on nodule of malachite; *Burra Burra.*

881. AZURITE ; granular, with malachite on quartz grit ; *Lady Alice mine, South Australia.*

882. AZURITE ; earthy, spherical nodules ; *Burra Burra, South Australia.*

883. AZURITE ; minute crystals, in earthy nodules ; *Burra Burra.*

884. AZURITE ; nodules, coated with silicate of magnesia ; *North Australia.*

885. AZURITE ; disseminated in diorite ; *Wiseman's Creek, near Bathurst, New South Wales.*

886. AZURITE ; invested by cerussite ; *Peelwood, New South Wales.*

887. AZURITE ; crystalline, interstratified with malachite and limonite ; *Cow Flat, Bathurst, New South Wales.*

888. AZURITE ; massive, earthy ; *Lachlan, New South Wales.*

889. AZURITE ; crystalline with limonite ; *New Caledonia.*

890. AZURITE ; disseminated with limonite and cuprite in mica schist ; *New Caledonia.*

891. AZURITE ; earthy, with chalcopyrite ; *Mt. Perry, Queensland.*

Chalcocite (Copper Glance) ; disulphide of copper : copper 80, sulphur 20 = 100.

892. CHALCOCITE ; massive ; *South Australia.*

893. CHALCOCITE ; massive ; nodular ; *South Anstralia.*

894. CHALCOCITE ; massive, part chalcopyrite ; *New Moonta mine, South Australia.*

895. CHALCOCITE ; massive, passing into malachite ; *Western Australia.*

896. CHALCOCITE ; massive, with quartz ; *Gilian mine, Champion Bay, Western Australia.*

897. CHALCOCITE ; lamellar, with *tennantite* (copper 46,

892[a] Chalcocite .. Massive granular . Moonta, S. A.

897[a] Chalcocite . Massive with barnite, Chalcopyrite and malachite Nymagee, near Cobar, New South Wales

900ª Covellite. - Earthy. Moonta, South Australia.

903ª Bornite. Massive with Chalcopyrite and quartz in porphyrite - Moonta, South Australia.
903ᵇ Bornite. Massive with Chalcopyrite. Moonta; depth 105 fathoms.
903ᶜ Bornite. Massive. Moonta, South Australia.
903ᵈ Bornite. With Chalcopyrite disseminated in quartz. Moonta S.A.

arsenic 19, iron 5, sulphur 30 = 100) and malachite; *Crocodile Ranges, Rockhampton, Western Australia.*

898. CHALCOCITE; massive, partly earthy, with malachite and limonite, coated with silica; *New Caledonia.*

899. CHALCOCITE; six-sided rhombic prisms on limonite; *St. Just, Cornwall.*

900. COVELLITE (Indigo Copper); sulphide of copper: copper 66·5, sulphur 33·5 = 100·0; massive, part chalcopyrite; *South Australia.*

901. COVELLITE; massive, partly earthy; *Wallaroo mine, South Australia.*

902. COVELLITE; earthy; *Champion Bay, Western Australia.*

Bornite (Erubescite, purple copper, variegated copper), sulphide of copper and iron: copper 62·5, iron 13·8, sulphur 23·7 = 100·0.

903. BORNITE; massive, with chalcopyrite; *Moonta mine, South Australia.*

904. BORNITE; massive, enclosing quartz; *South Australia.*

905. BORNITE; massive with crystalline quartz; *South Australia.*

906. BORNITE; massive, with pyrite, chalcopyrite and quartz; *Blackall, Queensland.*

907. BORNITE; part chalcopyrite, with efflorescence of silica; *New Caledonia.*

908. BORNITE; massive, with chalcopyrite; *Cape of Good Hope.*

909. BORNITE; disseminated in calcite; *Harvey Hill, Canada.*

910. BORNITE; massive, with malachite and quartz; *Montecatini mine, Tuscany, Italy.*

Chalcopyrite (Copper pyrites, Yellow Copper ore, peacock ore) sulphide of copper and iron: copper 34·77, iron 30·46, sulphur 34·77 = 100·00·

911. CHALCOPYRITE; massive; *South Australia.*

912. CHALCOPYRITE ; with micaceous iron disseminated in limestone ; *Crinies mine, Angaston, South Australia.*

913. CHALCOPYRITE ; crystalline ; *Amcanda mine, South Australia.*

914. CHALCOPYRITE (peacock ore) ; crystalline with quartz ; *South Australia.*

915. CHALCOPYRITE ; crystalline with rock crystal ; *Moonta mine, South Australia.*

916. CHALCOPYRITE (peacock ore); crystalline; *N. Australia.*

917. CHALCOPYRITE ; massive, tarnished by black oxide of copper ; crevices filled with crystalline quartz; *Moonta mine, South Australia.*

918. CHALCOPYRITE (peacock ore); tetragonal sphenoids; *Wheal Blinman, South Australia.*

919. CHALCOPYRITE ; massive ; *Queensland.*

920. CHALCOPYRITE ; disseminated in quartz ; with rock crystal ; *New South Wales.*

921. CHALCOPYRITE ; with black oxide in quartz ; *Currawang, New South Wales.*

922. CHALCOPYRITE ; finely disseminated in devonian limestone ; *Quedong, Bombala, New South Wales.*

923. CHALCOPYRITE ; disseminated in calcite; *Badger Head, Port Sorrell, Tasmania.*

924. CHALCOPYRITE ; granular ; *Tasmania.*

925. CHALCOPYRITE ; granular, with quartz ; *Ascot, Canada.*

926. CHALCOPYRITE ; crystalline and botryoidal, investing ankerite, which forms a coating on large crystals of milky quartz.

927. CHALCOPYRITE ; twin crystals, tetragonal sphenoid and pyramid ; *Cornwall.*

928. CHALCOPYRITE ; massive with chalcocite; *North America.*

929. CHALCOPYRITE ; finely disseminated, interlaminar with quartz ; *Tuscany, Italy.*

930. CHALCOPYRITE ; finely disseminated through a quartz vein in slate ; from an excavation for dock ; *Capetown.*

915[a] Chalcopyrite. Granular, disseminated through white quartz. Prince Alfred Shaft, 90 fathoms, Moonta, S.A.

915[b] Chalcopyrite -- Disseminated through grey quartz. Moonta, S.A.

916[a] Chalcopyrite. Massive, granular, Fergusons shaft, 90 fathoms Moonta, South Australia.

917[a] Chalcopyrite -- Granular, disseminated through Bornite. Moonta, S.A.

917[b] Chalcopyrite. Massive, Crystalline. 90 fathoms, Prince Alfred Shaft, Moonta, S. Australia

917[c] Chalcopyrite -- Massive, granular. Moonta, S. Australia.

922[a] Chalcopyrite. Massive. Nymagee, near Cobar, N.S.W.

937a Tetrahedrite. Tetrahedra with Chalcopyrite, Calcite, and Chalybite. Clausthal, Hartz.

931. CHALCOPYRITE; tetragonal sphenoids with rock crystal; *East Caradon mine, Cornwall.*

932. CHALCOPYRITE; massive, with pyrite, galena, and blende in quartz; *Chiverton mine, Cornwall.*

933. CHALCOPYRITE; tetragonal sphenoids on brownspar; *Freiberg, Saxony.*

934. CHALCOPYRITE (peacock ore); tetragonal sphenoids; *Hartz, Germany.*

Tetrahedrite (Fahlerz, Grey Copper ore); sulphide of copper and antimony, with variable quantities of zinc, iron, silver, mercury and arsenic.

935. TETRAHEDRITE; massive, with calcite on serpentine; *Penguin, Tasmania.*

936. TETRAHEDRITE; coating on melaconite, with malachite, calcite, quartz and pyrite; *New Zealand.*

936*a*. TETRAHEDRITE; portion of the copper replaced by iron; twin-tetrahedra on quartz-breccia with oxide and carbonate of copper; *North-east coast of Tasmania.*

937. TETRAHEDRITE; tetrahedra, with pyrite and rock crystal; *Andreasberg, Hartz.*

938. TETRAHEDRITE (var. *Hermesite*); mercuriferous; massive with calcite; *Zslana, Siebenbürgen, Austria.*

939. TETRAHEDRITE; disseminated in fluorite; *Hungary.*

940. TETRAHEDRITE; tetrahedra, with chalcopyrite in brownspar; *Freiberg, Saxony.*

941. CYANOSITE (Copper Vitriol); sulphate of copper: oxide of copper 32, sulphuric acid 32, water 36 = 100; triclinic, crystalline; *Hueola caves, Spain.*

942. CYANOSITE; triclinic crystalline; *Bedford mine, Tamar River, Tavistock, Devon, England.*

943. ATACAMITE; muriate of copper: oxide of copper 53·6, chloride of copper 30·2 (chlorine 16·0, copper 14·3) water 16·2 = 100·0; rectangular octahedra in quartz; *Moonta mine. South Australia.*

944. ATACAMITE; rectangular octahedra on cuprite; *South Australia.*

945. ATACAMITE; disseminated in chrysocolla; *Mt. Lyndhurst, South Australia.*

946. CHRYSOCOLLA; silicate of copper: silica 34·2, oxide of copper 45·3, water 20·5 = 100·0; disseminated in serpentine: *Cornwall.*

SEE also specimens 869 and 945.

Mercury, Hg. Native mercury, although rare, is found in many localities. Its geological zone is limited to the middle and upper palaeozoic rocks; the fact of its occurrence in younger rocks is probably due to the re-distribution of material derived from the abrasion of palaeozoic strata, or, in some instances, to the process of transmutation. In California it fills cavities in quartz; near Verona in Italy, it impregnates a tertiary calcareous clay; at Linoges in central France, it occurs in a decomposed granite. The quicksilver of commerce is mostly extracted from cinnabar by sublimation in contact with lime. Cinnabar is found in shales and slates of all ages, from the carboniferous down to miocene, and also as a transmuted product in post-tertiary drift the deposits. It occurs near Gympie, in Queensland; at the Cudgegong River, New South Wales; at Waipori, Otago, New Zealand, and particularly at Borneo. Cinnabar is largely used as a pigment under the name of vermilion. Mercury is used in the extraction of the royal metal from their ores (amalgamation), and in silver and gold plating. It also finds application as a powerful drug. Alloyed with tin it is employed in the manufacture of mirrors. The bi-chloride (so-called corrosive sublimate) is a preventive of the decay of organic substances, such as dry-rot in timber, and has been successfully used in embalming dead bodies. The price of quicksilver in Victoria is £10 10s. per cwt. In the year 1880 this colony imported 73,916 lbs. of quicksilver.

947. NATIVE MERCURY; *Almaden, Spain.*

948. CINNABAR; proto-sulphide of mercury: mercury 86·21,

944ª Atacamite. - Minute rectangular octahedra, partly massive. Moruta, S.A.

945ª Atacamite. Aggregation of interwoven rectangular prisms. Los Remolinos, Chili.

946ª Chrysocolla. - Botryoidal with red oxide of copper. Siberia

954ª Cinnabar.– Crystalline, rhombohedral on Calcite.
Palatinate, Bavaria.

956ª Silver.– Metallurgical product. New Zealand.

957ª Native Silver. Thin plates in quartz. From stanniferous granite
Lottah Tin Co., Blue Tier, Goulds New Country, Tasmania.

959ª Native Silver. Capillary, tarnished brown. Freiberg, Saxony.

sulphur 13·79 = 100·0; crystalline granular, disseminated with calcite in quartz breccia; *Kilkivan, Gympie, Queensland.*

949. CINNABAR; rolled grains, with topaz and native gold; *Cudgegong River, New South Wales.*

950. CINNABAR; earthy; *New South Wales.*

951. CINNABAR; granular, with pyrite in slate; *Borneo.*

952. CINNABAR; granular; *Almaden, Spain.*

953. CINNABAR; disseminated in quartz; *St. Bernardino Co., California.*

954. CINNABAR; disseminated through a quartz vein in talc schist; *Tuscany, Italy.*

955. CINNABAR; granular; *Brazil.*

Silver, Ag. Native silver is found in small quantities in several auriferous quartz veins at St. Arnaud, also in a recent drift in the southern district of New South Wales. Silver glance ($Ag.^2$ S.) is generally the mineral which, accompanying galena, forms the argentiferous lead ore mined upon in many parts of Australia (*vide* galena).

The quantity of silver produced in Victoria during the year 1880 was 23,248 oz., chiefly from the refinement of gold; in the same year New South Wales produced 91,419 oz.; New Zealand 24,000 oz.; and Queensland, from the argentiferous lead ore of Ravenswood, 30,392 oz.

956. SILVER; metallurgical product.

957. NATIVE SILVER; reticulated; *Chili.*

958. NATIVE SILVER; octahedra, with native copper on calcite; *Lake Superior, North America.*

959. NATIVE SILVER; disseminated with chalcopyrite in quartz; *Comstock Lode, Nevada, North America.*

960. ARGENTITE (Silver Glance); sulphide of silver: silver 87·1, sulphur 12·9 = 100·0; fine plates with galena and chalcopyrite in quartz; *Gulgong, New South Wales.*

961. ARGENTITE; with chalcopyrite; *Almaden, Spain.*

962. PYRARGYRITE (Red Silver ore); sulphide of silver and

antimony: silver 60·2, antimony 21·8, sulphur 18·0 = 100·0; disseminated in grey gneiss; *Himmelfürst mine, Freiberg, Saxony.*

963. EMBOLITE; chloro-bromide of silver: silver 65·14, bromine 24·16, chlorine 10·73 = 100·03; roundish grains in quartz; *St. Arnaud, Victoria.*

Platinum, Pt. Native platinum occurs always in combination with iron, copper, palladium, osmium, and other metals. It has been found disseminated through syenite, serpentine, and other metamorphic rocks, but the chief source lies in the post-tertiary river gravels, from which it is obtained in rounded grains and "nuggets." The platinum of commerce is supplied by the Ural, in Russia, Brazil, Borneo, St. Domingo and Columbia. The Australian mineral occurs as small flattened grains in auriferous valley-drifts at Stockyard Creek, South Gippsland; Shoalhaven River, New South Wales; and at Southland, New Zealand. It is largely alloyed with osmium, iridium, gold, copper, and iron to the extent of from 30 to 55 per cent. The principal use of platinum is in the manufacture of crucibles. The price of platinum is £1 per oz.

964. PLATINUM; metallurgical product.

965. NATIVE PLATINUM; fine scales; *Southland, New Zealand.*

Iridium, Ir., does not occur in a pure state in nature; it is generally alloyed with osmium, rhodium, platinum and other metals. Iridium is the hardest of metals (H = 7), and on that account has been found useful in making nibs of writing pens ("diamond pens"). It is employed in enamel and glass painting, where a dense, pure black is required. But the metal is destined to become chiefly valuable, owing to its practical infusibility, as a material for making assay crucibles. The alloyed osmium-iridium is found in flattened hexagonal grains in the auriferous gravel drift at Stockyard Creek, South Gippsland; similarly in Tasmania, and at Mudgee and Bathurst, New South Wales. Professor Liversidge says that "its presence in alluvial gold is occasionally a source of trouble at the Sydney mint, for minute grains are

962ª Pyrargyrite. - Granular, micaceous with calcite: Andreasberg, Hartz.

often mechanically enclosed by the gold after melting, which by their hardness speedily destroy the dies during the operation of coining,"

966. OSMIRIDIUM; iridium 58, osmium 34, rhodium 3, ruthenium 5 = 100; flattened scales, in part hexagonal; *Tasmania*.

Gold, Au., in nature is rarely met with quite pure, but generally contains silver, and occasionally copper, iron, palladium, etc. Native gold is found either in veins ("reef gold"), or in sedimentary deposits ("alluvial gold"). As "reef gold" it occurs in isometric crystals, in plates and scales, crystalline efflorescent, spongiform, filiform, or in finely disseminated, almost microscopic grains; as "alluvial gold" in more or less rounded fragments, from the finest dust, devoid of metallic lustre (see specimen 1005) to nuggets of many pounds weight (see models of nuggets).

The mineral, *in situ*, is found in quartz veins, whose planes, as a rule, coincide with those of the stratification or cleavage of the highly inclined beds of the country rock, viz., shale, slate, and sandstone of the Lower and Upper Silurian—(Ballaarat, Heathcote); also in quartz veins traversing diorite dykes in these rocks (Alexandra, Woods Point). Gold frequently enters into the selvage (casing) on either side of the quartz veins; and this casing may be slate, sandstone, diorite. or clay ("friction seams," "slickensides"). Combined with iron sulphuret it occurs in pyrite, pyrrhotite and arsenopyrite, both in quartz veins and their selvages.

Gold also enters veins of segregation in crystalline schist, the quartz matrix occurring in massive, more or less horizontal deposits (Stawell). Further, in irregular veins in granite, wherever the latter is clearly the result of metamorphism of the neighboring palaeozoic rocks (Maldon, Beechworth). Under abnormal conditions "reef gold" is found in crevices in serpentine (Gundagai, New South Wales), and in cupriferous mica schist adjoining serpentine rock (New Caledonia).

"Alluvial Gold" is essentially a secondary product, *i.e.*, the product of redistribution of denuded palaeozoic rocks, and of

precipitation from ground waters holding gold in solution (probably through the agency of chlorine and persulphate of iron). The formation of the so-called "gold drifts" has been referred to five distinct periods, viz. :—*Upper Miocene* (fluvial "leads" of Dargo Plains, Gippsland); *Lower Pliocene* (marine; Clark's Hill, Creswick; Great Western, Stawell; "reef wash," South Ballaarat); *Middle Pliocene* (deep leads of Ballaarat, Spring Hill, Beaufort); *Upper Pliocene* (fluvial drift; Gong Gong Creek, Little Bendigo); *Post Pliocene* (shallow deposits in valleys, and cappings on hill sides). The precipitation of gold in contact with iron sulphuret appears to have taken place down to the most recent time, and is probably still active in drifts and casings, which permit the circulation of meteoric waters.

Statistics issued by the several colonial Governments, and other publications, give the quantities of gold produced as follows:—

	Quantity of Gold produced in the year 1880.	Do. from the time of the gold discovery to the end of 1880.
Victoria.	829,121 oz.	49,500,000 oz.
New South Wales.	118,600 ,,	9,075,552 ,,
Queensland.	267,136 ,,	3,200,000 ,,
New Zealand.	311,000 ,,	9,547,000 ,,
Tasmania.	52,595 ,,	180,178 ,,
South Australia. (approximate)	12,000 ,,	80,000 ,,
Total Australian Colonies.	1,590,452 oz.	71,582,730 oz.

The value of gold produced in the year 1880 in the Australian colonies thus amounted to £6,361,808. It is remarkable that the estimate of gold raised in the United States of America, British Columbia and Western Mexico, during last year, amounts to almost exactly the same figure, viz., £6,373,737*.

* Annual report of Messrs. Wells, Fargo and Co., Bankers and Express Agents, San Francisco.

967. NATIVE GOLD; spongiform in quartz geode; from the footwall of a lode 14 ft. thick, at a depth of 570 feet; *Young Band Extended Co., Cobden, Street, Redan, Ballaarat.*

967*a*. NATIVE GOLD; similar to 967 and from same locality.

968. NATIVE GOLD; efflorescent on white opaque quartz; 400 *feet level, Band and Albion Consols mine, Redan, Ballaarat.*

969. NATIVE GOLD; mossiform in slate casing; *Band of Hope mine, Redan, Ballaarat.*

970. NATIVE GOLD; octahedral crystals in quartz geode; *Black Hill, Ballaarat.*

971. NATIVE GOLD; with cubic pyrites in quartz; *Ballaarat.*

972. NATIVE GOLD; coarse grains, reticulated in cavity of quartz; this is a fragment of a rounded boulder found in the lower pliocene drift; *Sir William Don mine, Ballaarat.*

973. NATIVE GOLD; finely disseminated in irridescent quartz; *Township Reef, Ballaarat.*

974. NATIVE GOLD; cube with faces of rhombic dodecahedron; *Black Hill Ballaarat.*

975. NATIVE GOLD efflorescent on brecciated quartz, veined by limonite; *Buninyong Estate mine, Ballaarat.*

976. NATIVE GOLD; coarse grain in green silurian slate; *Buninyong Estate mine, Ballaarat.*

977. NATIVE GOLD; disseminated with arsenopyrite in white opaque quartz; *Victoria Co., Clunes; depth, 600 ft.*

978. NATIVE GOLD; compressed cubes with rhombic dodecahedral planes; collected from mercury trough of the *Port Philip mine, Clunes.*

979. NATIVE GOLD; disseminated in white opaque quartz, with pyrite, arsenopyrite and galena; *Clunes.*

980. NATIVE GOLD; with pyrite and galena in "greasy" quartz; from a depth of 160 ft.; width of lode, 12 inches; yield, 5 oz. per ton; *Monater's claim, Barry's Reef, Blackwood.*

981. NATIVE GOLD; crystalline grains in cavities of white, opaque quartz; *Blackwood.*

982 NATIVE GOLD; mossiform with rock crystal and galena; *Blackwood.*

983. NATIVE GOLD; disseminated in ferruginous brecciated quartz; lode 1-5 ft. thick; *Minerva claim, Post Office Reef, Elaine.*

984. NATIVE GOLD; mossiform and smooth grains in quartz; from wall of lode 3-4 ft. thick; *Steel's Reef, Pioneer Reef, Yandoit.*

985. NATIVE GOLD; fine grains on joint plane of ferruginous quartz; from a lode 4 ft. thick at depth of 50 feet; *Richmond Co., Waterloo Flat, Beaufort.*

986. NATIVE GOLD; finely disseminated with arsenopyrite in veined quartz, with a casing of lithomarge; *from* 1100 *ft. level, Prince Patrick mine, Stawell.*

987. NATIVE GOLD; fine grains on glassy quartz; from a lode 4 ft. thick in metamorphic slate; *Victoria Reef, Maldon.*

988. NATIVE GOLD; coarse-grained in glassy quartz; from a vein in granite; *Maldon.*

989. NATIVE GOLD; fine grained with *maldonite* (alloy of gold and bismuth) in quartz, banded by ferruginous veins; *Maldon.*

990. NATIVE GOLD; disseminated in metamorphic slate; *Union Reef, Eaglehawk, Maldon.*

991. NATIVE GOLD; thickly impregnating quartz; *North-eastern Co.'s mine, Reedy Creek, Kilmore.*

992. NATIVE GOLD; disseminated in saccharine quartz; *Langridge's claim, Reedy Creek, Kilmore.*

993. NATIVE GOLD; fine grained, on veined quartz; *Beechworth.*

994. NATIVE GOLD; finely disseminated in thin quartz veins through binary granite; from a dyke; *Beechworth.*

995. NATIVE GOLD; thickly investing vesicular quartz; *Happy Valley, Running Creek, Ovens River.*

996. NATIVE GOLD; fine grains with blende and pyrite on quartz; *Christmas Reef, Happy Valley, Ovens River.*

997. NATIVE GOLD; coarse grains with blende and pyrite on milky quartz; *Burke's Flat, Dunolly.*

998. NATIVE GOLD; finely disseminated with pyrite on veined quartz; *Welcome Reef, Bealiba.*

999. NATIVE GOLD; coarse grains with arsenopyrite in veined quartz; *New Bristol Reef, St. Arnaud.*

1000. NATIVE GOLD; crystalline in cavities of white cavernous quartz; *Garden Gully Reef, Sandhurst.*

1001. NATIVE GOLD; coarse grains in white quartz, enclosing fragments of black shale; from a depth of 700 ft.; *Hustler's Reef, Sandhurst.*

1002. NATIVE GOLD; octahedral crystals with rounded edges; *Sandhurst.*

1003. NATIVE GOLD; waterworn pieces; *Castlemaine.*

1004. NATIVE GOLD; waterworn flattish grains; *Beechworth.*

1005. NATIVE GOLD; fine gold dust; *Maryborough.*

1006. NATIVE GOLD; coarse grains in joints of ferruginous quartz; *Castlemaine.*

1007. NATIVE GOLD; coarse grains in vesicular quartz; *Morning Star Reef, Clarence River, New South Wales.*

1008. NATIVE GOLD; coarse grains with pyrite in vesicular quartz; from a lode 2 ft. 4 in. thick; *Little Nell Reef, Grafton, New South Wales.*

1009. NATIVE GOLD; coarse grains in ferruginous quartz; *Morning Star Reef, Grafton, New South Wales.*

1010. NATIVE GOLD; fine grains with pyrite and galena on "fatty" quartz; *Union mine, Lady Alice Reef, Port Darwin.*

1011. NATIVE GOLD; crystalline in cavities of white opaque quartz; *Port Darwin.*

1012. NATIVE GOLD; similar to 1011.

1013. NATIVE GOLD; fine grains in chrome-colored brecciated quartz; *Fountain Head Reef, Yam Creek, Port Darwin.*

1014. NATIVE GOLD; flat scales on brecciated quartz; *Yam Creek, Port Darwin.*

1015. NATIVE GOLD; fine grains in glassy quartz; *Kalfunda Co., Port Darwin.*

1016. NATIVE GOLD; spongiform in "fatty" quartz; *Port Darwin.*

1017. NATIVE GOLD; finely disseminated on joints of vesicular quartz; *Union mine, Lady Alice Reef, Port Darwin.*

1018. NATIVE GOLD; coarse grains with blende and arsenopyrite; *Tannuda Creek, South Australia.*

1019. NATIVE GOLD; thickly impregnating quartz; contains 34 per cent. of silver; *Long Drive claim, Thames River, New Zealand.*

1020. NATIVE GOLD; fine grained; with galena in glassy quartz; the stone yields 4 oz. per ton; *Royal Standard Co.'s mine, Tambaroora, Hillend, New South Wales.*

1021. NATIVE GOLD; coarse grains with pyrite in white quartz; *Courier Company's mine, Puriri, New Zealand.*

1022. NATIVE GOLD; fine grains in mica schist; *Fernhill mine, Diahot River, New Caledonia.*

1023. NATIVE GOLD; coarse grains with pyrite, chalcopyrite and argentiferous galena; from a depth of 1300 ft.; *Comstock Lode, Savage Co., Virginia, Nevada, North America.*

1024. NATIVE GOLD; spongiform, partly coated with decomposed pyrite; associated with blende, galena and pyrite on quartz; from a lode 1 to 14 ft. thick; *Young Band Extended Co.'s mine, Redan, Ballaarat.*

1025, NATIVE GOLD; similar to 1024.

MODELS OF NUGGETS.

(Cases 32 and 33.)

1. "THE WELCOME;" weight 2195 oz.; found on the 11th June, 1858, at a depth of 180 ft. at *Bakery Hill, Ballaarat.*

2. "THE VISCOUNTESS CANTERBURY;" weight 884 oz. 10 dwt.; fineness of gold 23⅞ carat; found on the 3rd October, 1870, at a depth of 6 ft. 8 in. at *Berlin, Rheola.*

3. "THE BEAUTY;" weight 377 oz. 6 dwt.; fineness of gold

22⅛ carat; found in March 1861, in an old pillar of earth in a deserted claim at *Robinson Crusoe Gully, Bendigo.*

4. "THE NEEDFUL;" weight 246 oz. 16 dwt.; *Berlin Rheola.*

5. "KUM TOW;" weight 718 oz.; *Berlin, Rheola.*

6. NUGGET; weight 250 oz. 14 dwt.; found on the 15th July, 1878, at *Kitty's Lead, Buninyong.*

7. "THE CRESCENT;" weight 176 oz. 8 dwt.; found on the 2nd April, 1872, at a depth of 2 ft. at *Berlin, Rheola.*

8. NUGGET; weight 46 oz. 15 dwt.; found on the 12th August, 1872, at a depth of 100 ft.; at *Broomfield's Gully, Creswick.*

9. NUGGET; weight 30 oz. 1 dwt.; found on the 31st August, 1872, at a depth of 180 ft.; at the *Red Streak Lead, Creswick.*

10. NUGGET; weight 24 oz. 3 dwt.; found on the 8th August, 1872, at a depth of 100 ft.; at *Broomfield's Gully, Creswick.*

11. NUGGET; weight 410 oz. 8 dwt.; found on the 25th December, 1875, at the *White Horse Ranges, Ballaarat.*

12. "THE PRECIOUS;" weight 1621 oz. 2 dwt.; of 23⅛ carat gold; found on the 5th January, 1871, at a depth of 12½ ft., in *Catto's Paddock, Berlin, Rheola.*

13. "THE VISCOUNT CANTERBURY;" weight 1105 oz. of 23⅜ carat gold; found on 31st May, 1870, at a depth of 15 ft.; at *Johns' Paddock, Berlin, Rheola.*

14. "THE SCHLEMM;" weight 538 oz., inclusive of 60 oz. of quartz; found on the 11th July, 1872, at a depth of 3 ft.; at *Dunolly.*

15. NUGGET; weight 242 oz. 17¼ dwt., of 22⅞ carat gold; found in 1856, at a depth of 9 ft.; at *Kangaroo Gully, Bendigo.*

16. "THE LITTLE HIGHLANDER;" weight 187¼ oz.; found on the 18th July, 1878; at *Corindhap, Rokewood.*

17. NUGGET; weight 75 oz. 12 dwt. 12 grs., of 23⅜ carat gold; found on the 8th April, 1880, at a depth of 150 ft., in the mine of the Golden Age Co.; at *Brown's, Scarsdale.*

18. NUGGET; gross weight of gold and quartz 122 oz.; found

on the 15th February, 1876, at a depth of 400 ft., in the Indicator Lode, *Black Hill Flat, Ballaarat East.*

19. PLATINUM NUGGET; weight 21 lbs.; found in 1827, at *Tagilsk, in the Ural Mountains.* This is a cast from the original in the Demidoff Museum, St. Petersburg, of the largest mass of native platinum ever found.

20. NUGGET; weight 61 oz. 5 dwt., inclusive of 15 oz. 3 dwt. of quartz; found in the *Rising Sun claim, Ballaarat East.*

21. "THE CHRISTMAS GIFT;" weight 175 oz.; found on the 12th December, 1877, at a depth of 29 ft.; at *Break-o'Day, Corindhap.*

22. NUGGET; weight 32 oz.; found in January 1871, at a depth of 205 ft., in the *Key Co.'s mine, Creswick.*

23. NUGGET; weight 60 oz.; found on the 21st June, 1875, at a depth of 160 ft., in the "*Board of Advice*" *claim, Durham Lead, Ballaarat.*

THE END.