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PREFACE.

THE very flattering reception the Descriptive Catalogue of Minerals has met with, so as to pass through a third edition in less than two years, has induced the Author considerably to enlarge its former contents, and to enter more particularly into a detail of the physical and chemical characters of minerals.

THE substances constituting the species, are printed in small capitals, and the sub-species in Italics. And, to render the following pages more intelligible to the general reader, the German phrases have been avoided as much as possible, and English substituted in their place.

THE Author has labored under some difficulty in finding words to describe different shades of color, degrees of transparency, opacity, &c. for which, and any other defects that may offend the scientific connoiseur, he hopes to be pardoned, and humbly solicits his remarks, in order

that the next edition may be more correct, should the Public be pleased to favor him so far as to call for it.

Although aware that the most scientific mode of treating of the crystalline forms of minerals, would be to have followed the method of Haüy, by which the secondary varieties are traced from the primitive ones, by the addition of successive layers of particles, not exactly covering the faces of the primitive nucleus, but suffering an extension or diminution according to certain laws; it was considered more eligible, with a view to the encouragement of young beginners, to adopt the expressions usual among mineralogists to designate those forms on which additional faces appear. Thus, when we speak of cubic fluor truncated on the edges, any one can present to his imagination a cube originally complete, but from each edge of which a part had been removed, leaving a new linear face equally inclined to the two adjoining planes: though it would be by no means easy for a person, who had not studied crystallography as a science, to form so clear a conception of the form in question, if described as arising from certain additions to its octahedral nucleus. It is judged expedient to make this observation, in order to correct the ideas, and awaken a spirit of inquiry, in those who have hitherto contemplated the various truncations and bevelments on crystals, as resulting from the

removal of parts which had once existed. Many, whose other pursuits prevent mineralogy being more to them than an instructive relaxation, will be content still to view the different forms in this light; and some of the species are so arranged, as to show the progress by which forms, apparently quite unconnected, pass into each other, merely by the depth to which the truncations, &c. extend. On the other hand, those whose leisure will permit, would not find it unprofitable to devote some of their hours to the examination of the admirable system of Haüy. The study of his theory will open to the mind new channels for contemplation, every crystallized substance will be invested with a degree of interest, and the science of mineralogy will be found to abound with beauties, unseen by the eye which merely glances over the exterior.

To promote, therefore, the study of crystallographywe have selected from Haüy's treatise, the diagrams of the most simple forms which crystallized minerals assume, and subjoined to each, in alphabetical order, a list of substances to which that form is peculiar. The various modifications of these forms, (as well in the bevelling of the solid edges, or angles, or both, as in the different terminations), are of course omitted in the enumeration—for these the reader is referred to the Catalogue.

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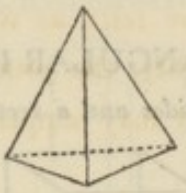
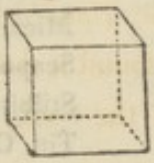
TETRAHEDRON,

Having three sides and a base.



Blende, Zinc Sulphuret.
Grey Copper, Sulphuret.
Pyritous Copper, Sulphuret.

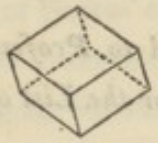
CUBE.



Amphigene ?
Analcime.
Boracite.
Copper, Native.
Copper, Red Oxide.
Cobalt, Arsenical.

Fluor Spar.
Gold, Native.
Iron Pyrites, Super-sulphuret.
Iron, Arseniate.
Lead, Sulphuret.
Lead, Molybdate.
Mellite.
Silver, Muriate.

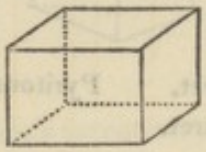
RHOMBOID.



Chabasite.
Corundum.
Copper, Phosphate.
Iron, Oxide.
Lead, Chromate.
Lime, Carbonate.
Lime, Magnesian Carbonate.
Silver, Antimonial Sulphuret.
Sulphate of Lime.
Quartz.

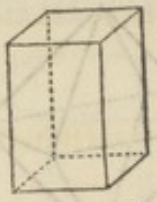
RECTANGULAR PRISM.

Having four sides and a rectangular base.



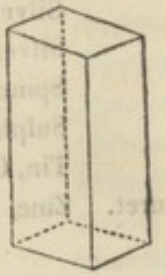
Andalusite,
Apophyllite.
Antimony, Sulphuret.
Chrysolite.
Cymophane.
Epidote.
Harmotome.
Idocrase.
Lead, Muriate.
Macle.
Manganese, White Oxide.
Mesotype.
Meionite.
Mercury, Muriate.
Micarelle.
Scapolite.
Stilbite.
Tin, Oxide.
Uranium, Oxide.
Wolfram.
Zinc, Sulphate.
Zircon.

RIGHT RHOMBOIDAL PRISM.



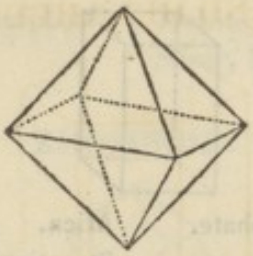
Barytes, Sulphate.
Gadolinite.
Yenite.
Iron, Phosphate.
Iron, Arsenical.
Lime, Sulphate.
Mica.
Strontian, Sulphate.
Topaz.
Tremolite.
Prehnite.

OBLIQUE RHOMBOIDAL PRISM.



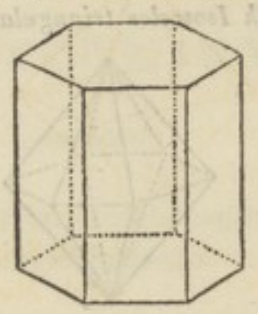
Axinite.
Copper, Sulphate.
Copper, Blue Carbonate.
Corundum.
Euclase
Feldspar.
Hornblende.
Iron, Oxide.
Lime, Carbonate.
Scapolite.
Sphene, Silicco-calcareous Titanium.

OCTAHEDRON.



Amalgam, Native.
Anatase, Titanium Oxide.
Bismuth, Native.
Ceylonite.
Copper, Native.
Copper, Arseniate.
Copper, Muriate.
Copper, Red Oxide.
Diamond.
Gold, Native.
Iron, Chromate.
Iron, Oxide.
Iron Pyrites, Super-sulphuret.
Lead, Sulphate.
Lead, Molybdate.
Lead, Carbonate.
Lead, Sulphuret.
Lime, Fluate.
Lime, Tungstate.
Mellite,
Silver, Native.
Silver, Sulphuret.
Spinelle.
Sulphur.
Tin, Oxide.
Zinc, Sulphuret.

HEXAGON AND HEXAHEDRAL PRISM.



Actynolite.
Arragonite.
Barytes, Carbonate.
Barytes, Sulphate,
Corundum.
Copper, Arseniate.
Cyanite.
Dichroite.
Dioptase.
Emerald.
Epidote.
Grenatite.
Hornblende.
Lead, Arseniate.
Lead, Phosphate.
Lime, Carbonate.
Lime, Sulphate.
Lime, Phosphate.
Mercury, Red Sulphuret.
Mica.
Molybdenum, Sulphuret.
Nepheline.
Pyroxene.
Quartz.
Schorlite.
Silver, Antimonial Sulphuret.
Strontian, Carbonate.
Strontian, Sulphate.
Tourmaline *.

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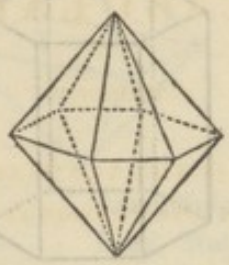
* Three sides are so diminished as to give to the hexagonal the appearance of a triangular prism with bevelled or rounded edges. In some specimens the lateral planes are so numerous that the crystal assumes a rounded form with a striated surface, resembling some varieties of aqua-marine.

DODECAHEDRON,

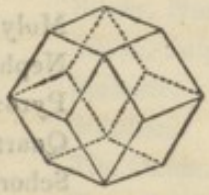
With Isosceles triangular faces.



Corundum. Quartz.

DODECAHEDRON,

With Rhomboidal faces.



Amalgam, Native.
Amphigene?
Ceylonite.
Copper, Red Oxide.
Copper, Grey.
Garnet.
Gold, native.
Lime, Fluate, *rare.*
Mellite.
Sodalite.

A

VOCABULARY,

CONTAINING

AN EXPLANATION OF THE TERMS COMMONLY USED IN MINERALOGY.

Acicular, long and slender crystals.
Aggregate, several substances adhering together.
Alloy, a composition of two or more metals.
Amalgam, a combination of two metals, one of which is Mercury.
Amorphous, without any regular form.
Anhydrous, without water.
Arborescent, or *Dendritic*, resembling a tree or shrub.
Bevelled—A crystal is said to be bevelled when its edges are replaced by two planes, which are separated only by an edge.
Brittle, when the particles fly off in cutting or breaking.
Botryoidal, resembling a bunch of grapes.
Canaliculated, when the surface is indented by deep channels.
Capillary, hair-like.
Cellular, exhibiting cells, or pores.
Chatoyant, a changeable light, as seen in the eye of a cat.
Cleavage, is the division of a crystal in the direction of its natural joints.

Conchoidal, when the fractured surface has smooth, shallow hollows resembling the inside of a shell.

Coralloidal, resembling a coral.

Cuneiform, having the form of a wedge.

Decrepitate, is a term applied to minerals which fly into particles with a crackling noise, when exposed to heat.

Dendritic, see Arborescent.

Double Refraction, is the property, possessed by some minerals, of presenting two images of any object seen through them.

Drusy, when the surface is covered with minute aggregated crystals.

Efflorescence, very small fibres, or powder, produced by decomposition.

Fascicular, when small groups of crystals slightly diverge in *two opposite directions*, like a bundle of pliant rods tied tight in the middle.

Filiform, wire-like, thread-like.

Foliated, in parallel layers, like the leaves of a book.

Fracture, is the surface a mineral presents when broken, as, compact, foliated, conchoidal, earthy, &c.

Frangible, relates to the degree of force necessary to break or separate one piece from another. Thus calcareous spar, from the ease with which it may be broken, is said to be fragile; emery or basalt, tough, &c.

Friable, when the particles of a mineral loosely cohere.

Gangue, or *Matrix*, is the substance in or upon which a mineral is found, or embedded.

Glance, shining.

Hæmatitic, having the *structure* of the Red Hæmatites. (Hæmatites signifies blood-red.)

Hepatic, resembling the liver in color or form.

Iridescent, tarnish exhibiting prismatic colors.

Lamellar—A mineral is said to have a lamellar structure, when it can be fractured into thin plates.

Lenticular, having a double convex surface, resembling a lens.

Malleable, capable of being beaten out with a hammer.

Mammillated, in spherical excrescences or elevations.

Matrix.—See Gangue.

Nodular, in irregular globular masses.

Opaque, when *no* light is transmitted.

Phosphorescence, is a feeble light (unattended by heat), which is emitted by some minerals when thrown on a hot substance, (as in fluor), or when rubbed together, (as in quartz).

Plumose, down-like.

Pseudomorphous, is applied to those minerals which exhibit a form peculiar to substances of a different genus or species; and which they have obtained by coating these substances, or filling up cavities which were formerly occupied by them.

Pulverulent, in a state of powder or dust; feebly cohering.

Ramose, branch-like.

Reniform, kidney-shaped.

Reticulated, when the fibres intersect at right angles; net-like.

Scopiform, when a number of small crystals are aggregated in tufts or bundles.

Semi-transparent, when objects are seen *indistinctly* through a mineral.

Specular, having a smooth shining surface, like a mirror.

Spicular, in thorn-like fibres.
Stellated, when the fibres diverge from a common centre, and form a circle; star-like.
Striated, when the surface is marked by parallel lines.
Tabular, is applied to crystals which are nearly flat.
Translucent, when the substance transmits light; this is sometimes only observable on the edges of a mineral.
Transparent, when objects may be seen *distinctly* through the mineral.
Trapezoidal, having twenty-four faces, each a trapezium.
Truncated, when the edge or solid angle of a crystal appears to have been cut off.
Tuberose, exhibiting round bumps.
Vesicular, porous, sponge-like.
Vitreous, glassy.

CONTENTS.

MAWE'S

NEW

DESCRIPTIVE CATALOGUE.

Metals.

PLATINA, PALLADIUM, IRIDIUM.

These substances generally occur in small irregularly formed grains, flat, angular, or blunted, having apparently acquired this form by attrition; rarely crystallized. They are found with granular gold, in Peru, Mexico, and Brazil. When associated, it requires a well accustomed eye to discriminate one from the other.

Platina occurs in considerable quantities, and sometimes in rough lumps, larger than a pea. It resembles silver in color; it may be melted with arsenic, and is soluble in nitro-muriatic acid: when pure, it is the heaviest substance known.—*Sp. Gr.* 17; *purified*, 23.

Palladium is very rare, and is found with Platina, with which it is alloyed. It is delicately striated, and of a lead color: it melts with sulphur.

Iridium is also extremely rare, and occurs with the preceding in small, flat, foliated grains, of a shining steel color: it is alloyed with Osmium, and melts with nitre. From either of the preceding it may be distinguished by its texture and extreme hardness: a grain placed on a polished iron surface, and struck with a hammer, will make an indention in both.

Native Platina. In rough irregular lumps.
In flat, angular, or blunted grains.

Palladium. In delicate foliæ, surface striated.

Iridium. In shining grains, edges striated.
Imperfectly crystallized.
Oxide of Iridium. In black ferruginous grains.

GOLD.

TWO Species are contained in this Genus, viz. Native Gold, and Electrum, or Gold combined with Silver.

Gold occurs in rounded lumps of various sizes; also disseminated in quartz and ferruginous substances, but generally in dust of a yellow or reddish yellow color, and grains of irregular forms. It is also found crystallized* in

* The finest crystals known are in the Author's collection, which he brought from the gold mines of Brazil.

cubes, octohedrons, and many other forms, as well as foliated, ramified, capillary, reticulated, &c. It is very generally dispersed throughout the globe, and particularly in South America; also in Ireland, Scotland, Cornwall, &c. but is never found pure in its natural state.

Native Gold is of a pale or deep yellow color, and sometimes tarnished, according as it is less or more alloyed with silver or copper. It is always ductile, easily melted, and does not change color in heated nitric acid. Its proper solvent is nitro-muriatic acid.—*Sp. Gr.* 17 *to* 19.

Electrum occurs on quartz, &c. in patches of a pale yellow color, and sometimes contains one third silver.

Native Gold. Massive, generally rounded.
Disseminated, embedded in quartz, &c.
Ramified, reticulated.
Crystallized in cubes, or modified.
Crystallized in octahedrons, or modified.
In rhombic dodecahedrons.
In aggregated crystals, confused.
In tetrahedrons, or serrated prisms.
Foliated.
Crystallized in three, four, six, or eight sided tables.
In delicate prisms or capillary.
In coarse pieces, as broken from the matrix.
Granular, angular and blunted grains.
Gold dust, yellow, or reddish yellow.

Electrum. In superficial patches.

SILVER

IS rarely or never found pure; it is combined with many of the metals (particularly with lead) and two of the acids, which become volatilized by a continuance of the heat of the blowpipe, and a bead of pure silver will remain. It is soluble in nitric acid. The mines of this metal are very numerous, but the most productive are those of Mexico and Peru; it is met with in Devonshire and Cornwall, and has been found in Scotland. It is also extracted from lead.

Native Silver occurs massive, ramose, capillary, reticulated, serrated, foliated, &c. and crystallized in various forms. Its color is nearly white, but is subject to tarnish resembling copper, and becomes blackish. It is ductile, a little harder than lead, and may easily be known by being soft and tough to the knife.—*Sp. Gr.* 10.

Auriferous Silver contains a portion of gold. It generally occurs in superficial patches of a yellowish white color, and is sometimes tarnished.

Antimonial Silver is found massive, and crystallized in striated cubes, but more generally disseminated. It has a bright white color, and contains from sixty to seventy per cent. of silver.

Arsenical Silver is sometimes massive or disseminated, also crystallized. It has a dark metallic lustre, and is extremely heavy and brittle. It contains iron, and a large portion of arsenic.

Bismuthic Silver occurs disseminated, and embedded, in fascicular crystals. It has a slight purple tint, and is alloyed with lead.

NATIVE SILVER. Massive.
Crystallized in cubes, or variously modified.
In octahedrons, or modified.
In dodecahedrons.
Trapezoidal—with twenty-four faces.
In hexagonal prisms.
In four-sided prisms.
In three-sided prisms.
Tabular, in three or six sided tables.
Capillary, in delicate curls.
Ramose.
Foliated.
In delicate foliæ, superficial.
Variety.

Auriferous Silver. Superficial.

ANTIMONIAL SILVER. Massive.
Crystallized in cubes.
Disseminated.

ARSENICAL SILVER. Massive.
Crystallized or disseminated.

BISMUTHIC SILVER. Crystallized.
Disseminated, or fascicular.

Sulphurets of Silver.

THE following ores contain a larger portion of sulphur, with antimony, iron, copper, lead, &c. and less of silver,

than the preceding; they are also brittle and harder, and more difficult to melt. They occur massive, disseminated, and crystallized. Their general color is that of polished iron after it has become dull, approaching to lead grey. They are the most common ores of silver, particularly in Europe, and present a great variety.

Black Sulphuret of Silver is found coating quartz, massive, disseminated, reticulated, and crystallized; it is sometimes loosely coherent, resembling soot, and often associated with native silver. It is of a dark color, approaching black, and has, when cut or broken, a metallic lustre. It is malleable, soft to the knife, and easily melts before the blow-pipe. It contains from sixty to seventy per cent. of silver, the remainder sulphur.

Grey Silver Ore occurs massive, disseminated, also in regular and confused crystals. Its color is steel, or lead grey. Its alloys are with difficulty volatilized before the blow-pipe.

Dark Red Silver Ore. This beautiful mineral occurs massive, disseminated, dendritic, cellular, in superficial patches, and crystallized: it has a strong black-red metallic lustre. It contains about sixty per cent. of silver, with antimony and sulphur.

Light Red Silver Ore occurs massive, disseminated, dendritic, reniform, and crystallized. It is of a bright red color, beautifully translucent. It easily melts before the blow-pipe, emitting fumes of antimony and sulphur, leaving a bead of silver.

White Silver Ore is said to be lighter colored than lead ore; it contains a large portion of lead, antimony, and sulphur, with less than ten per cent. of silver, and is probably an argentiferous ore of lead.

SULPHURET OF SILVER. Massive and compact.
Disseminated with quartz, &c.
Crystallized in cubes or modified.
In octahedrons, or variously modified.
In garnet-formed dodecahedrons.
Variety, in aggregated crystals.
Tabular, in three or six sided tables.
Indeterminately crystallized.
Variety.
Pulverulent, sooty.

GREY SILVER ORE. Massive.
Disseminated.
Crystallized in six-sided prisms.
Variety, with or without pyramid.
In double six-sided pyramids.
Tabular.
Confusedly crystallized, aggregated.
Indeterminately crystallized.

DARK RED SILVER ORE. Massive.
Crystallized in six-sided prisms.
In six-sided prisms with pyramids.
In six-sided prisms and double pyramids.
Variety, pyramidal.
In four or eight-sided prisms.
Dendritic.
Acicular.
Capillary.
Disseminated with pyrites.
Variety foliated.

Light Red Silver Ore. Massive.
In equi-angular six-sided prisms.
Variety, with double pyramids.
In six-sided pyramids, acuminated.
In double six-sided pyramids.
Variety, acuminated.
In acicular crystals.
Disseminated.

White Silver Ore,

Muriate of Silver occurs massive, disseminated, in delicate veins and superficial layers; also crystallized. It is frequently dark brown, sometimes black, green of various shades, and yellow; the fresh fracture generally resembles gum arabic, but it soon acquires a metallic hue. It is easily indented by the nail, and melts even in the flame of a candle. It is mineralized by muriatic acid; whence its name: from being soft and translucent it is also called Horn-silver.

Carbonate of Silver is so scarce as to occur in one mine only. It is of an iron grey color, heavy, and yields above seventy per cent. of silver, twelve of carbonic acid, with sulphur and antimony.

MURIATE OF SILVER. Massive.
Crystallized in cubes.
Variously modified.
In octahedrons.
Modified.
Disseminated.
Superficial.
Earthy.
Variety, radiated.
Variety.

CARBONATE OF SILVER.

MERCURY.

OF this mineral there are five different ores, viz. Native Mercury, Native Amalgam, Muriate or Horn Mercury, Hepatic or Brown Cinnabar, and Red Cinnabar.

Mercury generally occurs in a fluid state, and has strong silver white lustre. Its presence in any of its ores may be easily detected, by heating a small portion under a gold coin, or plate of polished copper; the mercury will be volatilized by the heat, and condensed by the cold metal, to which it will adhere in minute globules. The ores of mercury are confined to a few localities, but wherever they have been found, they occur in great abundance. The principal mines are situated in Almaden, Deux-ponts, Idria, and South America.

Native Mercury occurs in minute or large globules, also disseminated in cinnabar, clay-slate, bituminous schist, sand-stone, &c.—*Sp. Gr. above* 13.

Native Amalgam—Mercury and silver in various proportions, is sometimes crystallized, very heavy, and soft, and has a silver white color. The proportion of silver is generally above twenty per cent. When rubbed on a plate of polished metal, it leaves a silvery trace. Amalgam may be formed by uniting a globule of mercury with gold or silver-leaf.—*Sp. Gr. above* 10.

Muriate of Mercury, or *Horn Mercury*, quicksilver combined with muriatic acid, occurs coating ores of mercury, and lining cavities, and sometimes crystallized.

It has generally the appearance and color of gum-arabic. It is so soft, that a pin may be stuck into it.

Hepatic Brown Cinnabar is found massive or disseminated, very heavy, and its fracture is fine grained, and sometimes slaty. Its color varies from red to brown.

Red Cinnabar occurs in beautiful diaphanous crystals, sometimes having a metallic lustre; and another variety, called Native Vermillion, is in the state of powder. Its color is dark or light red. It contains portions of sulphur and iron.

*** The mercury of commerce is obtained from the preceding ores.

Native Mercury. In globules disseminated on sandstone.
In globules on bituminous schist, &c.
In globules with cinnabar, &c.
Variety.

Native Amalgam. Crystallized in octahedrons.
Crystallized in dodecahedrons, or modified.
Crystallized and variously modified.
Superficial, disseminated.
In capillary veins.
Variety.

Muriate of Mercury. Spongeous, soft, disseminated.
Crystallized in cubes on ores of Mercury.
Variety, in aggregated crystals, confused.
Crystallized in octahedrons, or modified.
In capillary veins.
Superficially disseminated.

Hepatic Brown Cinnabar. Massive.
Slaty texture, curved, foliated.

Red Cinnabar. Crystallized in six-sided prisms.
In rhombs, or modified.
Variety.
In tabular crystals.
In flat lenticular rhombs.

Bright Red Cinnabar. Massive.
Disseminated.
Foliated.

Vermillion. Pulverulent.

COPPER.—*Sp. Gr.* 7.

THIS metal is in such general use, that it is unnecessary to describe its appearance or color. It is easily dissolved in nitric acid, to which it communicates a green color, and may be precipitated in a metallic state, by a rod of iron. The ores of copper are very numerous, and are found in almost all parts of the world, particularly in Cornwall and Chili. When alloyed with zinc, it forms brass. Silver and gold coin are debased by it, and of jeweller's gold it often forms the greatest proportion.

NATIVE or VIRGIN COPPER occurs massive, disseminated, and crystallized, and in a variety of other forms. It has a bright or dark red color, as it is less or more tarnished. It is extremely ductile, always soft to the knife, and if scratched, exhibits a bright metallic lustre. It is found in great abundance in the mines of Cornwall, as well as in Chili, where it is accompanied by a small portion of gold.

NATIVE COPPER. Massive.
Foliated.
Ramose.
Crystallized in cubes, modified.
In four-sided prisms.
In hexagonal prisms.
In double six-sided pyramids, elongated.
In three-sided pyramids.
In aggregated crystals, indeterminate.

Dendrictic, serrated.
Moss-like, interwoven.
Reticulated.
Disseminated.
Earthy.
Variety.

Sulphurets of Copper.

Grey Copper—*Copper Glance*, occurs massive and crystallized, of a dark color, approaching bluish black; it is often tarnished, and has sometimes a metallic lustre. It is soft, has occurred feebly malleable, and is easily melted. It frequently contains above eighty per cent. of copper, with a small portion of sulphur, either with or without iron. To this species belongs the *Nail-head* copper of Cornwall, viz. two hexagonal pyramids, united at the base, truncated by a plane on the apex, supported on a long hexagonal prism, and sometimes variously modified.

Fahlertz Grey Copper occurs disseminated, compact, and crystallized, and is often covered with pyrites. It has a dull iron color, and contains antimony, iron, silver, and a portion of sulphur. The black variety I have placed with the silvers, as it is generally melted for that metal.

Purple or Variegated Copper Ore is found massive, botryoidal, and crystallized. It has a beautiful iridescent appearance, exhibiting various shades of purple, blue, green, &c. from which it is commonly called *Peacock-ore*. It is soft to the knife, and melts easily, emitting sulphurous vapors. It contains from fifty to sixty per cent. of copper, with iron and sulphur.

Copper Pyrites occurs in great abundance, massive, disseminated, stalactitic, and crystallized, of a pale yellow color. It is harder and more difficult to melt than the preceding, but is easily dissolved in nitric acid. It contains from nine to twenty-five or thirty per cent. of copper, with iron, sulphur, and sometimes arsenic.

Grey Copper Ore. Compact.
Variety, massive.
Crystallized in hexagonal prisms.
Variety confusedly crystallized.
In double six-sided pyramids.
Variety tabular.
In dodecahedrons.
Variety, aggregated.

Fahlertz Grey Copper. Compact.
Crystallized in tetrahedrons.
In tetrahedrons, modified on the angles.
Variety, modified on the edges.
Variety, aggregated.
Massive, with bright metallic lustre.
Disseminated.

Variegated Copper Ore. Massive.
Variety, color deep steel blue.
Botryoidal, mammillated, stalactitic.
Yellow Copper Ore.
Crystallized in cubes inclining to curvilinear.
In cubes intersecting, or variously modified.
In aggregated crystals, iridescent.
Disseminated.

Copper Pyrites. Massive.
Botryoidal or stalactitic.
Crystallized in tetrahedrons.
In tetrahedrons, modified on the angles.
In tetrahedrons, modified on the edges.
In octahedrons, or modified.
In dodecahedrons, or modified.
Tabular, lamellar.
Indeterminately crystallized, aggregated.
Disseminated with lead ore.

Black Copper Ore is sometimes loosely cohesive soot-like; it is also massive and compact. Its color approaches black. It is very heavy, and easily fused, tinging borax green, which, when cold, becomes hollow, and appears like a scoria. The massive variety is soft, shows a metallic white streak, and is almost ductile. This ore has been called an oxide of copper.

Black Copper Ore. Massive.
Variety, with metallic lustre.
Loosely cohesive.
Variety.

White Copper Ore—*Arsenical Copper*, is a rare mineral; it occurs massive and disseminated, and has a granular texture; it is heavy, brittle, and soft to the knife. Its color is yellowish white, with bright metallic lustre, or tarnished. Before the blow-pipe it exhales arsenical vapors.

ARSENICAL COPPER. Massive.
Disseminated, granular.

RED OXIDE OF COPPER occurs massive, foliated, crystallized, capillary, and earthy. Its color varies from bright red to dull brown, and has sometimes a metallic lustre. It easily fuses, and may be detected by nitric acid. It is generally associated with native copper.

Ferruginous Red Copper is found massive and earthy. It is heavy, soft to the knife, and has a dull red color. It contains a large portion of iron, and is more difficult to melt than the preceding.

RUBY COPPER ORE. Massive.
Disseminated.
Foliated, indeterminately crystallized.
Crystallized in octahedrons.
Variety, modified on the angles.
Variety, modified on the edges.
Variety, grouped, reticulated.
In cubes, variously modified.
In minute crystals, aggregated.
In bright, capillary red prisms.
Variety, crossing at right angles.
Variety, plumose.
Earthy, disseminated.
Variety, dull brown.

Brick Red Copper. Massive.
Earthy, often coated by green copper ore.
Variety, brown, ferruginous.

HYDRO BLUE CARBONATE OF COPPER. This species occurs in foliated, globular masses, lamellar, disseminated, stalactitic, crystallized, and earthy, upon ferruginous substances. Its colors are various shades of blue, from light to dark. It is soft, effervesces with nitric acid; and, before the flame of the blow-pipe, tinges borax green, leaving a small bead of copper.

GREEN CARBONATE OF COPPER—*Malachite.* This beautiful species occurs in a variety of forms, massive, disseminated, botryoidal, stalactitic, crystallized, and coating red copper; also earthy: the fracture is zoned, fibrous or radiated. Its colors are of various shades, from pale to dark green, and sometimes even blue. Before the blow-pipe it burns with a green flame, and then melts into a bead of copper.

BLUE CARBONATE OF COPPER. Massive.
Disseminated, foliated.
Crystallized in rhombic prisms.
Variously modified.
In hexagonal tabular crystals.
Variety.
In four or eight-sided prisms.
Variety.
In diverging speculæ.

Earthy Blue Copper Ore. Botryoidal.
Variety, associated with barytes.
Fibrous.
Pitch-like.
Scoriatious, sometimes black.

MALACHITE. Massive, and compact.
Cellular.
Mammillated, zoned.
Crystallized in hexagonal prisms.
In prisms with pyramids.
In octahedrons, coating red copper.
Variety, variously modified.
In rhombic dodecahedrons.
Variety, in aggregated crystals.
Variety, variously modified.
Tabular, in delicate four-sided crystals.
Blue variety.
Fibrous.
Variety, diverging.
Earthy.
Green and blue, disseminated.

SILICIOUS COPPER--*Crysocolla*, occurs massive, botryoidal, cellular, stalactitic, and incrusting other ores; it has often a slag-like appearance, and is very brittle. Its color varies from dark olive to white and blue green. It contains oxide of copper, silex, and water.

CRYSOCOLLA. Massive.
Botryoidal.
Stalactitic.
Variety.
Slag-like.

DIOPTASE is extremely rare, and is found crystallized, sometimes upon lime-stone. It is of a beautiful emerald

green color; contains 30 per cent. copper, 40 lime, and 28 silex.

Dioptase. Upon the matrix.

Crystallized in hexagonal prisms.

Variety, in rhombic dodecahedrons.

Muriate of Copper occurs in compact radiated masses, lamellar prisms, and arenaceous. Its color is shining green and blackish green; before the blow-pipe it produces a beautiful and continued blue flame. It is found at Atacama, in Chili, and contains seventy per cent. copper, twelve muriatic acid, and fifteen water.

Phosphate of Copper is found compact in mammillar concretions, and disseminated (on quartz or chalcedony), also crystallized. Its color is green, or dark green, with blackish spots. It burns wtih a green flame, melts into a fluid, which extends on the charcoal, and when cool becomes crystallized, and of a brownish red color. It contains copper 60 to 70 per cent. and phosphoric acid.

Arseniate of Copper.—This interesting mineral occurs massive, disseminated, crystallized, fibrous, in mammillary concretions, asbestos-like, and earthy; and has a foliated fracture. Its color presents various shades of green. Before the blow-pipe it swells, and easily melts, with gentle explosions, emitting strong fumes of arsenic, and leaves a globule of copper.

Tabular Arseniate of Copper occurs in flat hexahedral crystals, the sides alternately inclining; color, beautiful green.

Octahedral Arseniate of Copper occurs in oblate crystals, of a sky blue or emerald green color.

Prismatic Arseniate of Copper. In prisms, of various shades of color, but commonly brown, or blackish-green.

MURIATE OF COPPER. Massive.
Disseminated in ferruginous earth.
Crystallized in rhombic prisms.
Variety, variously modified.
Fibrous, stellated, diverging.
Arenaceous. *(Atacamite).*

PHOSPHATE OF COPPER. Compact.
Disseminated in delicate veins, &c.
Mammillar.
Fibrous, diverging.
Crystallized in rhombs.
In octahedrons.
Variety.
In rhombic prisms, with pyramids.
Variety.
In aggregated crystals, or curvilinear.

ARSENIATE OF COPPER. Massive.
Foliated.
Crystallized in rhombic prisms.
In rhombic prisms with dihedral pyramids.
Fibrous.
Variety.
Capillary.
In mammillary concretions.
Variety.
Hematitic, fracture silky.
Asbestos-like.
Earthy.

Tabular Arseniate of Copper.—
In flat six-sided crystals.

Octahedral Arseniate of Copper.—
Crystallized in blue oblate octahedrons.
Variety, green.
Foliated, or disseminated.
Variety, aggregated.
In delicate veins.

Prismatic Arseniate of Copper. In three-sided prisms.
Variety, curvilinear, flat, foliated.
In four-sided prisms.
In rhombs, elongated.
Variety, diverging.
In delicate prisms, with pyramids.
Variety, in capillary prisms.

IRON.

THIS useful mineral is so generally distributed, that there are but few substances into which it does not enter, or associate with. It is found in all countries, in a variety of forms, and of different colors. Its presence may in general be detected by the magnet, especially after having been exposed to the flame of the blow-pipe or a red heat.

NATIVE IRON *is said* to have been met with massive, and in plates of a grey color, with a granular fracture, soft and malleable. Of this ore there are two varieties—

Terrestrial Native Iron, which is feebly malleable, and

Meteoric Native Iron, which is found in large lumps, and coating earthy substances, of a rusty brown exterior. Its streak has a shining metallic lustre, and the fracture exhibits delicate, bright foliæ. These varieties are strongly magnetic, and contain nickel.

NATIVE IRON. Massive.
In laminæ.

Terrestrial Native Iron.

Meteoric Native Iron. Massive.
Cellular, containing olivine.
Coating earthy nodules.
In white foliæ, embedded.

Sulphurets of Iron.

Iron Pyrites occurs in great abundance, massive, crystallized, &c. It is brittle, and hard to the knife. The color is of various shades of yellow, tarnished, and sometimes beautifully iridescent.

Hepatic Pyrites, is found reniform, globular, &c. the fracture generally diverging. It is of a liver-brown color; the fresh fracture is yellowish.

Magnetic Pyrites, as its name implies, is attracted by the magnet; it occurs massive, embedded, and crystallized, and has generally the color of tarnished copper.

Iron Pyrites.—Massive.
Granular.
Stalactitic, mammillated.
Radiated, diverging.
Disseminated.
Crystallized in cubes, smooth or striated.
Variety, variously modified.
In octahedrons.
In octahedrons modified, aggregated.
In dodecahedrons.
Variety, crystals striated.
In isocahedrons.
Capillary, embedded in calcareous spar.

Hepatic Pyrites. Crystallized in prisms.
Variety, aggregated crystals.
Nodular.
Variety.
Earthy.

Magnetic Pyrites. Massive.
Disseminated.
Crystallized.
In decomposition.

Oxides of Iron.

Natural Loadstone is massive, compact, earthy, and strongly magnetic. Its color is black or brown.

Iron Glance occurs massive, disseminated, and crystallized. Its color is that of shining steel, sometimes beautifully iridescent, especially in the specimens from Elba.

Micaceous Iron Ore is found in masses composed of aggregated and disseminated delicate shining laminæ. It is unctuous to the touch, and has a metallic-grey color, with a red tinge.

Red Iron Ore occurs sometimes compact, but generally in crusts or masses, which are more or less friable; the color is brownish red. Of this ore there are several varieties, viz.

Scaly Red Iron Ore occurs in loose scaly particles, and sometimes pulverulent, of a red color: it is extremely light, and has been called *Iron Froth.*

Compact Red Iron Glance is found massive, and sometimes in supposititious crystals, which have a feeble lustre; its color approaches black or reddish brown.

Red Hematites occurs in large masses, reniform, globular, botryoidal, stalactitic, &c. of a brownish-red color, and often fibrous, with metallic lustre.

Red Ochre occurs in friable masses, also coating ores of iron; its color is brownish-red.

Reddle is found massive; it is adhesive, soft, unctuous to the touch, and soils the fingers: color dull-red.

Brown Iron Ore is more or less compact, and friable.

Scaly Brown Iron Ore is composed of delicate particles, and occurs sometimes with Brown Hematites.

Compact Brown Iron Ore occurs massive and crystallized; its color presents various shades of brown.

Brown Hematites is found stalactitic, reniform, or coralloidal, with a structure radiated and silky lustre; color, brownish-black.

Brown Ochre occurs in dull earthy masses, soft, soiling the fingers: color, yellowish brown.

Black Iron Ore occurs massive, reniform, stalactitic, and in distinct concretions.

Black Hematites is also found massive and reniform, the fracture is delicately fibrous, with a strong metallic lustre.

Clay Iron Stone occurs massive and reniform, and containing vegetable impressions; its color is dull brown of various shades. This is the common ore of England, and occurs in beds above coal.

Columnar Clay Iron Stone. In distinct long prisms, straight or curved; it is generally friable, and of a red-brown color; appears as having been exposed to heat.

Pea Iron Ore occurs aggregated, in pea-like concretions, with ochre; its color is light or dark brown.

Lenticular Iron Stone is in aggregated masses, composed of lenticular particles; color, yellowish or reddish brown.

Nodular Iron Stone occurs in spherical or reniform masses, composed of concentric layers enveloping loose earth, and sometimes, in the specimens from Brazil, gold and diamonds.

Bog Iron Ore occurs in amorphous or rounded masses, more or less compact; its color is brown of dif-

ferent shades, and approaching black. *Meadow* and *Morass Iron Ore* are varieties of this species, and are formed by deposits from stagnant water.

Pitchy Iron Ore occurs in soft, shining crusts, which resemble pitch.

Umber is a fine deposit, of a brown color; it is used as a pigment.

Titanious Iron Ore is found massive, of a shining greyish black color; it contains oxide of titanium.

Natural Loadstone. Massive.
Coarsely granular.
Variety.
Crystallized in octahedrons.
Arenaceous.
Minutely crystallized, granular.
Earthy, decomposed.

Iron Glance. Compact.
In flat double three-sided pyramids.
In three-sided pyramids, angles truncated.
Variety.
Variety, approaching octahedrons.
Variety.
In foliated hexagonal tables.
Variety.
In double six-sided pyramids.
Lenticular.

Iron Mica. Massive.
In delicate six-sided tables.
Aggregated.
Disseminated with other substances.

RED IRON ORE. Compact.
In crusts, coating other substances.

Scaly Red Iron Ore. Encrusting red hematites.
Variety, earthy, pulverulent.

Compact Red Iron Glance. Massive.
In supposititious crystals.
Variety.

Red Hematites. Massive.
Reniform, mammillar.
Zoned, fracture radiated.
Variety, fibrous.

Red Ochre. Friable, with hematites.

Reddle. Massive.

BROWN IRON ORE. Massive and compact.
Friable.

Scaly Brown Iron Ore.

Compact Brown Iron Ore. In crusts, on iron ochre.

Brown Hematites. Massive.
Reniform, mammillated.

Brown Ochre. Massive.

BLACK IRON ORE. Massive.
In distinct concretions.

Black Hematites. Massive.
Variety, stalactitic.

Clay Iron Stone. Massive.
Variety, with vegetable impressions.
Containing veins of calcareous spar. *(Septaria).*
Variety.

Columnar Clay Iron Stone. In long prisms.

Pea Iron Ore. In pea-like concretions.

Lenticular Clay Iron stone. Massive.
Granular, aggregated.
Earthy.

Nodular Iron Stone. Reniform.
In hollow nodules.
Variety, enveloping gold or diamonds.
Variety, showing several stages of decomposition.

Bog Iron Ore. Compact.
Earthy.

Pitchy Iron Ore. Incrusting.

Umber. Massive.
Earthy.

Titanious Iron Ore. Massive.
Variety, fracture granular.

Carbonate of Iron, or *Sparry Iron Ore*, occurs amorphous, crystallized, and lamellar; structure foliated; its color is yellowish-white, brown, or reddish-brown.

Phosphate of Iron occurs crystallized on pyrites, (Cornwall); also in delicate foliæ, stellated on earthy carbonate of lime, (Derbyshire): it has a Prussian-blue color, is soft, and easily melts.

Earthy Blue Iron Ore occurs in friable masses, sometimes compact, and coating ores of iron; wood is often impregnated with it: color, light blue.

Chromate of Iron is found in aggregated concretions; massive, crystallized, and in shining grains; its color approaches black. It is slightly magnetic; before the blowpipe it gives a green flame, and tinges borax of the same color.

Arseniate of Iron occurs in small aggregated crystals. Its color is generally green. It easily melts, emitting fumes of arsenic.

Cupreous Arseniate of Iron occurs in aggregated crystals, of a bluish-green color.

Sparry Iron Ore. Amorphous.
Crystallized in hexagonal prisms.
In rhombs, or double pyramids.
Lenticular.
Variety.

Red Sparry Iron Ore. Rhombic.
In aggregated crystals.
Granular.

Yellow Sparry Iron Ore. Massive.
Indeterminately crystallized.

PHOSPHATE OF IRON. Crystallized on pyrites.
In rhombic prisms.
In hexagonal prisms.
Variously modified.
Foliated.
Variety.
Tabular.
Variety.

Earthy Phosphate of Iron. Pulverulent.
Variety.

CHROMATE OF IRON. Massive.
Variety.
Crystallized in octahedrons.
Variety.
Granular.

ARSENIATE OF IRON. Crystallized in cubes.
Variety, color brown.

Cupreous Arseniate of Iron. In rhombic crystals.
Variety, aggregated, globular.

MANGANESE.

THE ores of Manganese present great diversity in external characters; but its presence in any substance may easily be detected by melting it with borax and a little nitre, which will form a violet glass. It is much used in the arts, particularly in bleaching, in making glass, and for producing oxygen gas. It is generally combined with oxygen, and more rarely with sulphur, and carbonic or phosphoric acids. It occurs in great abundance in Devonshire, Cornwall, Derbyshire, and Scotland, often associated with ores of iron.

GREY MANGANESE occurs massive, crystallized, foliated, compact, and earthy. The color is steel grey or iron black; it has a metallic lustre, which characters generally pervade all the varieties.

Radiated Grey Manganese occurs stalactitic and crystallized; it is often tarnished.

Foliated Grey Manganese is found massive, disseminated, and crystallized, with a foliated fracture.

Compact Grey Manganese occurs massive and botryoidol; it is soft, and stains the fingers.

Earthy Grey Manganese occurs massive and in crusts, sometimes friable. It is used for oxygen gas, and effervesces with the acids.

Wad is a variety of the preceding, and is found stalactitic, botryoidal, reticulated, and pulverulent: it is frequently associated with other minerals, and is used as a pigment.

BLACK MANGANESE is found massive, disseminated, or crystallized, also in nests with quartz, &c. lustre, that of iron tarnished.

GREY MANGANESE. Massive.
In delicate acicular crystals.
Variety.

Radiated Grey Manganese. Stalactitic.
In small crystals, structure radiated or fibrous.

Foliated Grey Manganese. Massive.
Crystallized in acicular prisms.

Compact Grey Manganese. Amorphous.
Stalactitic.

Earthy Grey Manganese. Massive.
In crusts, disseminated.

Wad. Massive.
Fibrous, color brown.
Pulverulent.

BLACK MANGANESE. Massive.
Disseminated.
Crystallized in elongated octahedrons.
Dendritic, on indurated marl, &c.
Imbedded.

SULPHURET OF MANGANESE occurs massive, of a dark color, approaching black: its fracture has a shining metallic lustre, which soon becomes tarnished; in melting it emits sulphurous vapors.

PHOSPHATE OF MANGANESE occurs massive, fracture uneven or foliated. It has a shining black or brownish color, is hard, and melts before the blowpipe into a black enamel.

CARBONATE OF MANGANESE is composed of carbonate of lime, with oxide of manganese, and occurs massive, crystallized, and fibrous; fracture, foliated; color, pale rose-red.

Compact Red Manganese occurs combined with feldspar, is heavy, and has generally a rose-red color.

Fibrous Red Manganese occurs reticulated, in delicate acicular crystals; color, brownish red.

SULPHURET OF MANGANESE. Massive.

CARBONATE OF MANGANESE. Massive.
Crystallized.
Fibrous.

Compact Red Manganese. Massive.
Variety, with black veins.

Fibrous Carbonate of Manganese. Reticulated.
Embedded.
Stellated.

TITANIUM

GENERALLY occurs combined with the oxides of other metals. It is found in various parts, in alluvial deposits, in the form of black grains; also imbedded and crystallized. It is almost infusible, but when reduced, it has a dark copper-red color.

MENACHANITE has a black sand-like appearance resembling gunpowder. It is feebly attracted by the magnet, and is infusible by the blowpipe.

ISERINE occurs in larger grains, and more spherical than the preceding; the color is brownish black.

NIGRINE is also found in rounded or angular grains; its color approaches black, its lustre is semi-metallic; it is not attracted by the magnet.

SPHENE occurs in amorphous masses, in grains, and crystals, also imbedded; it presents a great variety of colors, but they may in general be referred to brown or yellow; one variety has a green or greyish-green tinge, with a shining lustre, and often coated by chlorite.

RUTILE is very heavy, and occurs massive, and in beautiful striated and capillary prisms, intersecting each other; of a brown and red color, also gold-yellow. A variety of this species, from its hair-like appearance, has been called *Cheveux de Venus*.

OCTAHEDRITE occurs in elongated octahedrons, which are often variously modified, of an indigo-blue color: it is generally associated with adularia and quartz.

CRICHTONITE is found crystallized in very acute rhomboids, not unlike foliated iron; it is harder than Octahedrite, and is generally associated with it.

MENACHANITE. In grains.

ISERINE. In spherical grains.

NIGRINE. In grains.
In rolled pieces.

BROWN SPHENE. Imbedded.
In very oblique four-sided prisms.
Variety, with dihedral summits.

Pale-green Sphene. Imbedded.
In oblique four-sided prisms.
Variety.
In oblique flat rhombs.
In double crystals, canaliculated.
In blade-like crystals.

RUTILE. Massive.
In striated prisms.
Variety, geniculated.
In aggregated crystals.
In capillary prisms, embedded in crystal.
Variety, curved. *(Cheveux de Venus).*
Acicular. *(Fleche d'Amure).*
Variety, reticulated.

OCTAHEDRITE. In elongated octahedrons.
Variety, solid angles truncated.
Variety, modified.

CRICHTONITE. In acute rhomboids.

LEAD.

THIS is one of the most abundant of metals, and occurs in large and small veins, in almost every rock formation, combined with sulphur, oxygen, and many of the acids, and generally contains silver. The ores of lead are easily reduced by the blow-pipe, and dissolved in nitric acid. Its uses in the arts are numerous and well known. There are many mines of this metal in England; the principal are situated in Northumberland, about Alston Moor; Durham; the West Riding of Yorkshire; Matlock, and throughout the Peak in Derbyshire; Devonshire, and Cornwall.

The ores of Devonshire and Cornwall are particularly rich in silver.

Sulphuret of Lead—*Galena*, occurs massive, in veins, and crystallized; its structure is foliated, fibrous, granular, or compact. It has a bright lead-grey color, sometimes beautifully iridescent. It melts easily before the blow-pipe, emitting fumes of sulphur.

Blue Lead Ore occurs massive, and in crystals, with a rough surface, sometimes pulverulent. It melts before the blowpipe, burning with a bluish flame. It is rare.

Antimonial Lead Ore occurs reticulated and crystallized. Its color approaches tin-white; it contains lead, a large portion of antimony, and sulphur.

Triple Sulphuret of Lead—Bournonite, occurs massive and crystallized. Its color is shining steel-grey. It is

composed of sulphur, lead, antimony, and copper, and derives its name from the discoverer, Count Bournon.

Cobaltic Lead Ore is found disseminated with ores of Cobalt, in minute aggregated crystals, and of a grey color.

GALENA. Massive.
Fibrous, or striated.
Granular, fine or coarse.
Foliated.
Crystallized in cubes.
Variety, modified.
In octahedrons.
Variety, modified.
Variety, argentiferous.
In brilliant aggregated prisms.
Variety, reticulated and indeterminately formed.
Specular. *(Slickenside).*

Blue Lead Ore. Massive.
Crystallized in hexagonal prisms.
Pulverulent.
Variety, coating Galena.—Derbyshire.

Antimoniated Lead Ore. Reticulated.
In aggregated crystals.

Bournonite. Massive.
Crystallized in four-sided prisms.
Tabular, variously modified.
Variety.

Cobaltic Lead Ore. In minute crystals.
Variety, disseminated.

CARBONATE OF LEAD—*Sparry Lead Ore*, occurs in compact masses, crystallized, fibrous, laminar, and earthy. It is more or less translucent, and in color presents various shades of white; it is easily reduced to a globule of lead.

Compact Carbonate of Lead occurs massive and crystallized. It is semi-translucent; color, white or cream-yellow, sometimes approaching metallic lustre; and is commonly associated with galena.

Earthy Carbonate of Lead occurs massive, scaly, or coarsely granular, and friable, sometimes presenting a glistening fracture; its color is brown, green, or blue, of various shades.

Black Lead Ore occurs massive, disseminated, corroded, cellular, and crystallized. Its color is bluish or greyish black.

MURIATE OF LEAD is extremely rare, and occurs crystallized; color, wine-yellow, of various shades.

PHOSPHATE OF LEAD occurs massive, stalactitic, reniform, and crystallized. Its color varies from green to brown and yellow. It is very heavy, and has a glistening fracture.

ARSENIATE OF LEAD occurs reniform, crystallized, and capillary. It has a yellowish brown color, and easily fuses, emitting arsenical fumes.

SULPHATE OF LEAD occurs disseminated and crystallized, of a yellowish-grey color, and is very easily fused. It also occurs reniform in Siberia.

MOLYBDATE OF LEAD occurs crystallized, and very rarely massive. Its color is some shade of yellow.

CHROMATE OF LEAD—*Red Lead*, occurs massive, disseminated, and crystallized. It has a beautiful red color, and a splendent exterior.

Green Chromite of Lead occurs earthy and crystallized, usually associated with red lead and manganese.

CARBONATE OF LEAD.

Compact Carbonate of Lead. Massive.
Laminated, micaceous.
Foliated.
Crystallized in three or four sided prisms.
Variety, canaliculated.
In six-sided prisms.
Variety, modified.
In double hexagonal pyramids.
Variety, modified.
In aggregated acicular crystals, fibrous.
Variety, coated by green or blue carbonate of copper.
Variety, coated with brown oxide of iron.

Earthy Carbonate of Lead. Massive.
Scaly, or coarsely granular.
Friable, earthy.

Black Lead Ore. Massive.
Crystallized in six-sided prisms.
Cellular.
Coating carbonate of lead.

MURIATE OF LEAD. In rectangular four-sided prisms.
Variety, angles truncated.
Variety, edges truncated.
Variety, with pyramids.

PHOSPHATE OF LEAD. Massive.
Crystallized in six-sided prisms.
Variety, modified.
In acicular crystals.
Variety, dendritic.
Botryoïdal.

Brown Phosphate of Lead. Massive.
Crystallized in hexagonal prisms.
In double hexagonal pyramids.
Acicular.

ARSENIATE OF LEAD. In reniform masses.
Crystallized in hexagonal prisms.
Variety, in double pyramids.
In capillary fibres.
Earthy, in crusts.
Variety.

SULPHATE OF LEAD. Massive.
Crystallized in octahedrons.
Variety, cuneiform.
Tabular.
Reniform Sulphate of Lead. Compact.
Earthy Sulphate of Lead.

MOLYBDATE OF LEAD. Massive.
Crystallized in perfect octahedrons.
Variety, modified.
In eight-sided tables.
Variety, modified.

CHROMATE OF LEAD. Massive.
Crystallized in four-sided prisms.
Variety, with pyramids.
Variety, modified.
In obtuse rhombs.
Pulverulent.

Green Chromite of Lead. Earthy.
In acicular crystals.

ZINC.

THE ores of this metal are generally found associated with lead. They are combined with sulphur and oxygen, and with carbonic and sulphuric acids. From the external appearance of some of the ores, the presence of a metal would not be suspected; but it may readily be discovered by first roasting the ore, and then fusing it with copper filings, with which it will form brass:—this is one of the uses to which this metal is applied.

RED OXIDE OF ZINC occurs massive and disseminated, also indeterminately crystallized. Its color is red tinged with yellow, or brownish.

ELECTRIC CALAMINE has a stony appearance, and occurs massive, stalactitic, and botryoidal; it is very hard and heavy, and becomes electric by heat: the color is dull grey.

CALAMINE occurs massive, stalactitic, and crystallized; also compact and earthy: its colors are yellowish-grey and brown, sometimes green. A variety with a striated diverging fracture, and resinous lustre, contains cadmium, and occurs in a mine near Matlock.

Cupriferous Calamine is composed of delicate diverging speculæ, with a silky lustre; its green color is owing to the presence of carbonate of copper.

SULPHURET OF ZINC—*Blende*, occurs massive, disseminated, and seldom regularly crystallized: its colors are yellow, brown, and black, of various shades. It accom-

panies almost every metal; some varieties become phosphorescent by friction.

Yellow Blende occurs massive and crystallized, of a resin-yellow color; its fracture is foliated.

Brown Blende differs from the preceding only in color, which is reddish-brown.

Black Blende has also the same forms, and is of a shining or dull black color.

Green Blende occurs disseminated with galena, and has a shining metallic lustre.

RED OXIDE OF ZINC. Massive.
Disseminated.
Indeterminately crystallized.

ELECTRIC CALAMINE. Massive.
Stalactitic or botryoidal.
Crystallized in flat six-sided prisms.
Variety.
In acute octahedrons.
Variety.

CALAMINE. Massive.
Stalactitic, or reniform.
Crystallized in obtuse rhomboids.
Variety.
In four-sided tables.
Striated, composed of delicate prisms.
Compact.
Coating calcareous spar or fluor.
Earthy.

Cupriferous Calamine. In capillary tufts.

SULPHURET OF ZINC. Massive and foliated.
Disseminated.
In minute shining crystals.

Yellow Blende. Massive and foliated.
Crystallized in dodecahedrons.
In twin crystals.

Brown Blende. Massive.
Crystallized in tetrahedrons.
In twin crystals.
In octahedrons.
In dodecahedrons.
In minute crystals, aggregated.
In double or twin crystals.

Black Blende. Massive.
Crystallized in tetrahedrons.
In octahedrons.
In dodecahedrons.
In minute crystals, aggregated.
In double crystals.

Green Blende. Disseminated with galena.

TIN.

THIS genus contains only three species; its localities are not numerous, but wherever it has been found, it occurs in abundance. It is fused with difficulty.

SULPHURET OF TIN occurs massive and disseminated; its color approaches steel-grey, with shades of yellow, and has a metallic glistening lustre. It is peculiar to Cornwall, and is often called *Bell-metal Ore.*

OXIDE OF TIN is found massive, disseminated, and crystallized, also in rounded lumps, when it is called *Stream Tin:* its color is dark brownish black, and is extremely heavy.

Wood Tin occurs in small mammillated masses, has a diverging, fibrous structure: its color varies from red to brown. It is very heavy, and occurs in alluvial soil*.

SULPHURET OF TIN. Massive.
Disseminated.

OXIDE OF TIN. Massive.
Disseminated in clay-slate.
Variety, in quartz or granite.
Crystallized in octahedrons.

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* A remarkably fine piece, beautifully zoned, and weighing 10½ ounces, from Mexico, was once in the Author's possession.

Crystallized in four-sided prisms.
Variety, with pyramids.
In double six-sided pyramids.
Variety, modified.
In twin crystals.
In aggregated crystals.
In delicate capillary crystals.
Detached crystals, broken from the matrix.

Wood Tin. In mammillary masses.
In fragments, zoned, diverging.
Variety, wood-like.
Variety, in globular concretions, embedded.
Variety.

BISMUTH

IS not found in great abundance; it occurs in veins with silver, cobalt, arsenic, &c. It is extremely easy of fusion, and is used in making pewter, solder, &c.

Native Bismuth occurs massive and crystallized. It has a whitish metallic lustre, and its fresh fracture is beautifully iridescent, resembling the hues of a pigeon's neck.

Sulphuret of Bismuth occurs massive, disseminated, and in delicate crystals, often acicular. The color approaches tin-white, or tarnished with a yellow tinge; it melts in the flame of a candle.

Needle Ore is found amorphous and in grey acicular crystals, embedded in quartz, and often surrounding wire like gold.

Cupreous Bismuth Ore is massive and disseminated; its color is lead-grey, approaching tin-white. It contains Bismuth, copper, and sulphur.

Bismuth Ochre is found in an earthy state, with Native Bismuth and ores of Cobalt. Its color is yellowish and greenish grey.

Native Bismuth. Massive.
Crystallized in octahedrons.
In double three-sided pyramids.
In tabular crystals, striated.
Granular.

SULPHURET OF BISMUTH. Massive.
Disseminated.
In delicate crystals.
In acicular crystals.

NEEDLE ORE. Amorphous.
In striated prisms.
Variety, covering filiform gold.
Variety.

CUPREOUS BISMUTH ORE. Massive.
Disseminated.

BISMUTH OCHRE. Earthy.
Variety.

TELLURIUM

HAS only been found in Transylvania, where it occurs in delicate veins, and is alloyed with gold, silver, &c. Its lustre varies from bright to that of tarnished iron. In nitric acid it forms a limpid solution, and easily melts before the blow-pipe, emitting a peculiar pungent odor.

NATIVE TELLURIUM occurs massive and disseminated; it is fine grained, generally of a white color, with a metallic lustre.

Graphic Tellurium occurs foliated, crystallized, and reticulated, but is generally superficially distributed on quartz, with a moss-like appearance.

Yellow Tellurium is often accompanied by gold, manganese, &c. It is white, with a yellow tinge, and sometimes slightly iridescent.

Black Tellurium occurs generally foliated and crystallized, of an iron-black color; it is soft and flexible. This variety contains about 10 per cent. gold.

NATIVE TELLURIUM. Massive, granular.
Disseminated.
Graphic Tellurium. Superficially disseminated.
Crystallized in four-sided prisms.
In six-sided prisms, acuminated.
Tabular.
Yellow Tellurium. Disseminated.
Variety.
Black Tellurium. Massive.
In delicate folia, disseminated.
In tabular crystals.

ANTIMONY

IS found in veins, and generally accompanied by Blende. It often resembles Galena, but is not so heavy: it is mineralized by arsenic, sulphur, and oxygen; it easily melts, and discharges thick white vapors. It is used in type-metal, and in various medicinal preparations.

NATIVE ANTIMONY is found massive, rarely distinctly crystallized: it has a shining tin-white color, with a granular and foliated fracture. It is found in Dauphiny.

GREY ANTIMONY occurs massive, disseminated, and crystallized, with a compact, radiated, and foliated structure; it has a shining lead color, sometimes iridescent.

Nickeliferous Antimonial Ore occurs massive and disseminated; it has the color of steel or lead, and is often tarnished. It is harder than the preceding varieties, and contains antimony, nickel, arsenic, sulphur, iron, and lead.

OXIDE OF ANTIMONY—*White Antimony*, occurs crystallized, of a white or yellowish white color.

Antimony Ochre is found earthy, of a yellow color of different shades, upon ores of antimony.

RED ANTIMONY occurs in amorphous masses, and in delicate crystals, of a deep red or purple color.

Tinder Ore is an earthy variety of the preceding; the color is reddish brown; structure, tinder-like.

NATIVE ANTIMONY. Massive, granular, or foliated.
Indeterminately crystallized.

GREY ANTIMONY. Massive.
Disseminated.
Compact.
Fibrous.
Foliated.
Crystallized in oblique prisms.
In acicular crystals, iridescent.
Capillary, approaching black.
Plumose, coating quartz, &c.
Variety.

Nickeliferous Antimonial Ore. Massive.
Disseminated.

WHITE ANTIMONY. In flat four-sided tables
In acicular crystals.
Variety, stellated.

Antimony Ochre. Massive.
Variety, earthy.

RED ANTIMONY. Amorphous.
In delicate crystals.
Variety, stellated.

Tinder Ore. Earthy.
Friable.

MOLYBDENA.

THIS genus contains but one species, which is combined with sulphur. It is with great difficulty reduced to a metallic state.

MOLYBDENA occurs massive, disseminated, and crystallized, and in flexible laminæ. It has the color of black lead, and leaves a greenish streak on porcelain.

Molybdena Ochre is very rare; it is found disseminated, and coating molybdena, of a yellow color.

MOLYBDENA. Massive.
Disseminated.
Crystallized in hexahedral tables.
Variety, acuminated.
Variety, in hexagonal plates.

Molybdena Ochre. Disseminated.
Friable.
Encrusting molybdena.

COBALT.

THE ores of this metal are found in primitive and alluvial formations. Before the blow-pipe it emits arsenical vapors, and tinges borax intense blue. It is used in enamel painting, &c. It is found in Cornwall, but the best varieties are imported from Sweden and Saxony.

ARSENICAL COBALT occurs massive, disseminated, and crystallized; fracture, tin-white, which tarnishes by exposure.

GREY COBALT occurs massive and disseminated. It has a grey color.

COBALT GLANCE occurs massive, disseminated, and crystallized, of a shining white color. The finest crystals are found in Sweden.

SULPHURET OF COBALT occurs massive and disseminated, of a pale steel-grey color, which becomes reddish when tarnished.

OXIDE OF COBALT is generally found friable, of various colors, from brownish black to yellowish grey.

Black Cobalt Ochre is composed of dull black particles, loosely cohering, earthy, and often accompanied by brown and yellow varieties, which occur in alluvial deposits.

RED COBALT, or *Arseniate of Cobalt*, is found in small masses, and in velvet-like balls and crusts, of a reddish white or peach-red color.

Radiated Red Cobalt occurs disseminated and crystallized, in beautiful folia, of a shining peach-red color, of different shades.

Slaggy Red Cobalt occurs in crusts of a brownish red color, and has a slag-like appearance.

ARSENICAL COBALT. Massive.
Disseminated.
Crystallized in cubes.
In octahedrons.

GREY COBALT. Massive.
Disseminated.

COBALT GLANCE. Massive
Disseminated.
Crystallized in cubes.
In octahedrons.
In dodecahedrons.
In isocahedrons.
In detached crystals.
Variously modified.

SULPHURET OF COBALT. Massive.
Disseminated.

OXIDE OF COBALT. Earthy.

Black Cobalt Ochre. Earthy.

Brown Cobalt Ochre. Amorphous.

Yellow Cobalt Ochre. Amorphous.
Variety, corroded.

RED COBALT. In masses.
Encrusting.

Radiated Red Cobalt. Massive.
Disseminated.
Crystallized in flat four-sided prisms.
In double six-sided pyramids.
Acicular, radiated.

Slaggy Red Cobalt Ochre. In crusts.
Coating ores of cobalt.

NICKEL

IS not very abundant. It is found in combination with meteoric iron, and associated with copper. It is difficult to melt, and emits arsenical fumes; it gives a green color to nitric acid. With copper it forms *Petit Or.*

Native Nickel is found in long capillary crystals, of a brass-yellow color, and tarnished.

Arsenical Nickel—*Copper Nickel,* occurs in compact amorphous masses, which have a reddish copper color.

Black Ore of Nickel is said to be an earthy substance, of a blackish color, which gives a green solution in nitric acid.

Oxide of Nickel—*Nickel Ochre,* occurs earthy, and in efflorescences, of a light-green color.

Native Nickel. In capillary crystals, intersecting.
In diverging groups, or reticulated.

Copper Nickel. Massive.
Foliated.
Variety, with nickel ochre.

Black Ore of Nickel. Earthy.

Nickel Ochre. Earthy.
Coating ores of nickel.

ARSENIC.

THIS mineral is very generally diffused. It is found combined with sulphur and oxygen, and often enters into ores of other metals, which have been already described. The odor of garlic, which it emits when struck with a hammer, or heated before the blow-pipe, together with its *rapid* volatilization, will distinguish it from other metallic ores.

NATIVE ARSENIC occurs in amorphous or tuberose masses, also in plates. Its fresh fracture has a tin-white color, which soon becomes blackish; it has a bright metallic lustre, with a foliated, fibrous, or granular structure, and is very heavy.

ARSENICAL PYRITES occurs massive, disseminated, and crystallized, generally of a pale yellow color; it is sometimes argentiferous, and of a silver-white color. It melts easily, emitting fumes of arsenic and sulphur.

SULPHURET OF ARSENIC—*Realgar*, occurs massive, disseminated, and crystallized, and sometimes earthy, of a scarlet or orange-red color. It melts in the flame of a candle, and is extremely friable.

Orpiment occurs massive, structure foliated and granular, and in small crystals; it has a shining yellow color, and a foliated or slaty fracture; it is soft and flexible.

NATIVE ARSENIC. Massive.
Reniform.
Laminated.

ARSENICAL PYRITES. Massive.
Disseminated.
Crystallized in oblique four-sided prisms.
Variety, modified.
In flat octahedrons.
Variety, in aggregated crystals.
Argentiferous. Disseminated.
Embedded in lithomarge.
Variety.

SULPHURET OF ARSENIC—*Realgar.* Massive.
Disseminated.
Crystallized in rhombic four-sided prisms.
Variety, variously modified.
In friable concretions.
Orpiment. Massive, foliated.
In minute crystals.
In granular concretions.

OXIDE OF ARSENIC occurs stalactitic, crystallized, capillary, and earthy; color, various shades of white.

PHARMACOLITE occurs in minute cotton-like balls; its color is generally reddish-white, and its fracture stellular. Arsenic acid 50, lime 25, and water.

OXIDE OF ARSENIC. Stalactitic.
Botryoidal.
Crystallized in beautiful octahedrons.
In delicate tabular crystals.
Capillary, in snow-white silky filaments.
Earthy, encrusting other substances.
PHARMACOLITE. In balls.
In aggregated capillary crystals.

TUNGSTEN

IS found combined with oxygen, lime, and iron. It is associated with tin in primitive rocks, is infusible before the blow-pipe, and nearly insoluble in the acids. It is extremely heavy.

TUNGSTEN occurs massive and crystallized, of a dull white color, and shining lustre. It contains acid of tungsten 60 to 70, with lime.

WOLFRAM occurs massive, disseminated, and crystallized; it has a black shining metallic hue, structure foliated, and yields a *red* streak to the knife. It contains tungsten acid 60 to 70, with iron and manganese.

TUNGSTEN. Massive.
Crystallized in octahedrons.
Variety, modified, detached, or aggregated.
In four-sided tables.
Aggregated, coating other substances.

WOLFRAM. Massive.
Disseminated.
Crystallized in four-sided prisms.
Variety, tabular.
Variety, modified.
Variety, embedded.

URANIUM

THIS beautiful mineral has only been found combined with oxygen. Both of its species are infusible, but easily dissolved in diluted nitric acid, to which they communicate a yellow color.

BLACK OXIDE OF URANIUM—*Pitch Ore*, occurs massive, of a black color; it is extremely heavy, and yields to the knife. It contains oxide of uranium 60 to 70, with lead and iron.

GREEN OXIDE OF URANIUM—*Uranite*, occurs in delicate and beautiful crystals, generally aggregated, of an emerald-green color.

Uranium Ochre occurs in small nodular masses, and in crusts frequently upon pitch ore; it has a yellow color of various shades, is soft, and breaks with a glimmering lustre.

PITCH ORE. Massive, with or without uranium ochre.
Variety.

URANITE. Crystallized in four-sided tables.
Variety, detached.
Variety, elegantly grouped.
Variety, aggregated.
Variety, pyramidal.
Variety.

Uranium Ochre. In small nodular masses.
Pulverulent, or disseminated with pitch ore.

TANTALUM.—*Columbium.*

SINCE the time Mr. Hatchett discovered this mineral, in a specimen from America, it has not been met with, till recently. It is found combined with oxygen, and an earth called Yttria, and is very hard.

TANTALITE occurs imbedded, in striated fragments, and crystallized. It is of a black color, and resembles wolfram, but its streak is *brown* or *grey*. It contains tantalum 60 to 90, with iron and manganese.

Yttro-tantalite occurs in flat or angular masses, imbedded; color, black. It contains tantalum, yttria, and iron.

GADOLINITE occurs massive and disseminated, generally imbedded in quartz; color, black, often red-brown on the edges*.

TANTALITE. Imbedded in striated masses in granite.
Crystallized in irregular prisms.

Yttro-tantalite. Imbedded in oblique prisms.
In flat angular pieces.

GADOLINITE. Massive.
Disseminated in particles, embedded.
Variety, encrusted.

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* This mineral would perhaps be better removed to the class of earths, its most characteristic ingredient being Yttria.

CERIUM.

OF this mineral there are only two species, both oxides. They are infusible before the blow-pipe.

CERITE occurs massive and disseminated, of a pale lilac, or deep reddish brown color.

ALLANITE occurs massive and crystallized, of a brownish black color; it is often accompanied by tremolite. Oxide of cerium 34, iron 25, silica 35, with lime and alumine.

CERITE. Massive.
Disseminated.
Variety.

ALLANITE. Massive.
Crystallized in four-sided prisms.
In six-sided prisms.
Variety, aggregated.

CHROME

HAS only lately been found in the state of an oxide. It occurs massive or earthy, of a dull green color. It is with difficulty reduced to a metallic state; to glass it communicates a bright and permanent green.

SILICIOUS OXIDE OF CHROME. Massive.
Earthy.

SELENUM.

IS a new metal, which has lately been discovered in an ore of copper from the Hartz.

SELENIURET OF COPPER has a black appearance, and occurs disseminated in patches in foliated carbonate of lime, not unlike schorl in white feldspar.

CADMIUM.

IS also a newly discovered metal, and much resembles tin. It is extracted from a striated black blende, found in the Hartz, also from two varieties of calamine found in Derbyshire.

CADMIFEROUS BLENDE. In striated masses.
Cadmiferous Calamine. Stellated.
Variety, crystallized.

Metallic Salts.

THE substances of this class have metallic bases, and easily dissolve in water.

Sulphate of Iron—*Copperas*, occurs massive, crystallized, and stalactitic; color, generally green or brown. It is formed by the absorption of oxygen, during the decomposition of iron pyrites.

Sulphate of Copper—*Blue Vitriol*, occurs massive, stalactitic, and crystallized, of a blue or bluish green color.

Sulphate of Zinc—*White Vitriol*, occurs stalactitic and crystallized; color, greyish or greenish white.

Sulphate of Cobalt occurs in crusts, and pulverulent, of a pale green color. With borax it gives a fine blue.

Sulphate of Iron. Crystallized in rhombs.
In octahedrons.
Capillary.

Sulphate of Copper. Massive and stalactitic.
Crystallized in rhombs.
Variety, modified.

Sulphate of Zinc. Stalactitic.
Crystallized in four-sided prisms
Acicular.

Sulphate of Cobalt. Pulverulent.
In crusts.
In white balls.

DIAMOND.

THE diamond is often found with a polished surface, although more commonly rough. It generally occurs distinctly crystallized, of which the primitive form is an octahedron; also indeterminate and round. It has never been discovered in its matrix, though sometimes embedded in the indurated soil. Its color is generally pale grey, but sometimes brown, green, yellow, rose-red, and blue. It has a metallic-like lustre; it may be split in four directions, is incomparably hard, and burns with a brilliant light in oxygen gas. The diamond forms the most beautiful and perfect series of crystallization. Those diamonds which are unfit to be cut, are employed by glaziers, or pounded for the use of engravers and lapidaries, and are called *Bort*.

DIAMOND. Rounded, spheroidal, *veiny*.
In octahedrons, (primitive form).
Variety, modified.
Crystallized in cubes. *(Extremely rare)*.
Variety, modified.
In dodecahedrons, rhomboidal.
Variety, modified.
In tetrahedrons.
Variety, modified.
Variety, curvilinear.
In twin crystals.
Triangular, hemitrope, *veiny*.
Variety.

Earthy Minerals.

ZIRCON.

OF this genus there are two varieties; they contain a peculiar earth, called *Zirconia*, and silex; and when polished, somewhat resemble diamonds of inferior quality. They occur in the alluvial soil of Ceylon.

ZIRCON is found crystallized, also in rounded fragments, generally of a grey or brown color, also blue, yellow, and pink.

Hyacinth differs from the preceding only in color, which is a shining red-brown.

ZIRCON. In rectangular four-sided prisms, with pyramids.
Variety, modified.
In rounded fragments.
Embedded.

Hyacinth. Crystallized in four-sided prisms.
Variety, with pyramids.
Variety, modified.
In dodecahedrons.
Embedded.
In rounded and angular grains.

RUBY.

AUTOMALITE occurs embedded in chlorite-talc, in perfect octahedrons, of a dark green color, approaching black.

CEYLONITE—*Pleonaste*, occurs crystallized, and in rounded grains, of a dull bluish or red color, and frequently both red and blue in the same specimen. It is found with ruby, in the beds of rivers in Ceylon.

SPINELLE occurs crystallized; color, most beautiful bright red. It is sometimes embedded in granular and foliated carbonate of lime.

SAPPHIRE. The varieties of this species are the hardest of the earthy substances, and, next to the diamond, the most valuable. The finer stones are called *Oriental*, because they have generally been found in India. The colors are blue, red, violet, green, and yellow; and sometimes the same specimen exhibits two or three colors, which are frequently distinct. *Sp. Gr.* 4. Alumine 98.

Blue Sapphire is fine dark blue or party-colored, also pale blue or clouded; it occurs crystallized.

Oriental Ruby—Red Sapphire, is of a deep red color, also of different shades, generally with a bluish hue; some rubies exceed the diamond in value. It occurs crystallized and amorphous.

EMERY is nearly allied in chemical composition to the preceding and following varieties: it has a brown color, is very compact, and difficult to break; it occurs with mica, in the isle of Naxos. When reduced to powder, it is used by lapidaries for polishing and cutting facets in precious stones.

Corundum is of various colors, with a high metallic lustre, but generally grey or greenish white, and sometimes pink and blue; it occurs massive, detached, embedded, and crystallized. It is nearly allied, both in form and texture, to the oriental stones.

Chrysoberyl has a dull gold-yellow color of different shades, sometimes inclinable to reddish brown or green. It occurs amorphous and crystallized.

Cymophane is distinguished from the preceding by a chatoyant light on the surface. These two varieties are found with diamonds, in Brazil, and contain above 80 per cent of alumine.

Automalite. Crystallized in octahedrons.
Variety, modified.
Variety, hemitrope.

Ceylonite. Crystallized in octahedrons.
Variety, modified, party colored.
In rounded particles.

Spinelle. Crystallized in octahedrons.
Variety, modified on the angles.
Variety, modified on the edges.
In dodecahedrons.
Variety, modified.
Hemitrope, triangular.
In twin-crystals.
In tabular crystals.
Variety.
Indeterminately crystallized.
Blue Spinelle. In octahedrons, embedded.
Variety.

SAPPHIRE. In hexagonal prisms.
In double six-sided pyramids.
Variety, with double pyramids.
Variety.
Girasol, opalescent.
Asteria reflects a star of six rays*, *chatoyant*.
Variety, white or pale violet.
Variety, reddish white.
Oriental Ruby. In hexagonal prisms.
In double hexagonal pyramids.
Variety, indistinctly formed.
Variety, exhibiting a chatoyant star of six rays.
Oriental Topaz. Color, pale yellow.
Oriental Amethyst. Color, violet-blue. *(Very rare)*.
Oriental Emerald. Color, green. *(Extremely rare)*.

EMERY. Massive and compact.

CORUNDUM. Massive, amorphous.
Embedded, sometimes in fibrolite.
Crystallized in six-sided prisms, detached.
Variety, modified.
In hexahedral pyramids.
In double hexahedral pyramids
In rhombic dodecahedrons.
Variety.
Brown Corundum. Crystallized in six-sided pyramids.

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* The finest specimen of this variety the Author sold to Count Bournon, for the private collection of his Majesty Louis XVIII.

Blue Corundum. In six-sided prisms.
Variety.
Red Corundum.
Yellow Corundum.

CHRYSOBERYL. Amorphous, in rolled pieces.
Crystallized in four-sided prisms.
Variety, modified.

Cymophane. Amorphous.
Variety, crystallized.

SCHORL FAMILY.

THE substances which compose this family have generally a striated surface, and appear as if composed of an aggregation of long fibres. The specimens generally exhibit cross rents.

TOPAZ occurs in rolled masses, and in striated rhombic prisms, having sometimes one or both extremities terminated by pyramids; the cross fracture is always foliated. It is composed of alumine, silica, and fluoric acid. It is found in Brazil, Ceylon, New Holland, Saxony, Siberia, Cornwall, &c.

Brazil Topaz occurs crystallized, of a deep wine-yellow color, sometimes with a pink tinge, and pink; when heated, it becomes rose-red.

Saxon Topaz occurs in crystals, embedded or detached, of a pale yellow color.

Pycnite—*Schorlite*, is found embedded in granite, of a greyish or reddish white color. It occurs crystallized.

Pyrophysolite has a dull exterior, and a greenish white color; it occurs in irregular prisms, embedded in quartz. Its powder phosphoresces on hot coals.

Euclase is pale green, bluish green, and blue; it occurs crystallized, and is very rare.

Emerald has a green color, which migrates into various shades of white; it occurs in rounded fragments, and crystallized, sometimes exhibiting transverse striæ.

Beryl is yellowish green, and sometimes greenish blue; it occurs in crystals, longitudinally striated.

A variety of a sea-green color is called *Aqua-marine*.

Iolite is of a dull blue and yellowish brown color, as viewed in different directions. It occurs amorphous and crystallized. From the property of exhibiting two colors, it has been called *Dichroite*.

Schorl generally occurs in black acicular crystals, which are sometimes aggregated, forming irregular three and six-sided prisms, longitudinally striated; it is also found compact and disseminated.

Precious Tourmaline is of various colors, green, blue, red, yellow; and blackish blue *(Indicolite)*. It occurs crystallized.

Common Tourmaline differs from the preceding in color, which is a fine shining black.

Rubellite has a red color of various shades; it occurs crystallized and embedded, sometimes in the centre of the blue and green tourmalines.

Epidote.—*Pistazite*. Its color varies from blackish green to pale green. It occurs crystallized or granular.

Zoisite has a smoky-grey color, with a pearly lustre; it occurs in crystals, though rarely disseminated. An earthy variety is said to have occurred, of a pale reddish white color, with a shining lustre, and is friable.

Axinite has generally a brown color, with a violet tinge. It occurs embedded, and crystallized in striated rhombic tables, which have a high lustre, and resemble the edge of an axe—whence its name.

Brazil Topaz. Crystallized in rhombic prisms.
Variety, with four-sided summits.
Variety, with pyramid, modified.
Variety.
Pink Topaz, generally with a brownish tint.
Blue Topaz, rounded, rarely crystallized.
White Topaz. Crystallized in rhombic prisms.
Variety, modified.
In rolled pieces.
Variety, exhibiting the fracture.

Saxon Topaz. Crystallized in rhombic prisms.
Variety, with pyramid.
Variety, modified on the lateral edges.
Variety, modified on the terminal edges.
Variety, modified on the pyramids.
Variety, embedded.

Siberian Topaz. Embedded.
Variety.

Pycnite. In prismatic concretions.
Crystallized in long hexagonal prisms.

PYROPHYSOLITE.

EUCLASE. In rhombic prisms, with pyramids.
Variety, modified.
In fragments.

EMERALD. Crystallized in six-sided prisms.
Variety, truncated on the terminal edges.
Variety, modified.
Variety, pale-green.
Variety, the green and white distinct.
Variety, rounded and polished.

Beryl. Crystallized in long six-sided prisms, striated.
Variety, with pyramids, or modified.
Aqua-marine. In six-sided prisms, with pyramids.
Variety.

IOLITE. Amorphous.
Crystallized.
Embedded in feldspar.

SCHORL. Massive, fibrous.
Crystallized in three-sided prisms.
In six-sided prisms.
In acicular crystals.
Variety, aggregated.

Precious Tourmaline. In three-sided prisms.
Variety, the edges truncated or bevelled.
Variety, with pyramids.
In six-sided prisms.
Variety.

Common Tourmaline. In three-sided prisms.
Variety, with pyramids.
In six-sided prisms.
Variety.

Rubellite. Crystallized in three-sided prisms.
In cylindrical prisms, embedded in quartz.
Variety, embedded in green tourmaline.
Variety, wine-yellow. *(Very rare).*

Indicolite. Crystallized in three-sided prisms.
Variety, modified.
Variety, cylindrical.

EPIDOTE. Crystallized in oblique four-sided prisms.
In six-sided prisms.
Variety, with pyramids.
Variety, modified.
In aggregated acicular prisms, with pyramids.
Granular.

Zoisite. Crystallized in oblique prisms, fibrous.
Variety, indeterminate.
Variety, massive.
Friable.

AXINITE. Crystallized in rhombic tables.
Variety, modified.
Disseminated.

GARNET FAMILY.

THE substances which compose the following division are generally crystallized. The crystals are commonly modifications of the four-sided prism, the rhomboidal dodecahedron, or the trapezohedron, and their planes are usually smooth. They contain silica, alumine, and lime, with a small portion of iron.

LEUCITE is of a greyish-white and red color; it occurs embedded, granular, and crystallized.

VESUVIAN—*Idocrase*, has a resin-brown color, with a shining lustre; it occurs crystallized, generally associated with mica, schorl, and garnets.

GEHLENITE. It has generally a grey or yellow color; it only occurs in crystals, which have a rough snrface.

EGERAN has a deep brown color; it occurs crystallized.

GROSSULAR has a yellowish-green color; it occurs crystallized and massive.

GARNET, color, red, of various shades, occurs crystallized, and in fragments or grains. It easily melts before the blow-pipe.

Precious Garnet is of a blackish or bluish red color.

Topazolite is of a bright yellow color; it usually accompanies mussite. It occurs crystallized, and nearly allied to the precious garnet.

Pyrope has a dark cherry-red color, and occurs in rounded and angular concretions.

Common Garnet is brown of various shades; it occurs

massive, and in large dodecahedrons. It becomes magnetic after being heated. The brown variety is melted in Bohemia as an ore of iron.

Colophonite resembles resin in color and lustre: it occurs crystallized and in aggregated concretions. It is not so heavy as the garnet.

Melanite is a black variety of the garnet; it is always crystallized in dodecahedrons.

Aplome is generally of a dull green color; it occurs in rhomboidal dodecahedrons, striated in the direction of their shorter diagonals.

Grenatite—*Staurotide.* Color, dark brown; it occurs in prismatic crystals, which often intersect each other in the form of a cross, sometimes at right angles, and sometimes obliquely. It is frequently associated with cyanite.

Cinnamon Stone has a brownish or yellowish red color, and resinous lustre; it is found in grains or fragments.

Allochroite. Color, yellowish grey and greenish. It occurs massive, has a resinous lustre, gives fire with steel, and melts before the blow-pipe.

Leucite. In twenty-four-sided crystals.
Embedded in lava.
Variety.
In granular concretions.

Vesuvian. Crystallized in four-sided prisms.
Variety, lateral edges truncated.
Variety, terminated by four-sided pyramids.
Variety, pyramids truncated.

GEHLENITE. In rectangular flat prisms.

EGERAN. In rectangular prisms.
Variety, modified on the edges.

GROSSULAR. In smooth dodecahedrons.
Variety, trapezoidal.
Variety, modified.
Indistinctly aggregated.

PRECIOUS GARNET. In rhomboidal dodecahedrons.
Variety, truncated on all its edges.
Variety, in trapezoids.
Variety, embedded.
In detached crystals.
Topazolite. Crystallized in dodecahedrons.
Variety, modified.
Pyrope. In rounded or angular pieces.
Common Garnet. Massive.
In dodecahedrons.
Variety, embedded in blue calcareous spar.
Colophonite. In aggregated concretions.
Crystallized in dodecahedrons.
Melanite. Crystallized in dodecahedrons.
Variety, edges truncated.

Aplome. In dodecahedrons.
Variety.

GRENATITE. In short oblique four-sided prisms.
Variety, the acute lateral edges truncated.
In long hexagonal prisms, intersecting.

ALLOCHROITE. Massive.

QUARTZ FAMILY.

AMETHYST, color, violet-blue, occurs massive and crystallized. The *common* variety has a dull violet color, intermixed with red. The colors are seldom uniformly distributed, but appear in spots, or only in parts of the specimen. It occurs crystallized and disseminated.

Rock Crystal occurs massive and crystallized, and is perfectly transparent.

Common Quartz occurs massive and crystallized, sometimes exhibiting the primitive form, which is a rhomb. It is translucent: the colors are various, generally some shade of white, or red, which will appear from the numerous sub-varieties.

Aventurine. Color, red-brown. It is interspersed by minute spots of yellow mica, which shine with a golden lustre.

Pseudomorphous Quartz is formed in cavities formerly occupied by crystals of other minerals, and presents the cube, octahedron, rhomb, &c. which have generally a dull surface, and are often hollow.

Float Quartz is cellular and spongy, and floats on water.

Flexible Sandstone is supposed to owe its flexibility to flattened grains of quartz, resembling mica. It is not elastic, but bends by its own weight.

Rhombic Quartz—Fontainbleau Sandstone, has a yellowish white color, and is found massive and crystallized in rhombs.

Prase, color, dark and dull green, occurs massive and crystallized on quartz.

Ferruginous Quartz is opaque, or translucent at the edges only; it owes its colors to the oxide of iron; it occurs in small aggregated crystals, which become magnetic by heat.

Cat's Eye (quartz with amianthus) is generally pale grey, and exhibits a chatoyant play of light.

Hornstone is of various colors, commonly grey or greenish; it occurs massive and in supposititious crystals. Its fracture is splintery or conchoidal; it has a shining lustre. A variety called *Chert* contains petrifactions; it is used in the potteries.

Woodstone has various colors, but most commonly some shade of grey or brown. It occurs massive, and has the appearance of wood. It is evidently formed by the infiltration of silicious particles, as the vegetable fibres decay.

Flinty Slate has a dull smoke-grey color. It occurs massive, and is frequently traversed by veins of quartz. It is difficult to break.

Basanite, a finer variety, is used as a touch-stone to try the purity of gold.

Flint is of various colors, and is too generally known to require description. The interior of the spherical masses is often coated by crystals of quartz.

PRECIOUS AMETHYST. Massive.
Crystallized in six-sided prisms.
Variety.
Common Amethyst. Disseminated.
Crystallized in six-sided pyramids.
Variety.

Rock Crystal. Massive.
Variety, iridescent.
Variety, containing chlorite,
Variety, with actinolite.
Variety with rutile, &c.
Crystallized in six-sided prisms, with pyramids.
Variety, in double pyramids.
Variety, modified.
Variety.

Common Quartz. Massive and compact.
Variety, fibrous.
Imbedded in rhombic crystals.
Crystallized in six-sided pyramids, aggregated.
In double six-sided pyramids.
In six-sided prisms, with six-sided summits.
Cap Quartz. A six-sided pyramidal nucleus, coated, on which a silicious deposit is subsequently formed.
Babel-tower Quartz. Prism upon prism, diminishing. Lately discovered at the Land's End.
Smoky Quartz. Massive.
Crystallized.
Black Quartz.
Yellow Quartz—Topazine Crystal.—*Cairn Gorum.*
Blue Quartz—Sappharine.
Red Quartz—Hyacinth of Compostella.
Rose Quartz, red or white-red.
Milky Quartz—Hyaline. Color, pale bluish pink.
Crystallized.
Paper Quartz. In foliated leaves.

Aventurine.

Pseudomorphous Quartz. In cubes.
In octahedrons.
In rhombs.
Variety.

Float Quartz. In cellular masses.
Variety.
Variety, foliated.

Flexible Sandstone. In laminæ. Brazils.
Variety, from China.

Fontainbleau Sandstone. Massive.
Crystallized in rhombs.
Variety.

Prase. Massive.
Crystallized in six-sided prisms, with pyramids.
Variety, radiated.

Ferruginous Quartz. Massive.
In six-sided prisms, with pyramids.
Variety, reddish.
Variety, black or brown.

Cat's Eye. Compact.
Spheroidal, polished.

Hornstone. Massive.
In pseudomorphous cubes, rhombs, foliated.
Variety, fine-grained, fracture conchoidal.

Chert. Marine remains petrified.
Variety, compact.
Variety.

Woodstone. Massive.
Variety, striped, wood-like.
Variety.

Flinty Slate. Massive.
Stratified.
Basanite—Lydian Stone. Massive.
Variety, with veins of quartz.

Flint.

CHALCEDONY is a silicious substance, of great diversity of color, but generally grey or bluish grey, which sometimes appears in spots or stripes. It rarely occurs in large masses, but is commonly found in veins, or filling cavities in other minerals; more generally stalactitic and mammillated. It also forms pseudomorphous crystals. It is translucent, and receives a fine polish; which characters pervade the following varieties.

Mocha Stone is a beautiful variety of the preceding, and contains dendritic appearances.

Carnelian. Its usual colors are blood-red, flesh-red, and white, which sometimes appear in spots or stripes; it occurs in masses, and stalactitic or mammillated.

Onyx has a deep clove-brown color, with concentric white or grey veins of chalcedony.

Sardonyx has the same color as the preceding, and is

sometimes yellow, but is generally clouded, and without the white zones.

Plasma is of a green color, rather dull and dark, frequently with spots of white or yellow.

Chrysoprase has a pale green color, of various shades, and lighter than the preceding.

Heliotrope—Blood Stone, has a pleasing dark-green color, with red or yellow spots. It loses its colors before the blow-pipe.

Hyalite resembles chalcedony, except in its surface, which appears like gum-arabic. It occurs in crusts on decomposed basalt or porous wacke.

Silicious Tufa has a white color, and contains leaves and stems of plants mineralized. It is extremely friable and light: from the hot springs in Iceland.

Fiorite Pearl Sinter. Color, generally greyish white. It occurs stalactitic and botryoidal.

CHALCEDONY. Mammillated.
Stalactitic.
Botryoidal.
Veiny, striated.
Amorphous.
Crystallized in suppositious cubes.

Mocha Stone. Arborescent.
Variety, spotted.
Variety, red.
Variety.

Carnelian. Massive.
Variety, composed of red and white layers.
Mammillated.
Variety.

Onyx. Oriental.
Variety, from Germany,
Variety,
Sardonyx,
Plasma.
Chrysoprase.

Heliotrope. With red spots,
With yellow spots.

Hyalite. Encrusting basalt.
Variety, on porous wacke.
Silicious Tufa, With vegetable impressions,
Variety.
Fiorite Pearl Sinter. Stalactitic,
Botryoidal,

Opal. This beautiful species, when fine, is highly valued, and ranks with the first class of precious stones. Its varieties have a vitreous appearance.

Precious Opal is of a milk-white or pale blue color, diaphanous, and exhibits beautiful chatoyant and iridescent colors. It occurs in delicate veins and patches, also disseminated.

Girasol, or *Fire Opal,* has a red, yellow, and greenish color, with a flame-like iridescence. It is found in Mexico.

Hydrophane is considered to be a variety of the opal, which, after the absorption of water, becomes diaphanous, and sometimes opalescent, but less splendent than the preceding.

Common Opal. Color, white, yellow, red, and bluish. It is brittle, very light, and has a vitreous lustre.

Cacholong. Color, milk or greyish white. It is opaque, and often associated with varieties of opal and chalcedony.

Semi Opal is of various colors, generally yellow, white, or brown. It is distinguished from common opal by being heavier and less brilliant.

Jasper Opal is of a red-brown or yellow color, sometimes spotted.

Wood Opal occurs of various colors, generally light yellow, and has a wood-like appearance, and conchoidal fracture. The finest specimen known was brought by Dr. Clarke from Hungary.

Precious Opal. Disseminated in delicate veins.
In the matrix.
Detached.
Variety. *Harlequin Opal.*
Variety, in distinct patches. *Golden Opal.*
Girasol.
Hydrophane.
Variety, opalescent.

Common Opal. Variety, pale blue.
Variety, reddish brown.

Cacholong. Massive.
Variety, stratified with chalcedony.
With other varieties of opal.

Semi Opal. Amorphous.
Tuberose.
Variety.

Jasper Opal. In masses.
Variety, spotted.

Wood Opal. Massive.
Variety, wood penetrated by opal.

MENILITE is of various colors, generally brown and grey, and sometimes blue on the surface; it occurs in tuberose masses, embedded in adhesive slate, from Mount Menil, near Paris, whence its name.

MENILITE. Tuberose.
Embedded in adhesive slate.

TURQUOIS. This precious substance has a sky-blue color. It generally occurs in very delicate veins in limestone; it is opaque, and yields with difficulty to the file. It is very much used in jewellery, and has hitherto only been found in Persia.

JASPER is very universally distributed, and of infinite variety. Its colors are various, but most generally red, brown, or yellow. It never occurs crystallized. It is opaque; and contains portions of iron, to which its colors may be attributed.

Egyptian Jasper occurs of various colors, generally red or brown, with curvilinear delineations, concentric stripes, or black spots, often exhibiting curious *lusus naturæ*, dendritic appearances, &c.

Striped Jasper. This substance is of a brownish red color, with green bands passing through it.

Porcelain Jasper has a grey or dull blue color, some-

times black, with a vitreous lustre, and appears as if it had been acted upon by heat.

Common Jasper occurs of various colors, as red, yellow, brown, green, and black; it is compact, heavy, and breaks with much difficulty; fracture conchoidal.

Agate Jasper is an assemblage of jasper and agate, of various colors, generally white, red, or yellow.

Pudding-stone is composed of rounded pebbles, gravel, &c. cemented together by oxide of iron and silex.

RED EGYPTIAN JASPER. In spheroidal masses.
Variety.
Brown Egyptian Jasper. With concentric zones.
Variety, exhibiting *lusus naturæ, &c.*

Striped Jasper. Massive.

Porcelain Jasper. Massive.
Variety, vitrified.

Common Jasper. Massive and compact.
Variety.
Sinopal. Color, red.

Agate Jasper.

Pudding-stone. Aggregated pebbles.
Variety.

AGATE. This beautiful substance is generally composed of chalcedony, quartz, carnelian, &c. Its colors are various, and finely contrasted, sometimes arranged in

concentric zones and angular lines: from its great hardness it is capable of receiving a fine polish.

Striped Agate is composed of alternate layers of chalcedony, quartz, and amethyst, which are straight or curved.

Agate Breccia is composed of different fragments apparently cemented together by oxide of iron.

Fortification Agate is marked with angular lines, so disposed as to represent a fortification.

Landscape Agate. The colors are arranged so as to have a resemblance to a landscape.

Moss Agate is of various colors, generally yellow or red, with moss-like fibres.

Oriental Agate. Color, generally grey and clouded; often contains dendritic appearances.

Blue Agate has a clouded bluish appearance.

Petrifaction Agate is composed of marine substances silicified.

PITCH-STONE.

SOME of the substances which compose this family are supposed to be of volcanic origin.

Obsidian. Its color approaches black; it occurs massive and compact, with conchoidal fracture. It is translucent, and from its vitreous appearance has been called *Volcanic Glass.*

Marekanite, a variety of the preceding, occurs in rounded masses, of a smoke-grey color.

Pitch Stone generally resembles pitch in color and fracture, but is sometimes red, green, brown, and approaching black; the exterior is often decomposed: it is lighter, and melts more easily than the preceding.

Pitch Stone Porphyry is composed of feldspar, and other substances embedded in pitch-stone, generally of a green color.

Pearl Stone is commonly of a smoke-grey color, with a shining lustre; it occurs massive, and has a spheroidal structure; it is brittle.

Pumice. Its color is light or dark grey; it occurs in cellular masses, sometimes intermixed with obsidian; it is so light as to float in water, and is used for polishing. It is found in great abundance in the volcanic islands.

Porphyritic Pumice is generally of a grey color, and contains feldspar and mica.

OBSIDIAN. Massive.
Variety, stratified.
Variety, iridescent.
Variety, enveloping glassy feldspar.

Marekanite. In rounded pieces.
Variety.

PITCH STONE. Massive.
Variety, brown
Variety, green.
Variety, red.

Pitch Stone Porphyry. Massive.
Variety.

PEARL STONE. Massive.
Variety.

PUMICE. In cellular masses
Variety, fibrous.
Variety, glassy, containing obsidian.

Porphyritic Pumice.

ZEOLITE.

THIS family derives its name from the property of its species intumescing under the action of the blow-pipe.

PREHNITE. Its color is green, which migrates into white. It occurs massive and crystallized, with a foliated or fibrous structure; it easily melts before the blow-pipe.

ZEOLITE. Color, generally white, red, or green; it occurs massive and crystallized; its fracture is foliated, radiated, or fibrous, and forms a beautiful series.

Earthy Zeolite occurs massive, and in friable crusts, with other varieties of zeolite, and often filling cells in amygdaloid.

Fibrous Zeolite occurs massive, reniform, and in capillary crystals.

Needle Zeolite occurs massive and in delicate crystals, aggregated.

Radiated Zeolite is found massive, botryoidal, and crystallized; the fracture is beautifully radiated.

Foliated Zeolite—Stilbite, occurs massive, disseminated, and crystallized. It has a shining foliated fracture.

APOPHYLLITE. Its color is generally white or reddish white: it resembles calcareous spar; it occurs massive and crystallized. It exfoliates in acids, and in the flame of a candle; it easily melts before the blow-pipe into a white enamel.

CUBICITE. Color, greyish or reddish white; it occurs crystallized, seldom massive; it is sometimes translucent.

CHABASITE. Color, greyish white; it occurs crystallized; it melts into a porous white mass. A green variety of this substance is extremely rare.

HARMATOME. Its color is generally white; it occurs crystallized, the crystals sometimes macled, which forms the following variety.

Cross Stone. Its color is generally white, sometimes yellowish red, translucent; it occurs in tabular crystals, which intersect each other, forming a cross, whence its name.

LAUMONITE. The color of this rare mineral is snow or greyish white; it occurs massive and crystallized; it is liable to decompose, unless kept constantly in water.

DIPYRE. Its color is pearl-grey, with a shining lustre; it occurs massive, and in minute crystals, embedded, sometimes disintegrated; it phosphoresces and melts before the blow-pipe.

NATROLITE is of an ochre-yellow color, occurs massive, beautifully zoned, and in capillary crystals; it contains a large portion of natron.

PREHNITE. Massive.

Crystallized in short four-sided prisms.

Variety, truncated on the lateral edges.

In four-sided prisms, acicular.

Variety, aggregated.

Fibrous.

Embedded in wacke.

Variety.

ZEOLITE.

Earthy Zeolite. Massive.
In crusts.
In amygdaloid.

Fibrous Zeolite. Massive.
In reniform balls.
In delicate fibres.

Needle Zeolite. Massive.
In long four-sided prisms.
Variety, modified.

Radiated Zeolite. In four-sided prisms, with dihedral summits.

Foliated Zeolite. Massive.
Crystallized in four-sided tables.
In six-sided tables.
Variety, modified.

APOPHYLLITE. Massive.
Crystallized in four-sided prisms.
Variety, modified.
In four-sided tables.
Indeterminately crystallized.

CUBICITE. Crystallized in cubes.
Variety, modified on the edges.
Variety, modified on the angles.
Variety, trapezoidal.

CHABASITE. Crystallized in rhombs.
Variety, modified.
Green Chabasite.

HARMATOME. Crystallized in four-sided prisms.
Variety, with dihedral pyramids.

Cross Stone. In four-sided prisms with pyramids, macled.
Variety, red.
Variety, yellow.
Variety.

LAUMONITE. Crystallized in oblique prisms.
Variety, modified.
Variety, spicular.

DIPYRE. Embedded.
In minute crystals, disseminated.
Disintegrated. *(Very rare).*

NATROLITE. In veins.
Variety, embedded.
In delicate capillary crystals.
Diverging.

WAVELLITE.

THIS family derives its name from Dr. Wavel, its discoverer. It consists of two species, which are composed of alumine, phosphoric acid, and water.

WAVELLITE. Its colors are yellowish and brownish grey. It occurs in spherical balls, which have a stellular fracture, sometimes iridescent.

BRAZILIANITE. Its color is darker than the preceding; it occurs massive, botryoidal, and crystallized; its fracture is feebly radiated; it is extremely rare, and was discovered by the Author, at Villa Rica, in Brazil.

WAVELLITE. In spherical balls.
Variety, stellated.
Crystallized in oblique four-sided prisms.

BRAZILIANITE. Massive, stellular.
Botryoidal.
Crystallized in flat rhombic prisms.

AZURE STONE FAMILY.

THE substances which compose this family are of a blue color; they generally gelatinize in acid.

LAPIS LAZULI is of a light or dark blue color; it oc-

curs massive and disseminated, very rarely crystallized. It is generally associated with pyrites; it melts before the blow-pipe.

Azurite—*Lazulite*, is of a lighter blue color than the preceding; it occurs massive, and in crystals, embedded.

Hauyne is of a dark or pale blue color; it occurs in granular concretions, crystallized, and disseminated in basalt and feldspar.

Blue Spar is of a pale blue color; it occurs massive and disseminated; it is hard, and has a splintery fracture. It is found associated with quartz, mica, and garnets. It has hitherto been found only in Asia.

Lapis Lazuli. Massive, with pyrites.
Disseminated in spots.
Crystallized in rhombic dodecahedrons. *(Rare).*

Azurite. Embedded.
Crystallized in oblique prisms.
In four-sided pyramids.

Hauyne. Disseminated in feldspar.
Crystallized in rhombic dodecahedrons.
In granular concretions.

Blue Spar. Massive.
Disseminated.

FELDSPAR FAMILY.

THIS is a very numerous and interesting family, and inclined to crystallize in forms derived from the four-sided prism. The colors are various; most of its species have a foliated and glistening fracture.

ANDALUSITE is of a reddish brown or pale grey color. It occurs massive and in crystals, which are sometimes embedded in mica slate; it is hard, and scratches glass.

SAUSSURITE is of a white, grey, or green color; it occurs massive and disseminated.

CHIASTOLITE—*Macle*, is of a yellowish white color; it occurs in crystals intersecting each other, forming a cross, sometimes hollow, but generally filled with clay-slate, in which they are embedded.

INDIANITE is of a grey color; it occurs massive, and in granular concretions, with corundum embedded.

ADULARIA has generally a white or dull white color; it occurs massive and crystallized. A rare variety of this substance from Ceylon is called *Moonstone*, which, when cut in a convex form, exhibits a chatoyant light.

Glassy Feldspar is of a greyish white color; it occurs in crystals, embedded, and appears cracked in various directions.

Labrador Feldspar is of a dull grey color, and exhibits most beautiful opalescent colors; it is massive and compact, and translucent on the edges.

Common Feldspar is of various colors, flesh-red, grey,

or white, more rarely blue or green. It occurs massive and crystallized; it is one of the constituents of granite.

Disintegrated Feldspar is of a light grey color, and is a variety of the preceding, sometimes passing into clay.

Compact Feldspar is of a white or grey color; it occurs massive and crystallized.

Radiated Feldspar—Albite, has a white or greenish white color; it occurs massive and crystallized, with a fibrous or radiated structure.

Spodumene—*Triphane*, is of a pale green color; it occurs massive and disseminated; it is translucent. Before the blow-pipe it exfoliates in gold-like scales, then melts into a green enamel.

Scapolite—*Paranthine* or *Wernerite*. Its general color is grey, or greenish grey, sometimes red; it occurs massive and crystallized; often associated with mica, chlorite, and magnetic iron; its structure is compact, foliated, and radiated.

Bergmanite is of a greenish grey or flesh-red color; it occurs massive; its fracture is fibrous, curved, and stellular; it scratches feldspar.

Elaolite—*Fettstein*. Color, dull bluish green, passing into grey; it occurs massive. It melts into a white glass before the blow-pipe.

Petalite has a greyish color; it occurs massive; it has a glistening lustre, and is translucent; the fracture is foliated. It contains the new alkali Lithia.

Sodalite is of a dark muddy green color; it occurs massive and crystallized; it contains 25 per cent. soda, and a small portion of muriatic acid.

Meionite is of a greyish white color, and is trans-

lucent; it occurs massive and crystallized; it is easily fusible.

Nepheline is of a white color, sometimes tinged with yellow or green; it occurs crystallized, and generally accompanied by mica: it becomes clouded in nitric acid.

Ice Spar has a greyish white color resembling ice; it occurs massive, cellular, and crystallized; it is associated with mica, hornblende, and the preceding varieties. It is found at Monte Somma, in Italy.

Andalusite. Massive.
Crystallized in four-sided prisms.
Embedded in mica-slate.

Saussurite. Massive.
Disseminated.
In rolled pieces.

Chiastolite. Crystallized in four-sided prisms.
Variety, hollow.
Variety, filled with clay-slate.

Indianite. Massive.
In granular concretions.
Variety, containing corundum.

Adularia. Massive.
In oblique four-sided prisms, with pyramids.
Variety, modified.
Moonstone.
Variety.

Glassy Feldspar. In four-sided prisms, embedded.

Labrador Feldspar. Massive.
Variety, blue or blue and green.
Variety, flame-colored, margined.
Variety, color disseminated in small patches.
Variety.

Common Feldspar. Massive.
Crystallized in rhombic prisms.
Variety, embedded in granite.
In twin crystals.

Blue Feldspar. Massive.
Crystallized.
Green Feldspar. Massive.
Crystallized.
Aventurine Feldspar. Massive.
Variety, slaty.

Disintegrated Feldspar. Massive.
Variety, disseminated.
Variety, decomposing.

Compact Feldspar. Massive.
Crystallized in oblique four-sided prisms.

Albite. Massive.
Variety, radiated.
Crystallized in four-sided prisms with pyramids.

SPODUMENE. Crystallized.
Disseminated.

SCAPOLITE. Massive.
Crystallized in oblique four-sided prisms.
Variety, modified.

Foliated Scapolite. In oblique four-sided prisms.

Radiated Scapolite.

BERGMANITE. Massive.
Crystallized.

ELAOLITE. Massive.

PETALITE. Massive.

SODALITE. Massive.
Crystallized in rhomboidal dodecahedrons.

MEIONITE. Massive.
Crystallized in rectangular four-sided prisms.

NEPHELINE. Massive.
Crystallized in six-sided prisms.

ICE SPAR. Massive.
Crystallized in six-sided tables.
Cellular.

CLAY FAMILY.

THE varieties which compose this class of minerals have an earthy fracture, and emit an argillaceous smell when breathed upon; they are never found in any regular form; the colors are dull.

ALUMINITE has a white or yellowish white color; it occurs in reniform masses, and adheres feebly to the tongue.

Alum Stone is of various colors, generally greyish or reddish white; it occurs massive and porous; it is brittle, and is found in volcanic craters.

Porcelain Earth is generally of a white color; it occurs massive and compact; it is probably a deposit of decomposed feldspar, silica, &c.

COMMON CLAY—*Loam*, is of a yellowish grey color; it occurs massive, and sometimes indurated; it is an alluvial deposit; it adheres strongly to the tongue.

Potters' Clay. Its colors are greyish or yellowish white; it occurs massive, sometimes slaty, and semi-indurated; it is the common clay of which earthenware, pipes, &c. are made.

Variegated Clay. Its color is some shade of red or brown; it occurs massive.

Slate Clay. Color, approaching black; it occurs massive, and has a slaty or earthy structure; it is soon decomposed. It generally contains vegetable impressions.

Adhesive Slate has a grey color; it occurs massive: it exfoliates by exposure to the atmosphere, but becomes

compact on immersion in water: it adheres strongly to the tongue, whence its name.

Polishing Slate is of a snow or yellowish white color; it occurs massive. It appears to be a fine deposit of silica, with alumine.

Tripoli—Rotten Stone, has a dull brown color; it occurs earthy and friable; it is probably a decomposed limestone, or alluvial deposit.

Float Stone is of a yellowish grey color; it occurs massive, and appears to be a transition from flint.

Alum Slate. Its color approaches black; it occurs massive, often covered by a white efflorescence of alum.

Bituminous Slate. Its color is black, or brownish black; it occurs massive; it is hard, and soon decomposes by exposure to the atmosphere.

Drawing Slate is of a black color; it occurs massive and compact; it is used for crayons.

Whet Slate. Its color is generally grey, yellowish, or greenish; it occurs massive, and is of a fine texture.

Clay Slate. Its colors are various, from grey to black or red. It occurs massive, and is frequently traversed by delicate veins of tin. It is the common variety of this substance with which houses are slated.

MICA FAMILY.

THE principal characteristic of this family is its foliated and glistening appearance, sometimes approaching splendent; it has a tendency in all its crystallizations to the hexagonal form; it is difficultly fusible before the blowpipe.

LEPIDOLITE. Its color is peach-red, which migrates into greenish yellow or white; it occurs massive and crystallized; it is composed of delicate shining scaly particles.

MICA is of various colors, but generally white, grey, brown, or black; it occurs massive, disseminated, and crystallized; it is easily divisible into *the finest* laminæ, which are perfectly flexible.

PINITE is of a blackish green color; it occurs massive and crystallized, and is generally found embedded in granite.

CHLORITE. Its color is some shade of green; it occurs massive, disseminated, and crystallized; it is unctuous to the touch; its texture is earthy, slaty, or foliated.

Common Chlorite is of a dark dull green color; it occurs massive.

Chlorite Slate has a blackish green color; it occurs massive and compact, with a slaty texture. It probably passes into the earthy variety.

Foliated Chlorite is of a dark or light green color; it occurs massive and crystallized.

LEPIDOLITE. Massive.
Crystallized in six-sided prisms.
Variety, of a greenish hue.
Variety, pale pink.

MICA. Massive.
Disseminated.
Crystallized in rhomboidal four-sided prisms.
In rectangular six-sided prisms.
In four or six-sided tables.
Variety.

PINITE. Massive.
Crystallized in six-sided prisms.
Variety, truncated on the edges or angles.

CHLORITE. Massive.

Chlorite Slate. Massive.

Foliated Chlorite. Crystallized in six-sided tables.
Variety.
Aggregated.
Variety, massive.
Earthy.
Variety.

LITHOMARGE FAMILY.

THE substances which compose this family are rarely found crystallized; they are generally unctuous to the touch, which is a property common to all substances containing a considerable portion of magnesia; they are in general tough, though not hard; the colors are seldom bright.

GREEN EARTH is of a dull green color; it occurs massive, and in nodules, filling cells in amygdaloid; it contains a large portion of potass.

PIMELITE is of a dull green color; it occurs earthy, more or less indurated, and contains 15 per cent. of oxide of nickel.

LITHOMARGE is of a snow-white color; it occurs massive and disseminated; it is soft, also indurated; it adheres to the tongue, and falls to powder in water.

MOUNTAIN SOAP is of a dark brown color; it occurs massive, generally in cells, in trap rocks.

YELLOW EARTH has an ochre-yellow color; it occurs massive, is very soft, and adheres to the tongue.

CIMOLITE is of a greyish white color; it occurs massive, and is found in the island of Cimolia. It was highly prized in medicine by the ancients.

KOLLYRITE has a reddish or greyish white color; it occurs massive, is soft, and strongly adheres to the tongue.

GREEN EARTH. Massive.
Disseminated in amygdaloid.
Globular.

PIMELITE. Massive.
Disseminated.

LITHOMARGE. Massive.
Disseminated.

Indurated Lithomarge. Massive.

MOUNTAIN SOAP. Massive.

YELLOW EARTH. Massive.

CIMOLITE. Massive. (Impressed with a seal).

KOLLYRITE. Massive.

SOAP-STONE FAMILY.

Native Magnesia is of a white or greyish white color; it occurs massive; fracture, foliated or radiated; it is soft, and adheres slightly to the tongue.

Valentianite is a variety of the preceding; it occurs compact, in large crystals, and in rounded pieces; it has a splintery or conchoidal fracture. It was brought by Lord Valentia from the Red Sea.

Magnesite—*Carbonate of Magnesia.* Its color approaches cream-yellow, often spotted; it occurs vesicular.

Meerschaum has a greyish white color; it occurs massive; it is soft, very light, and adheres strongly to the tongue.

Bole is of various colors, generally red; it occurs massive: when put in water, it falls to pieces with a hissing noise.

Lemnian Earth has a yellow-grey or white color; it has a fine earthy fracture. The specimens hitherto received are from the Isle of Lemnos, and are impressed with a seal.

Fullers' Earth has a greenish-grey color; it occurs massive, and has a dull earthy appearance; it falls into powder in water; it is friable.

Steatite—*Soap-stone,* has a mottled soap-like appearance; it occurs massive, and in pseudomorphous crystals; it is generally soft, sometimes indurated, and has a greasy feel.

FIGURE STONE—*Agalmatolite*, has generally a grey color, sometimes mottled; it comes from China, carved in grotesque figures: it feels greasy, and differs from steatite in not containing magnesia; it is also much harder.

NATIVE MAGNESIA. Massive.
Valentianite. Crystallized.
Variety.

MAGNESITE. Massive.
Tuberose.
Vesicular.

MEERSCHAUM. Massive.
Tuberose.

BOLE. Massive.
Disseminated.

LEMNIAN EARTH. Massive.
With impressions.

FULLERS' EARTH. Massive.
Stratified.

STEATITE. Massive.
Crystallized in four or six-sided prisms.
In rhomboidal dodecahedrons.
Variety, indurated.

FIGURE STONE. Massive.
Variety, colored.

TALC FAMILY.

THIS family presents great diversity in color, texture, and general appearance; they all contain a large portion of magnesia.

NEPHRITE has a dull light-green color; it occurs in rounded masses, of a fine compact texture; it is translucent on the edges, is moderately hard, and receives a high polish.

Jade—Axe Stone, has a dark green color; it occurs massive, and is more translucent than the preceding. The specimens received in this country, come from the South Seas in the form of hatchets, idols, and various ornaments.

SERPENTINE has a dull color, generally green, brown, white, or red, often intermixed in the same specimen; it occurs massive; it frequently contains veins of asbestos, and some varieties have so large a portion of iron as to be magnetic.

Precious Serpentine. Its color is dark green, frequently spotted; it occurs massive; it is translucent, and easily yields to the knife.

POT-STONE is generally of a greenish-grey color, often spotted; it occurs massive; it is translucent on the edges, and is very soft; it is worked into culinary utensils, in which shape it always comes to this country.

TALC—*Venetian Talc*, has a greenish-white color, with a shining pearly lustre; it occurs massive, and in delicate foliated crystals, also radiated; it is peculiarly soft and agreeable to the touch; it is distinguished from mica by its inflexibility.

Compact Talc is of a dull white color; it occurs massive; it forms the base of rouge, and communicates a softness to the skin without any pernicious effect.

Columnar Talc has generally a greenish-grey color; it is composed of thin prismatic folia aggregated, forming six-sided prisms.

Nacrite—Earthy Talc, has generally a greenish color, with pearly lustre, it is composed of delicate scales, and is friable.

Asbestos. Its color is greenish-white or grey; it occurs massive, in delicate veins, and frequently disseminated in calcareous spar, quartz, &c.

Amianthus is a fine variety of the preceding, and has a silky lustre; it is composed of delicate flax-like fibres.

Amianthoide has an olive-green color; it occurs in filaments, accompanied by carbonate of lime, feldspar, quartz, &c. It is flexible and elastic.

Byssolite appears to be a variety of the preceding, and occurs in short and stiff filaments.

Rock Cork has a greyish or cream-like color; it occurs in laminar masses, with a porous structure; some varieties very much resemble leather.

Rock Wood has generally a wood-brown color; it occurs massive and compact, and has a ligneous appearance.

Nephrite. Massive.
In rolled pieces.
Jade. Massive.

Serpentine. Massive, spotted.
Variety, containing veins of asbestos.
Variety.
Precious Serpentine. Massive.

Pot-Stone. Massive.

Venetian Talc. Massive.
Disseminated and radiated.
Crystallized in six-sided tables.

Compact Talc. Massive.
Variety.

Columnar Talc. In common talc, folia aggregated.
Variety, disseminated.
Variety.

Nacrite. Compact.
Friable.

Asbestos. Massive.
Disseminated.
Variety.
Amianthus. In delicate flax-like fibres.
Variety, disseminated.
Variety, detached.

Amianthoide. In filaments.
Disseminated.
Byssolite. In short perpendicular filaments.
Disseminated.

Rock Cork. Massive.
Lamellar.

Rock Wood. Massive.
Ligneous.
Variety.

HORNBLENDE FAMILY

CONTAINS many minerals which resemble some of the schorl family; a little practice will, however, easily distinguish them; some varieties are characterised by a strong pseudo-metallic lustre. They are soft to the knife, and when abraded have a dull greenish hue.

HORNBLENDE. Its color is green or greenish-black; it occurs massive and crystallized.

Hornblende Slate is of a blackish-green color; it occurs massive, has a glistening lustre, and slaty fracture.

Basaltic Hornblende has a velvet-black appearance; it occurs crystallized, embedded in basalt.

ACTYNOLITE is of various colors, generally white or green; it occurs asbestos-like, massive, and crystallized.

Asbestos Actynolite has a snow-white color; it occurs massive, or aggregated in delicate spicula; it is always rough and coarse to the touch.

Common Actynolite has a green color of various shades; it occurs massive, disseminated, and crystallized.

Pargasite. Color, bottle-green; it occurs in concretions differing in size, also imperfectly crystallized in calcareous spar.

Glassy Actynolite is green of various shades, with considerable lustre; it occurs in crystals embedded, often separated by rents.

TREMOLITE is generally of a light color, never green, which distinguishes it from the two preceding species; it occurs massive and crystallized, with a pearly lustre.

Asbestos Tremolite is of a white color, variously tinged; it occurs massive, with a fibrous and stellular structure; it phosphoresces on hot coals.

Common Tremolite has a greyish-white color; it occurs massive and in crystals, embedded, longitudinally streaked.

Glassy Tremolite. Color, greyish or yellowish white; it occurs massive and crystallized, and has a shining lustre; it also frequently occurs granular.

Baikalite is of the same color as the preceding, of which it is a variety. It is found at the lake Baikal, whence its name.

Sappare—*Kyanite.* Its colors are yellow, white, and sky-blue of various shades; it occurs massive, disseminated, and crystallized, often embedded in mica-slate, and associated with granatite.

Rhætizite is of a white, green, or yellow color; it occurs in aggregated crystalline masses.

Schiller Spar has a black-green color; it occurs in patches, with a splendent lustre, embedded in serpentine.

Diallage has a green color of various shades; it occurs massive, disseminated, and granular; it is translucent on the edges, and is very hard.

Bronzite has a bronze-brown color, with shades of yellow; it occurs massive and disseminated, and has a strong metallic lustre.

Anthophyllite is of an intermixed brown and grey color, with semi-metallic lustre; it occurs massive and in aggregated crystals, sometimes fibrous.

Hyperstene. Its color is brownish, with a copper lustre; it occurs massive; it breaks into rhombic fragments.

HORNBLENDE. Massive.
Crystallized in four-sided prisms.
Variety, truncated.
Embedded.

Hornblende Slate. Massive.

Basaltic Hornblende. Crystallized in six-sided prisms.
Variety, modified.

ACTYNOLITE.

Asbestos Actynolite. Massive.
In delicate spicula, fibrous.

Common Actynolite. Massive.
Disseminated.
Fibrous or granular.

Pargasite.

Glassy Actynolite. Massive.
Disseminated.
Crystallized in rhomboidal four-sided prisms.

TREMOLITE.

Asbestos Tremolite. Massive.
Variety, fibrous or radiated.

Compact Tremolite. Massive.
Crystallized in oblique four-sided prisms.
Variety, modified.

Glassy Tremolite. Massive.
In acicular crystals.

Baikalite.

Sappare. Massive.
Crystallized in oblique four-sided prisms.
Variety, modified, twin crystals.
Variety, embedded in mica slate.

Rhætizite. Massive.
Foliated, diverging.

Schiller Spar. Massive.
Disseminated in patches.

Diallage. Massive.
Disseminated.
Granular. *(Smaragdite).*

Bronzite. Massive.
Disseminated.

Anthophyllite. Massive.
Disseminated, fibrous.
In reed-like crystals.

Hyperstene. Massive.
In granular or lamellar concretions.
In curved laminæ.

CHRYSOLITE FAMILY

IS composed of substances whose general color is green or black; the crystallizations are commonly derived from the four-sided prism; they have a foliated structure, and generally a vitreous lustre.

SAHLITE is green of various shades; it occurs massive and crystallized, sometimes disseminated in Tiree marble.

AUGITE has a blackish green or black color; it occurs massive, in rounded grains, and crystallized; it has an uneven or conchoidal fracture, and has different degrees of lustre.

Coccolite has a green color of various shades; it occurs granular, aggregated, and crystallized; it has a glistening lustre, and is translucent on the edges.

DIOPSIDE is green of various shades; it occurs finely crystallized, generally accompanied by the following sub-species.

Mussite has a light green color; it occurs in aggregated crystals, and has a silky asbestos-like appearance, with radiated fracture.

CHRYSOLITE has an oil-green color; it occurs generally embedded, filling cavities, rarely crystallized.

OLIVINE. Its color is olive-green, sometimes brown or black; it occurs massive, in granular concretions, also crystallized and embedded.

YENITE—*Leivrite.* Its color approaches black; it occurs massive, fascicular, and crystallized; it is very heavy: it has hitherto been found only in Elba.

SAHLITE. Massive.
Disseminated in Tiree marble.
Crystallized in rectangular four-sided prisms.

AUGITE. Massive.
In roundish grains.
Crystallized in four or eight-sided prisms.
Variety, modified.

COCCOLITE. Massive.
Disseminated, granular.
Crystallized in four or six-sided prisms.

DIOPSIDE. Massive.
Disseminated.
Crystallized in oblique four or eight-sided prisms.
Variety, modified.

Mussite. Massive.
In aggregated acicular fibres.

CHRYSOLITE. In angular pieces.
Crystallized in four-sided prisms.
Variety, modified.

OLIVINE. Massive, granular.
In rectangular four-sided prisms.
Variety, embedded.

YENITE. Massive.
Radiated, fascicular.
Crystallized in four-sided prisms.
Variety, modified.

BASALT FAMILY.

BASALT has a dull blackish color; it occurs massive, in large columnar prisms.

WACKE is of a grey or brown color; it occurs massive and vesicular.

AMYGDALOID is a variety of wacke, having the cells filled with zeolite, green earth, calcareous spar, &c.

CLINK-STONE is green of various shades; it occurs massive and compact; it has a slaty structure, and rings when struck with a hammer, whence its name.

BASALT. Massive.
Variety, compact.
Variety, granular.
Variety, articulated.

WACKE. Massive.
Vesicular.

AMYGDALOID. Massive.
Containing green earth, zeolite, or calcareous spar.

CLINK STONE. Massive.

DOLOMITE FAMILY.

THE substances which compose this family contain large portions of carbonate of lime and magnesia; they effervesce feebly in acids.

DOLOMITE has a snow-white color; it occurs granular and massive, often with realgar and pyrites disseminated.

Bitter Spar—Rhomb Spar, has a yellowish color; it occurs in rhombic crystals, embedded in chlorite-slate.

Magnesian Limestone has a light yellow or brown color; it occurs massive and botryoidal, and has a glistening fracture.

Flexible Limestone occurs massive; it is a variety of the preceding, and in thin slices is very flexible.

MIEMITE is of a green color; it occurs massive and crystallized, sometimes embedded in alabaster.

PEARL SPAR—*Brown Spar*, is of various colors, generally grey, white, pink, or brown, with a pearly lustre; it occurs massive, crystallized, stalactitic, and mammillated; it has a foliated or fibrous structure.

GURHOFITE has a snow-white or pink color; it occurs massive; it is dull, hard, and brittle.

DOLOMITE. Massive.
Crystallized in rhombs.
Variety, with pyrites disseminated.
Variety, with realgar.

Bitter Spar. Massive.
Crystallized in rhombs, embedded.

Magnesian Limestone. Massive.
Variety, with vegetable impressions.
Botryoidal.
Flexible Limestone. Massive.

MIEMITE. Massive.
Crystallized in flat double three-sided pyramids.

PEARL SPAR. Massive.
Variety, rose-colored.
Fibrous or foliated.
Stalactitic or mammillated.
Crystallized in rhombs.
Variety, modified.
Variety.

GURHOFITE. Massive, snow-white.
Pink.
Blackish, in patches.
Variety.

LIMESTONE FAMILY.

THE various members of this family are universally diffused. Independently of their use in the arts, they contribute largely to the fertility of the soil; and their chemical agencies are essentially beneficial to animal and vegetable life.

TABULAR SPAR has a greyish-white color; it occurs massive and crystallized, often disseminated in Cinnamonstone; it is rather hard and brittle; in nitric acid it effervesces for a moment, and then granulates.

SLATE SPAR—*Schiefer Spar.* Its color is white of various shades; it occurs massive and disseminated, also in distinct concretions, and lamellar; it has a pearly lustre, and slaty fracture.

APHRITE. Its color is white; it occurs massive and disseminated, of a slaty or sparry structure; it has an earthy texture, and effervesces violently in acid.

AGARIC MINERAL—*Rock-Milk*, is of a yellowish or white color; it occurs in crusts and tuberose pieces; it is a pure carbonate of lime, and dissolves in acid.

CHALK. Its color is snow-white; it occurs massive and disseminated.

COMMON LIMESTONE. Its color is grey; it occurs massive and compact; it burns to lime, and effervesces in acid.

Oolite—Roestone, is of a yellowish brown color; it occurs massive, composed of minute globular concretions, resembling the roe of a fish.

Granular Limestone—Marble, is of a white color, and occurs massive; it is much used in the arts, for statuary, &c.

Tiree Marble is of a flesh-red color; it often contains sahlite and titanium embedded in it.

Mona Marble has a white and green color, and much resembles verde antique.

Shell Limestone is of various colors, generally dark; it is composed of fossil shells.

Lumachella—Fire Marble, is a variety of the preceding; it is composed of shells, which have a brilliant opalescent lustre.

Coralloid Limestone is generally of a dark color; it is found massive, and composed of corals, zoophites, &c. some varieties much resemble madrepore.

Calcareous Spar. The crystallizations of this substance far exceed those of any other in number, beauty, and complexity. Count Bournon has described nearly 650 varieties: they are arranged in three divisions, arising 1st. from the acute six sided pyramid (primitive rhomb); 2d. the six-sided prism; and 3d. the three-sided pyramid; and so beautiful is the connexion, that the termination of the third series gradually approaches the first, forming, as it were, a complete circle. The color is generally yellowish white; the transparent variety exhibits double refraction.

Fibrous Limestone—Satin Spar, is snow-white; it occurs massive and compact, composed of short aggregated fibres; it is often associated with pyrites.

Stalactite has a white, yellow, green, or brown color; it occurs massive, botryoidal, reniform, &c. it is formed by precipitation, and hangs like icicles from the roofs of caverns.

Calcareous Tuffa. It is grey of various shades; it occurs massive, cellular, and ramose, and is generally found precipitated upon substances immersed in water strongly impregnated with carbonate of lime.

Pea Stone is generally brownish-white; it is composed of rounded pea-like concretions.

Lucullite—*Black Marble.* Its color is intense black; it is capable of receiving a very high polish, and is in much estimation for vases, chimney-pieces, &c.

Swine Stone is of a bluish-grey color, and clouded; it occurs in granular masses, and, when rubbed, emits a very disagreeable odor.

Marl is of various colors, generally greyish-white; it occurs massive, and frequently contains impressions of fish and dendritic appearances.

Arragonite. Its colors are white, yellow, or grey; it occurs massive, crystallized, arborescent, and stalactitic, with a fibrous or radiated structure, and pearly lustre; it is sometimes embedded in granular gypsum.

Tabular Spar. Massive.
Crystallized in rectangular four-sided tables.

Slate Spar. Massive.
Disseminated.
Crystallized.

Aphrite. Massive.
Disseminated.
Tuberose, friable.

Agaric Mineral. Pulverulent.

CHALK. Massive.
Variety, with organic remains.

COMMON LIMESTONE. Massive.
Oolite. Massive, in granular concretions.

Granular Limestone. Massive.
Tiree Marble. Massive.
Containing sahlite or titanium.
Mona Marble. Massive.
Shell Limestone. Massive.
Variety.
Lumachella. Massive, iridescent.
Coralloid Limestone. Massive.
Variety.

Calcareous Spar.

SIX-SIDED PRISM.

1 Terminated by planes perpendicular to the axis.
2 No. 1. The alternate terminal edges truncated.
3 No. 2. Truncations meeting and forming three-sided acuminations.
4 No. 3. Prism short, forming pentagonal dodecahedron.
5 No. 1. All the terminal edges truncated.
6 No. 5. Truncations meeting and forming six-sided acuminations.
7 No. 1. With terminating planes set on the lateral edges.
8 No. 7. Terminal planes meeting and forming pyramid.

9 Prism short and flattened, acumination on alternate lateral edges, forming rhombic dodecahedron. (*Rare.*)
10 No. 1. The alternate lateral planes broader.
11 No. 10. The alternate lateral planes meeting and forming three-sided prism.
12 No. 1. Prism shortened, forming six-sided table.
13 No. 3. Prism wanting, the acuminations meet and form a very obtuse rhomb.
14 No. 1. Alternate lateral planes inclined towards the axis, forming a prism six-sided at one end, and three-sided at the other.

Rhomb.

15 Primitive rhomb (angles 105. 5, and 74. 55.
16 Rhomb, with modifications on the edges, very nearly approaching the cube (angles 92. 18, and 87. 42).
17 Rhomb having on each face a flat four-sided pyramid set on the edges of the rhomb.
18 Rhomb having on each face a flat four-sided pyramid set on the angles of the rhomb.

Six-sided Pyramid.

19 Perfect.
20 With alternate faces broader.
21 Double, the alternate edges longer, junction of the bases forming a zigzag line.

The above are the principal *simple modifications*, which are liable to almost innumerable varieties arising from supernumerary planes, and in the rhombic and pyramidal sections from the various angles under which the planes meet. From so extensive a field it is difficult to select,

but the following few may be pointed out as interesting, and likely to fall under the notice of the young collector.

22 No. 3. With two additional planes set obliquely on the ends of the alternate lateral planes.
23 No. 3. With additional planes on the solid angles.
24 No. 3. With the lateral and terminal edges of the prism truncated.
25 No. 8. The summit of the pyramid again acuminated by six planes.
26 No. 25. The alternate edges of the original pyramid truncated.
27 No. 10. The broader planes truncated on the terminal edges.
28 No. 12. The tables truncated on the lateral edges.
29 No. 12. The tables truncated on the terminal edges.
30 Rhomb varying from very obtuse to very acute.
31 No. 21. The summits of the pyramids acuminated by three or six planes.
32 No. 21. With truncations on the angles, formed by the junction of the bases, (when these truncating planes meet, No. 8 is formed).

When the rhombic forms have their edges rounded, the crystal becomes lenticular, and should the student wish to obtain the primitive rhomb for examination or comparison, it will arise from the mechanical fracture of any of the crystallized varieties, the fragments always having angles whose measurement coincides with that of the primitive.

Fibrous Limestone. Massive.
Variety, with veins of pyrites.

Stalactite. Massive, zoned, agate-like.
Botryoidal.
Reniform or mammillated.
Variety, tubiform.
Stalactitic.
Variety, green.

Calcareous Tuffa. Massive.
Coating, cellular.
Variety.
Variety.

Pea Stone. Massive.
In pea-like concretions.
Variety.

LUCULLITE—*Black Marble.* Massive.
Variety.

Swine Stone. Massive, granular.
Variety.

MARL. Massive.
Bituminous, containing petrifactions.
Variety, with impressions.
Variety.

ARRAGONITE. Massive.
Fibrous or radiated.
Variety, arborescent or stalactitic.
Crystallized in six-sided prisms.
Variety, modified.
In very acute double six-sided pyramids.
Variety.

APATITE FAMILY.

OF this family there are only two species; they are composed of lime and phosphoric acid; and commonly phosphoresce when placed on hot coals.

APATITE is of a grey, green, or blueish color; it occurs crystallized, sometimes massive, and disseminated, generally embedded.

Moroxite—Asparagus Stone, has a green or blue color; it occurs disseminated and crystallized; it is translucent, some of its varieties do not phosphoresce.

PHOSPHORITE is white, or yellow, and reddish white; it occurs massive, earthy, stalactitic, and crystallized; it has sometimes a radiated or fibrous fracture.

APATITE. Massive.
Disseminated.
In crystals aggregated.
Variety.
Crystallized in six-sided prisms.
Variety, truncated.
Variously colored.

Asparagus Stone. Massive.
Disseminated.
Crystallized in six-sided prisms.
Variety, with pyramids.
Variety.

PHOSPHORITE. Massive.
Stalactitic.
Reniform.
Earthy.

FLUOR FAMILY.

THE substances of this family are composed of fluoric acid and lime; when powdered and digested with sulphuric acid, the fluoric acid escapes in the form of gas. By means of this acid the beautiful operation of etching upon glass is performed. It decrepitates on the application of heat, and becomes phosphorescent when thrown on hot coals.

COMPACT FLUOR has a blueish-grey, or greenish-white color; it is found massive, and gives a white streak with the knife; it is of rare occurrence.

CHLOROPHANE. This beautiful and rare species is of a brown or pale violet color; it occurs massive; fracture, foliated. It is beautifully phosphorescent.

FOLIATED FLUOR. Its colors are various, as white, blue, yellow, green, and pink, frequently two or more of them appear in the same specimen, often zoned; it occurs massive and crystallized in a variety of beautiful forms, the primitive of which is the octahedron; it admits of perfect cleavage. By exposure to heat, the color of the blue variety becomes a beautiful purple, and vanishes if the heat is continued. A variety of this species is manufactured into beautiful vases, &c.

EARTHY FLUOR. Its color is light purple or deep blue; it occurs massive, and coating the other varieties; it is very friable, and sometimes striated.

Argillaceous Fluor is of a brown color; it occurs in small detached cubes, and is generally found in decomposed amygdaloid.

COMPACT FLUOR. Massive.

CHLOROPHANE. Massive,
Foliated.

FOLIATED FLUOR. Massive.

1 Cube perfect.
2 Cube truncated on the edges.
3 No. 2. Truncations effacing the original planes of the cube, and forming a rhombic dodecahedron.
4 Rhombic dodecahedron, having each face bent in the direction of its shorter diagonal, crystal assuming a more globular form, and having twenty-four triangular faces.
5 The edges of the last form indistinct; the crystal becomes spheroidal.
6 Cube truncated on the solid angles.
7 No. 6. Truncations effacing the original planes of the cube, and forming an octahedron. (This is the primitive form).
8 Octahedron truncated on the edges.
9 Cube having each solid angle replaced by three planes. Variety, angles replaced by six planes.
10 Cube bevelled on the edges,
11 No. 10, the bevelments effacing the original planes of the cube, and forming a cube having a four-sided pyramid on each face.

*** It will easily be perceived that a strong connection exists between Nos. 4 and 11, each consisting of twenty-four triangular faces, which, taken in pairs, produce rhombs; but from the different angles under which the faces meet, their forms are dissimilar; and the general aspect of the crystals would appear to a casual observer as not possessing the slightest resemblance.

Idem. In cubes with indented faces.
Variety, with pyrites in the interior.
In cubes disseminated.
Variety, margined with barytes.
Variety.
In minute cubes aggregated.
Topazine. Yellow.
Sappharine. Blue.
False Emerald. Green.
Variety, with very low four-sided pyramid.
Variety, with planes on the edges.
Variety.
Variety, containing water.
False Ruby. Pink.
Variety.

Earthy Fluor. Massive.
Variety, granular.
Variety, disseminated.
Variety, striated.

Argillaceous Fluor. In detached cubes.

GYPSUM FAMILY.

GYPSUM, when calcined, forms Plaster of Paris; the translucent varieties become opaque in the flame of a candle.

Earthy Gypsum has a dull yellowish brown appearance, sometimes with red and white veins; it is massive, and has a granular structure; it is loosely coherent.

Compact Gypsum is of a snow-white color; it occurs massive, and is used in sculpture.

Fibrous Gypsum has a snow-white color; it occurs massive and in silky fibres; it is often translucent.

Foliated Gypsum. Its color is generally white, grey, or reddish; it occurs massive and crystallized.

Plumose Gypsum is of a snow-white color; it occurs in capillary curls, or mammillated.

Selenite is generally transparent; its colors are dull white; it occurs massive, disseminated, and crystallized.

ANHYDRITE is of a blueish white color, sometimes deep red; it occurs massive, and has a fibrous or radiated structure.

Cube Spar—Sparry Anhydrite, is pearl white of different shades; it occurs massive and crystallized; it is frequently embedded in a scaly or granular variety.

VULPINITE is of a blueish-white color; it occurs massive, and has a granular and foliated fracture; it is harder than the preceding, and is composed of sulphate of lime and silica.

GLAUBERITE has a greyish-white color; it occurs in minute crystals embedded in rock-salt; it is soluble in water.

EARTHY GYPSUM. Massive.
Variety, granular.

Compact Gypsum. Massive.
Variety.

Fibrous Gypsum. In fibrous masses.
Variety.

Foliated Gypsum. Massive.
Crystallized in six-sided prisms.

Plumose Gypsum. In delicate spicula, or curls.
Variety, mammillated.
Variety.

Selenite. Massive.
Crystallized in six-sided prisms.
In twin crystals.
Variety, acicular.
Variety.

ANHYDRITE. Massive.
Fibrous or radiated.

Cube Spar. Massive.
Crystallized in rectangular four-sided prisms.
In six-sided prisms.
In eight-sided prisms.

VULPINITE. Massive.
Disseminated.

GLAUBERITE. Disseminated.
Crystallized in four-sided prisms.

BORACITE FAMILY.

THERE are but two species in this family, and which are of rare occurrence; they contain silica from 80 to 90, with boracic acid, lime, and water.

DATHOLITE. Its color is pale greenish white; it occurs massive, disseminated, and crystallized; also botryoidal and in delicate concretions, when it is called *Botryolite.*

BORACITE has an opaque grey color, and is always crystallized, the crystals occur embedded in gypsum.

DATHOLITE. Massive.
Disseminated.
Crystallized in oblique four-sided prisms.

Botryolite. Massive.
Botryoidal.
Radiated or fibrous.

BORACITE. Crystallized in cubes.
Variety, truncated on the edges.
Variety, truncated on the angles.
Variety, truncated on the edges and angles.
Variety.

BARYTE FAMILY.

THERE are but two species in this family—Carbonate and Sulphate of Barytes; they are distinguished from other earthy substances by their great weight, whence their name.

CARBONATE OF BARYTES. Color, yellowish white or grey; it occurs massive, disseminated, and crystallized; its longitudinal fracture is striated or radiated, and has a glistening lustre. It is soluble in diluted muriatic acid, and melts before the blow-pipe.

SULPHATE OF BARYTES—*Heavy Spar.* Its colors are yellow, white, brown, grey, and blue, of various shades; it occurs massive, disseminated, and crystallized; also reniform, hepatic, dendritic, and columnar; its structure is compact, foliated, or earthy; it is transparent, translucent, or opaque; it often contains delicate veins and patches of galena.

CARBONATE OF BARYTES. Massive.
Crystallized in six-sided prisms.
In double six-sided pyramids.
Variety.

SULPHATE OF BARYTES. Massive, compact.
Variety, with galena.
Variety, earthy or granular.
Variety, lamellar.
Variety, arborescent.

Idem. Radiated.
Variety, reniform.
Variety, hepatic.
Crystallized in rectangular four-sided tables.
Variety, with bevelled edges.
Variety, edges and angles truncated.
In oblique four-sided tables.
In four or six-sided prisms.
Variety, bevelled.
Variety, transparent.
Variety, acicular.
Variety, columnar.

STRONTIAN FAMILY.

CARBONATE OF STRONTIAN—*Strontianite.* Its color is green of various shades, or brown; it occurs massive, disseminated, and crystallized, and has a radiated or fibrous fracture. It is generally associated with sulphate of barytes. Its powder gives a beautiful red color to the flame of spirits of wine; it phosphoresces at a high temperature before the blow-pipe. It is extremely rare, and has hitherto been only met with at Strontian.

SULPHATE OF STRONTIAN—*Celestine,* is of a white, sky-blue, or bluish grey color, sometimes reddish; it also occurs massive and crystallized, with a foliated and fibrous structure.

STRONTIANITE. Massive, green.
Variety, disseminated with sulphate of barytes.
Crystallized in acicular six-sided prisms.
Variety.
Variety, brown.

SULPHATE OF STRONTIAN. Massive and compact.
In irregular four, six, or eight-sided tables.
Radiated.
Fibrous.
Variety.
Granular.

CRYOLITE.

THE color of this rare substance is generally snow-white, but it is sometimes brown from the presence of iron; it occurs massive and disseminated; its fracture is foliated, with a glistening lustre; it is translucent. It contains a large quantity of soda, which causes its easy fusibility. It derives its name from melting like ice. It has hitherto been found only in Greenland.

CRYOLITE. Massive.
Disseminated.
Ferruginous.

Inflammables.

Native Sulphur has a bright yellow color; it occurs massive, disseminated, and crystallized; the finest varieties are from Conil, in Spain.

Volcanic Sulphur. Color, yellow of various shades; it occurs stalactitic, spongeous, and granular; also in aggregated crystals.

BITUMINOUS FAMILY.

Naptha. It is composed of carbon, hydrogen, and oxygen; it takes fire at the approach of flame.

Petrolium is reddish or blackish brown; it is thick, floats on the water, and may be seen oozing from various strata. It is sometimes precipitated on limestone.

Elastic Bitumen. Color, blackish, greenish, and yellowish brown; it occurs massive, filling holes in limestone; it is peculiar to Castleton, Derbyshire.

Indurated Bitumen. Color, brown; it occurs massive; fracture, perfectly conchoidal, with a shining lustre; it is brittle. It is found in Derbyshire.

COAL FAMILY.

Bituminous Wood—*Bovey Coal—Brown Coal,* has a dark brown color, and a ligneous appearance; it burns with a disagreeable smell.

Earthy Brown Coal. Its colors are yellowish or blackish brown; it occurs with the above.

Alum Earth—Bituminous Shale, is blackish brown; it occurs massive, and is scarcely inflammable.

Cannel Coal occurs massive and compact, of a black color; fracture, conchoidal. It is sometimes formed into vases, &c.

Black Coal—*Jet,* occurs massive, sometimes with impressions.

Newcastle Coal—Slate Coal. It occurs massive and foliated, often with pyrites disseminated.

Shining Coal is of a black color, often beautifully iridescent, and is sometimes called *Peacock Coal;* it occurs massive; it is fragile, and has a foliated fracture.

Slaty Coal. Color, black, and sometimes shining grey; it often contains layers of charcoal, in regular strata. It is found in Derbyshire and other coal counties.

Foliated Coal occurs massive, and is very soft and light; it contains fine folia of pyrites, which are sometimes silver white.

Glance Coal has a peculiar iron-black and tempered steel-like appearance; it occurs massive and vesicular; it has a conchoidal fracture. It is also found slaty and columnar.

GRAPHITE—PLUMBAGO.

Scaly Plumbago. Its color is dark steel-grey, with metallic lustre; it occurs massive and disseminated, rarely crystallized; it is very soft.

Compact Plumbago differs from the preceding only in structure. It is used for pencils, crayons, &c. It is known better by the name of Black Lead.

Mineral Charcoal. Color, black; it occurs in thin layers, disseminated in peculiar varieties of coal.

RESIN FAMILY.

Amber. Color, yellow, or yellowish white, and reddish; it occurs in rounded pieces, with a rough exterior, sometimes decomposed. It is found on the Norfolk coast. The variety from Mozambique often envelopes insects.

Honey Stone has a yellow color; it occurs embedded in grains, or crystallized in flat octahedrons in brown or wood coal, and is very rare.

Retin Asphalt. Colors, yellowish and reddish-brown; it occurs massive; it burns with a fragrant odor. It contains resin 55, asphalt 42.

Fossil Copal. Its color is yellow or brown; it occurs in rounded pieces, and appears to be a variety of retin asphalt, but approaches more nearly to gum; it has sometimes a resinous lustre.

Earthy Salts.

SALTS, with an earthy base, dissolve in water, and frequently diliquesce by the humidity of the atmosphere.

Native Alum has a white color, and occurs stalactitic, effloresecent, and in capillary crystals. It contains alumina 18, oxide of iron from 5 to 10, with sulphuric acid and water.

Epsom Salt is white of various shades; it occurs massive and tuberose; it contains sulphuric acid 33, magnesia 19, and water.

Alkaline Salts.

SALTS OF SODA.

THESE salts are composed of soda, variously combined.

Carbonate of Soda—*Natron.* Its color is yellowish white; it occurs in effloresecences, and acicular, or radiated.

Sulphate of Soda—*Glauber Salt,* is white of various shades; it occurs stalactitic, reniform, botryoidal, and crystallized.

MURIATE OF SODA—*Rock Salt.* Its colors are white and grey; it occurs massive, disseminated, reniform, and stalactitic; structure, foliated or fibrous.

BORAX. Its colors are yellowish or greenish white; it occurs crystallized, and has the property of double refraction. It contains boracic acid 40, soda 10, and water.

SASSOLIN. Its colors are greyish or yellowish white; it occurs in grains, crusts, or small corroded pieces in extinct volcanoes; it is very light.

SALT OF POTASH.

NITRE is white of various shades; it occurs in flakes or capillary crystals. It contains nitrate of potash 45, and lime.

SALTS OF AMMONIA.

THESE salts contain muriate of ammonia 98.

VOLCANIC SAL AMMONIAC. Its color is white, grey, green, or yellow; it occurs stalactitic, efflorescent, and sometimes crystallized; it may be known by its pungent taste. It is found in volcanic countries.

SULPHATE OF AMMONIA. Color, yellowish grey, or yellow; it occurs in mealy crusts or stalactitic.

Geology.

ROCKS are either simple or compound; the simple are those which consist entirely, or at least essentially, of one mineralogical species, and are therefore arranged amongst the simple minerals. Such are limestone, gypsum, serpentine, rock salt, and coal.

The compound rocks are formed of two or more mineralogical species, variously aggregated, in different proportions, and differing in magnitude.

According to Werner, there are three distinct classes of rocks, formed at different and very distant periods: viz. primitive, transition, and secondary, or floetz.

PRIMITIVE ROCKS,

AS the term implies, are such as were formed first; they do not contain fossil remains, and are supposed to have had their origin before the creation of animal or vegetable substances, and to be the result of chemical precipitation.

GRANITE is a crystalline aggregate, consisting of quartz, feldspar, and mica, promiscuously arranged.

Gneiss—*Slaty Granite*, consists of quartz, feldspar, hornblende, or mica, stratified, waved, or in patches; the structure is commonly slaty.

Mica Slate consists of quartz and mica, generally laminated. This rock is considered to pass into clay slate.

Clay Slate. This is a simple rock, often lamellar.

Primitive Limestone is that which contains no fossil remains, and is generally crystalline in its structure.

Primitive Trap is principally composed of hornblende, and sometimes feldspar, generally dark colored, forming a crystalline aggregate.

Serpentine is a simple rock; it contains hornblende, and sometimes veins of asbestos and steatite; it is frequently spotted.

Porphyry is a compact indurated substance, not unlike jasper; it contains crystals of feldspar, embedded; color, generally red, green, or brown.

Sienite. This rock consists of feldspar and hornblende; it is of various colors, as reddish, dull green, &c. as the feldspar or hornblende may predominate.

Topaz Rock is an aggregate of feldspar and quartz, containing topazes, and frequently schorl.

Quartz Rock is compact; its varieties frequently contain schorl and other substances.

Flinty Slate is a black compact substance of close texture; it often contains veins of quartz.

Primitive Gypsum is massive, and occurs with the preceding rocks.

White Stone is apparently a variety of fine-grained granite, chiefly composed of granular feldspar.

GRANITE.

Common Granite. Large-grained.
Variety, containing schorl.
Variety.
Variety, small-grained.
Variety.
Variety.

Graphic Granite. Exhibiting the appearance of Hebrew letters.

Porphyritic Granite. Containing large crystals of feldspar embedded in fine grained granite.

Granite, the feldspar of which is decomposing and forming clay.
Variety.

GNEISS. Stratified.
Variety, with garnets.
Variety, containing hornblende.
Variety.

MICA SLATE. Waved.
Variety, slaty.
Variety, with crystals of garnet embedded.
Variety, with schorl embedded.
Variety.

CLAY SLATE.

Common Slate.
Variety, with chiastolite embedded.
Variety, with veins of tin ore.
Variety, with pyrites.
Variety.

PRIMITIVE LIMESTONE.

Tiree Marble. Massive, containing sahlite.

Dolomite. Granular limestone.
Variety.

Carrara Marble. (Parian Marble).
Variety.

PRIMITIVE TRAP. Fine-grained.
Variety.
Variety, with feldspar.
Variety.

SERPENTINE.
Variety, dark colored.
Variety, spotted.
Variety, with asbestos.
Variety.

PORPHYRY.
Red Porphyry.
Brown Porphyry.
Green Porphyry. (Oophites of Pliny).
Pitchstone Porphyry.

SIENITE. With red feldspar and green hornblende.
Variety,
Variety.

TOPAZ ROCK. Massive,
Variety, with topazes embedded.

QUARTZ ROCK. Massive.
Variety,

Schorl Rock. Massive.
Variety, schorl embedded in quartz.

FLINTY SLATE.
Variety.

PRIMITIVE GYPSUM.

WHITE STONE.

Thus ends the series of what are termed primitive rocks, according to Werner's theory; but they must be supposed to form infinite variety in the actual proportions of their constituents, and, (notwithstanding the regular arrangement of authors), to have undergone great alterations from various causes. The formation of what are considered to be primitive and transition rocks is by no means a determined point.

TRANSITION ROCKS.

THE Transition Formation, as it is termed, according to Werner, contains only four distinct species, which are supposed to have been formed, during the transition of the earth from its uninhabitable to its habitable state. Hence they sometimes contain the first traces of organic remains, partaking of both chemical and mechanical deposit; and connecting the primitive with the Floetz Formation.

It is not easy to form any thing like a correct opinion of the alteration substances undergo, on being exposed to the action of water or atmospherical changes, for a series of ages. The rocks of this class may be supposed to be originally placed at the base of the primitive, filling ravines, or skirting mountains.

TRANSITION LIMESTONE is fine grained, and is most common in Devonshire, where it fills ravines between clay-slate; it sometimes contains traces of fossil remains.

TRANSITION TRAP—*Green-Stone.* This substance forms great variety, and is considered to be composed of feldspar and hornblende, in different proportions, and of different colors. It is less crystalline than the primitive order.

GREY WACKE is a mechanical deposit, in which are embedded fragments of primitive rock, in coarse and fine particles; it is sometimes slaty, and probably migrates into an earthy sandstone. It is extremely variable in its

appearance and texture, and is considered to be of great extent.

Transition Flinty Slate is stratified chert or flint.

Transition Limestone.
Variety, green.
Variety, red.
Variety, with organic remains.

Trap—*Greenstone.*
Variety.
Variety, with veins.
Variety, amygdaloidal

Grey Wacke
Variety, composed of clay-slate and fragments of primitive rocks.
Variety.
Variety.

Grey Wacke Slate.
Variety, fine grained.
Variety, with organic remains.

*** The two last Rocks are not well understood; geologists by no means agree in describing their characters and components. The same may be said of old red sandstone, the first in the following series.

FLOETZ OR FLAT FORMATION

CONSISTS of a series of rocks hereafter enumerated, that are supposed to be the result of decomposition, containing animal and vegetable remains, and formed by aqueous deposit. This formation fills up vast tracts betwixt elevated rocks of the primitive or transition class.

Old Red Sandstone is an aggregate extremely variable in appearance, consisting chiefly of silicious particles produced from the debris of the preceding formations, on which it is considered to rest. Its structure varies from very fine to very coarse.

Floetz Limestone is generally of a dull color and compact texture; it contains more or less of fossil remains, such as echinites, madrepores, zoophytes, &c. and often entirely composed of marine remains. It is evidently formed under water. It is a formation of great extent, and is highly metalliferous, and regularly stratified.

Toadstone—Trap alternates with the Derbyshire floetz limestone. It migrates into a variety of amygdaloid, and decomposes into clay.

First Gypsum is not of great extent, though in considerable abundance. In some cases it rises into small hills, and fills cavities; it is always accompanied with clay and marl.

Variegated Sandstone is colored, by the oxide of iron, red or yellow of various shades. It is a deposit, more or less pure; it is marked with lines, and often stratified,

Shell Limestone is evidently of more modern formation than the limestones before mentioned; it is almost wholly composed of shells and marine substances, such as bivalves, ammonites, &c.

Third Sandstone is of modern formation, and may be considered the uppermost, and what is daily forming by accumulation on the banks of rivers, &c.

Second Gypsum occurs filling cavities, and surrounded by clay, sandstone, &c. It is fibrous, and very soft.

Rock Salt. Its situation is peculiar; it is very widely diffused, being under some varieties of sandstone, and above others. It is accompanied by gypsum and clay. In this country the beds of rock salt are about fifty to sixty fathoms deep, and are peculiar to Cheshire.

Chalk Formation is of considerable extent; it contains a great variety of animal, vegetable, and marine remains; also flint in great abundance, and pyrites. It is of different qualities, regularly stratified, and contains beds of sand, marl, and clay.

Bituminous Shale, which forms a large range in Derbyshire, is not even noticed in the Wernerian series. Its place is directly above the floetz limestone.

Coarse Grit lies immediately upon the preceding, and under the coal formation. It is a granular aggregate, containing feldspar, sometimes schorl, and oxide of iron. It is considered to be both a mechanical and chemical deposit. It often resembles old red sandstone.

Coal Formation occurs alternating with shale and sandstone, accompanied by beds of clay iron-stone.

Newest Trap is probably an earthy homogeneous substance; it is not met with in our coal formation, except in a disintegrated state, or decomposed into clay. There are substances, called Whinstones, intersecting

the coal formation, which occur in large veins or dykes. They vary in color and texture.

Varieties of basalt, trap-tuff, green-stones, amygdaloid, pitch-stones, and jaspers, are said to belong to this formation.

OLD RED SANDSTONE. Fine-grained.
Variety, coarse.

FLOETZ LIMESTONE. Massive.
Variety, with fossil remains.
Coralloid.
Botryoidal.
Variety, black.

TOADSTONE—TRAP. Compact.
Variety.
Variety.
Variety, containing pyrites.
Variety.
Variety, in decomposition.

Amygdaloid.
Variety.
Variety.
Variety in decomposition.

Wacke. Cellular.
Variety.

FIRST GYPSUM.
Variety.

VARIEGATED SANDSTONE. Stratified, red.
Variety, yellow.
Variety, green.

SHELL LIMESTONE.
Variety.
Variety.

THIRD SANDSTONE.
Variety.

SECOND GYPSUM.
Variety.

ROCK SALT. Massive.
Variety.

CHALK FORMATION. With marine remains.
With pyrites.

BITUMINOUS SHALE.
Variety.
Variety, with impressions.

COARSE GRIT. With feldspar.
Variety.

COAL FORMATION. Coal, with pyrites.
Variety, with sandstone.
Variety.

NEWEST TRAP.

Whinstone, Jew Stone, and *Dyke Stones.*
Variety.
Variety.

Basalt.
Variety.

Trap Tuff. Fragments of trap, coarsely cemented.

TUFFA is a calcareous substance, coating vegetables, &c. which is deposited by water issuing from limestone rocks, and containing lime in solution. These waters have received the name of Petrifying Wells; and if twigs, straw, nests, &c. be laid in them for a year, they will become coated with this deposit *.

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* For more particulars upon this subject, see the Author's Familiar Lessons on Mineralogy.

The Author meets with such difficulty, in finding words to distinguish many of the varieties, that he feels obliged to make use of the term Variety, as a reference to undecided specimens that may accompany collections.

ALLUVIAL DEPOSITS.

CASCALHAO isan alluvial deposit, consisting chiefly of rounded and angular pebbles, with sand; this formation is immediately incumbent on the rock (in the gold district of Brazil); and amongst these loose stones are found diamonds, gold, topaz, amethyst, &c. This stratum is often covered many feet by vegetable earth, forming the richest soil*.

GRAVEL generally consists of pebbles of quartz, chalcedony, jaspers in great variety, &c. which have been rounded by attrition. Pieces of limestone, fossil wood, iron-stone, animal remains apparently passing into a fossil state, and various other substances, are often found in gravel. In some places this deposit is above forty feet thick. Gravel and sand sometimes become cemented, and form aggregates, called pudding-stone.

SAND and MARL are too well known to require any description.

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* For a more particular description, see the Author's Travels through the Diamond District in Brazil.

VOLCANIC ROCKS.

ROCKS, in which volcanoes are situated, are called volcanic, and are so, if altered by fire; they form a very extensive class, and present considerable varieties, which generally contain olivine, augite, &c. They are commonly black, and more or less cellular; and often, (more particularly the lavas, cinders, and ashes), form whole islands, or extend over considerable territories.

Rocks, altered by fire, have a peculiar vitreous appearance, and may generally be easily distinguished; it frequently occurs that great varieties of crystallized substances are embedded in them.

VOLCANIC ROCK.

Variety.
Lava, compact.
Variety.
Variety, cellular.
Variety.
Variety, spongeous.
Variety.
Ashes, volcanic.

APPENDIX.

Containing substances imperfectly known; or separated from species in which they had been formerly included, for reasons which, on further examination, may not be deemed sufficient to authorize their being established as distinct species.

Where their alliances are not specified, it may be judged by the composition to what places in a Collection the various individuals should be referred.

TENNANTITE occurs crystallized in modified rhomboidal dodecahedrons, cubes, or octahedrons, of a lead-grey color, inclining to black, with shining surfaces; it is rather harder than grey copper, of which it appears to be merely a variety, and is better known under that name.

STILPNOSIDERITE occurs massive, small reniform, and lamellar; it is of a brownish black color, splendent and opaque, with a nearly perfect conchoidal fracture. It is probably a variety of meadow iron ore.

SKORODITE is usually crystallized in broad four-sided prisms, terminated on each extremity by four-sided

pyramids; its color is green, passing into brown; the lustre is somewhat vitreous, the fracture uneven, and in composition it seems to be an impure arseniate of iron, free from copper.

Pyrosmalite occurs massive, or in six-sided prisms; it is of a liver brown color, and has a shining lustre, with a glimmering fracture. The composition appears to be oxides of iron and manganese, with silex and about 14 per cent. of sub-muriate of iron.

Cupreous Manganese is found massive, or botryoidal, of a blueish black color, with a shining resinous lustre, and conchoidal fracture.

Orthite has a general resemblance to gadolinite; it is composed of about 19.5 oxide of Cerium, 32 silex, 15 alumine, 12.5 oxide of iron, with manganese, yttria, lime, and water.

Woodan Pyrites is found in vesicular masses of a tin white color, passing into brown; its lustre is shining and metallic; the fracture uneven: it is opaque, brittle, and rather harder than fluor, and is said to contain 20 per cent. of a new metal, called Wodanium, united with sulphur, arsenic, iron, and nickel.

EARTHY.

HUMITE is found crystallized in modified octahedrons of a reddish brown color, shining, transparent and hard. It is found in the vicinity of Naples, and will probably prove to be a variety of Spinelle.

FIBROLITE occurs in fibrous masses, and sometimes prismatic; its colors are white or grey. It has a glistening lustre, and is harder than quartz. It is found in the East Indies, forming the matrix for corundum.

ALLOPHANE is found massive, disseminated, and botryoidal; the color usually blue. It has a glistening lustre, with an imperfectly conchoidal fracture. It gelatinizes with acids, and seems allied in some respects to opal, and in others to zeolite.

SPHÆRULITE occurs in embedded globules of a brown or grey color; it is usually faintly glimmering and opaque, hard, though brittle, and appears allied to pearl stone.

COMPTONITE occurs in small four or eight-sided prisms, colorless, semi-transparent, harder than apatite It is very nearly allied to the mesotypes, and was found about three years since in the vicinity of Vesuvius.

AMBLYGONITE occurs massive and crystallized in oblique four-sided prisms; color, various shades of light green,

spotted externally. It has a vitreous lustre, an uneven fracture, and appears to be a variety of spodumene.

Cereolite.—Of this substance little is known. *De Dree*, (*Musée Mineralogique*, page 17), says, it derives its name from its resemblance to wax, of which it often has the softness, and that the variety found in lava has been erroneously considered as steatite.

Conite occurs massive, stalactitic, and encrusting; its color is various shades of grey. It becomes brown by exposure to the atmosphere; is brittle, and has an uneven fracture. It appears to be a calcareous carbonate of Magnesia.

Fahlunite is found massive, and imperfectly crystallized, in four or six-sided prisms; is of a brownish black color, with an uneven or flat conchoidal fracture and resinous lustre. It seems nearly allied to precious serpentine.

Carinthin occurs in coarse granular concretions of a greenish black color; it is translucent, and has a conchoidal fracture. It is the Amphibole laminaire of Haüy, and may be arranged at the head of the hornblende family.

Chondrodite is in small grains of an orange color, with resinous lustre, disseminated in an imperfectly crystallized carbonate of lime. It has been recently imported from Pargas, in Finland; and, excepting in

color, has a considerable resemblance to Pargasite, from the same place.

Omphacite is a lightish green variety of augite, which was separated by Werner, who considered it a distinct species.

Montmartrite never is crystallized, but occurs in masses of a yellowish or greenish grey color. It consists of 83 sulphate of lime, with 17 carbonate of lime, and may be placed after the other varieties of gypsum.

Polyhallite is massive, with a fibrous structure, of a yellowish brick-red color. It is composed of common and anhydrous sulphates of lime, sulphate of potash, and anhydrous sulphate of magnesia: it is the fibrous anhydrite of some authors.

Picolite is a name given to a mineral found in the Pyrenees, which has not yet been analysed, but whose external characters are very similar to those of Gadolinite.

Holmite.—Our knowledge of this mineral is little more than that it is chiefly carbonate of lime, with about 30 per cent. oxide of iron, and occurs in oblique four-sided prisms.

Desmine is but little known; it occurs in small silky tufts in lava, from the vicinity of the Rhine, and is sometimes accompanied by Hauyne.

HELVIN is a crystallized substance of a red brown, or pale yellow color: it occurs in a dull green matrix of chlorite. Its form is said to be a tetrahedron modified.

EUDIALITE, is of a red color, and accompanied by sodalite and hornblende. It is composed of silica, zirconia, and soda: is from Greenland.

GIESECKITE occurs crystallized in six-sided prisms, of a dark green, or brownish green color, with an uneven dull fracture, and is moderately hard, affording a nearly white streak with the knife.

KILLINITE is found in layers dispersed through a very light-colored granite: the color is a brownish yellow, and the structure compact or slightly lamellar. It is moderately hard, and yields a light-colored streak.

THULITE occurs dispersed through a shattered carbonate of lime, in a granular form, assuming sometimes an imperfect crystallization: its color is a fine rose red, the fracture uneven or slightly lamellar, with a somewhat resinous lustre.

SPAK; the mineral frequently described under this name is merely fibrous rock salt.

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