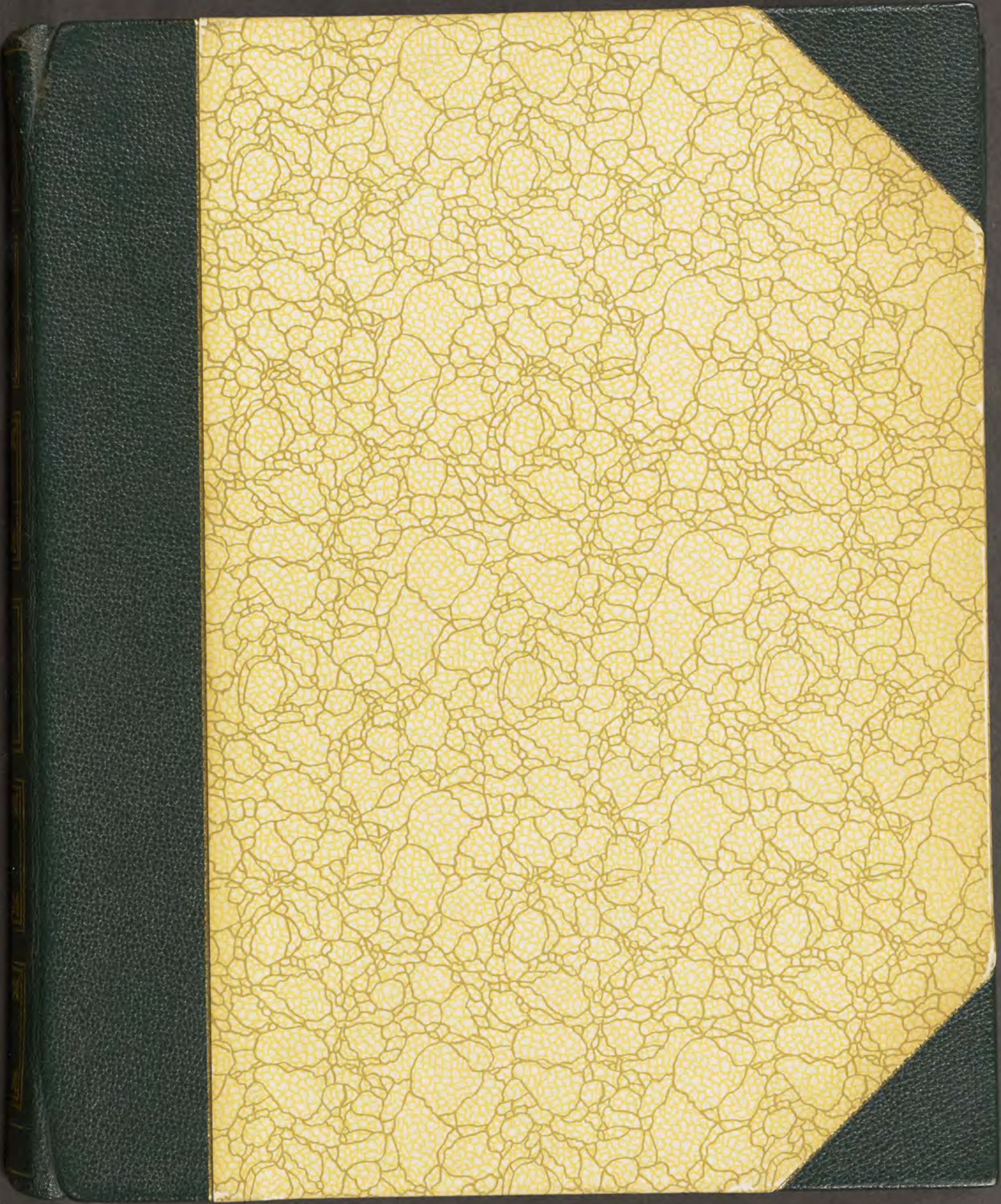

MINERALOGY · EMERALD · AND · OTHER · BERYLS · CATALOG
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GEM · CUTTING
GEMSTONES · OF · NORTH · AMERICA · PROSPECTING · FOR · GEM
STONES · AND
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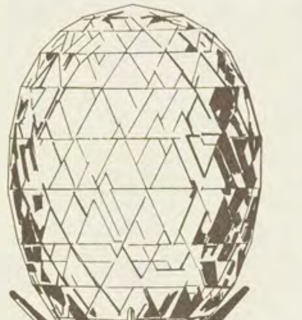

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JOHN SINKANKAS

A. W. Edmonds Feby. 1864

British Mineralogy

or

coloured figures.

intended to elucidate

The Mineralogy

of

Great Britain

By Martha Proby

From James Sowerby, F.L.S.
Honorary member of the Physical Society of
Gottengen;
Designer of English Botany, Author of
English Fungi, &c.

VOL. II

M.P 1840

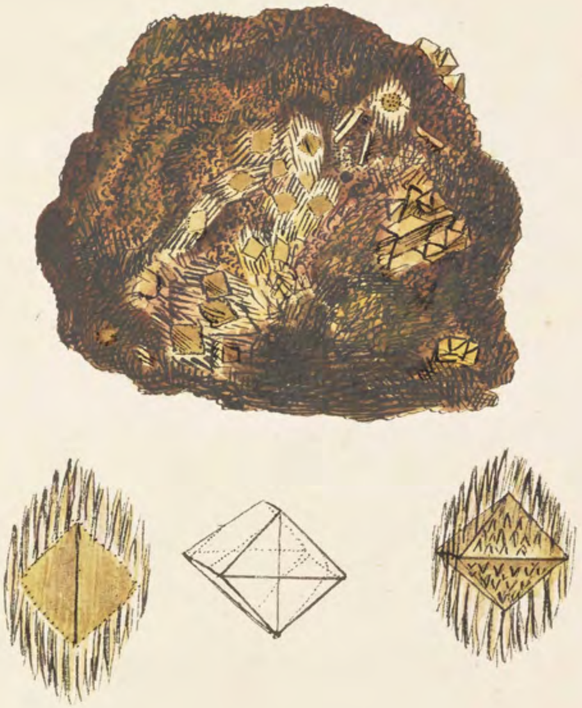
Tab. 108

Plumbum sulphatum.

Crystallized Sulphate of Lead.

Div. 1. Crystallized.

This is one of the set of modifications of Sulphate of Lead which does not appear to have been noticed before, and shows a curious change as to the formation taking place by means of spiculæ. The inner part of the crystals are of the primitive octaëdron, apparently tending to a new modification by decomposition, and forming spiculæ from the mutual bases of the two pyramids of the octaëdron - This seems quite new to the mineralogical world. however Sow^{y} has carbonate of Lead in dodecaëdral crystals, looking as if decomposing, with spiculæ attached in a particular manner.



Crystallized Sulphate of Lead, or Vitriolated Lead Ore, on Spiculæ on the surface of the Crystals.

4

Tab. 109

Argilla hydrata.

Hydrargillite.

Class 2. Earths. Order 1. Homogeneous.
Gen. 1. Argil. Spec. 2. Hydrargillite.
Div. 1. Crystallized.

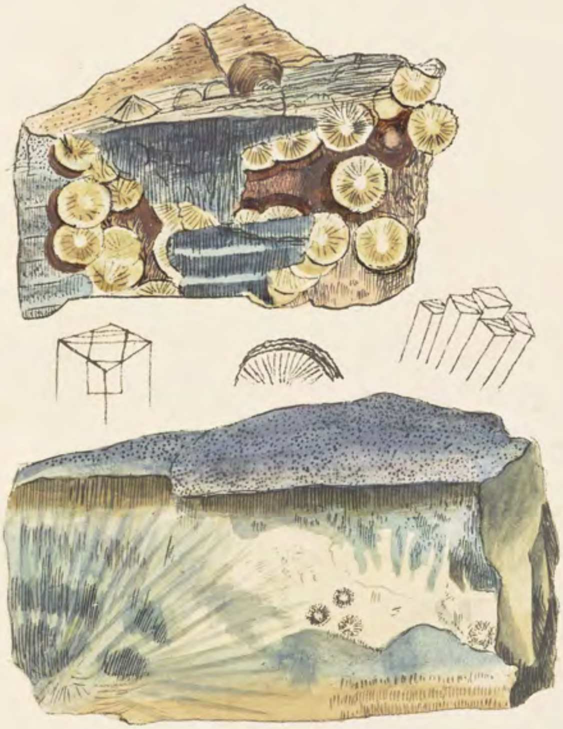
Spec. Char. Argil in combination with Water.
Syn. Hydrargillite. Davy in Phil. Trans.
Wavellite. Babington in Davy's paper Phil. Trans.

Dr. Wavell first discovered this substance, near Barnstable. it was once called a Zeolite. but more properly Hydrargillite (from ὕδωρ water, and αργιλλος clay): "The most common appearance is in hemisphærical groups of crystals" (on the surface of the gangue); "in some instances it exists as a collection of irregularly disposed prisms, forming small veins in the stone: no insulated or distinct crystals have yet been found." (Sowerby's specimens terminate the radii outwardly, something like sulphate of Barytes, and seem to be parts of a depressed octaëdron, sometimes a little truncated: see middle figures.) "Its colour is white in a few cases with a tinge of gray or green, and in some pieces (apparently beginning to decompose) of yellow. Its lustre is silky, some nearly opaque, Its texture is loose." Our upper fig: chiefly resembles this description. The lower fig: has small dark circles, which seem to be same substance with the margin darkened. Those larger spreading radii, which condense into white opaque circles with the help of smaller stellæ, terminate towards the ends. The whiter parts are small opaque clusters in which the three darker ones are imbedded: A similar substance has been found near Truro Cornl: which has been examined by the Revd: W Gregor of which I hope hereafter to give a figure

Mr Davy's analysis of Hydrargillite:

Alumine	70
Fluid	26·2
Lime	1·4
Loss	2·4
	100·0

Upon further examination we find it possible that the crystal may be derived from the cube, as we find the fracture perpendicular to the terminal faces of the right hand figure on a plane with the lengthened sides; and another parallel to the plane of the terminal face. The column or prism is conformy to these faces, forming 4 sides, and there are 2 triangular faces set edge~~ways~~wise on the broader angle. These faces were too small to be measured. These faces are often somewhat rounded with a rusty sort of decomposition.



Hydrargillite, or Wavellite. Bristol.

Tab. 110

Strontia sulphata.

Sulphate of Strontian.

Claſs 2. Earths. Ordr. 1. Homogeneous.
Gen. 6. Strontia. Spec. 2. Sulphate of.
Div. 1. crystallized.

Spec. Char. Strontian in combination with Sulphuric Acid.

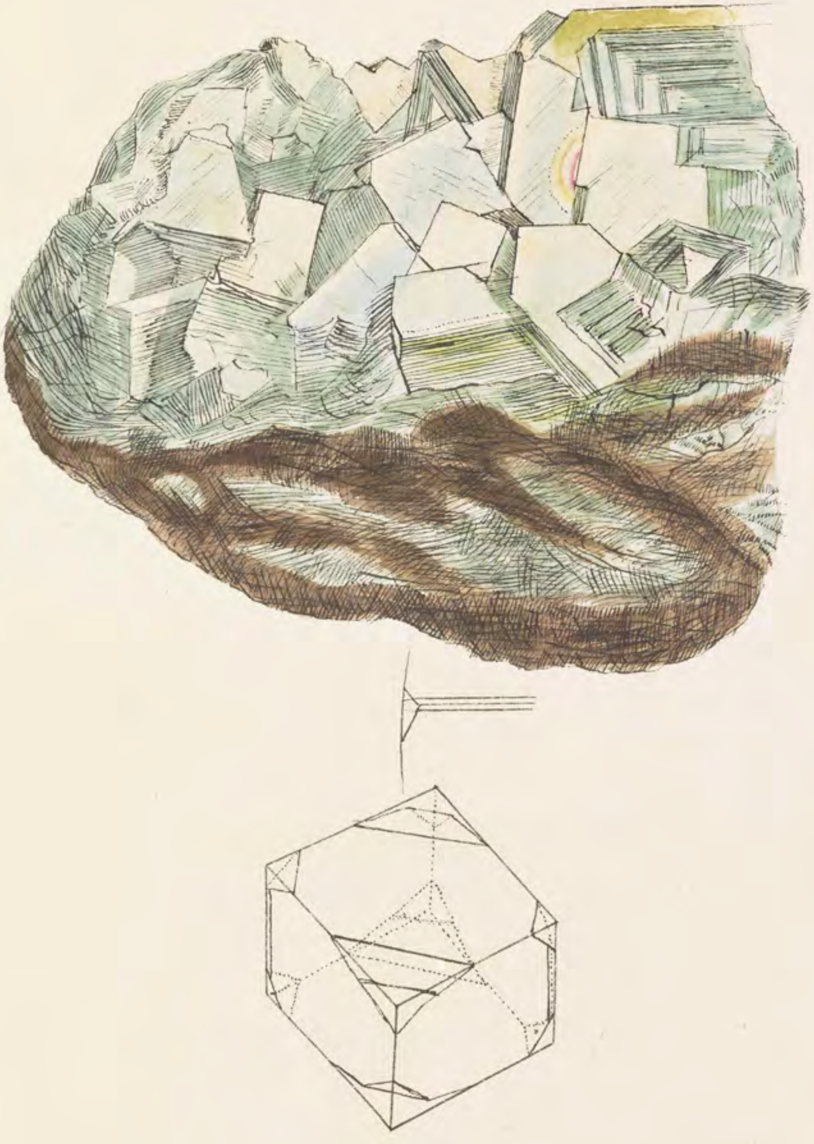
Syn. Schwefel Saurer Strontianit. Emmerl. 3. 312.
Strontiane. Daubenton, tab. 19.
La Celestine. Brochant, 1. 640.
Strontiane sulfatee. Haüy, 2. 313.

Sulphate of Strontian was discovered by Mr. Tobin in 1794 at Redland, near Bristol. He observes, that he discovered detached veins in different parts of the cliff. The strata in which the veins are found are nearly horizontal, consisting of Lime-stone of different hardneſs, and argillaceous Sandstone intermixed with Clay and Gypsum, and some of the fiſsures were filled up with Sulphate of Strontian from 3 to 12 inches thick.

The primitive appears to be a rhomboidal prism of about 105°, & 75°: ours are a little truncated at the solid angles, otherwise they represent the primitive, The fractures are parallel to the primitive faces, and those of the upper and lower faces are brightest, and often show a sort of opaline lustre. Some the two diagonal fractures may be seen. Cross fractures somewhat splintery, harder than Carbonate of Lime, and softer than Sulphate of Barytes. The natural colour is a little milky and somewhat bluish, whence Werner calls it Celestine. nearly transparent. Spec. Grav. according to Clayfield from 3·88 to 3·96; the fibrous about 3·91. Analysis by him

Strontian	116·5
Acid	83·5
A Little Iron	
	200

Sulphate of Strontian was in many cabinets before this discovery of Mr. Tobin's, as Sulphate of Lime, or Sulphate of Barytes, – among others in the Woodwardian Collection at Cambridge. It is found in Sicily, Mont-Martre near Paris, and in America. Those of Sicily are said to be the finest, and are columnar, not tabular like the Bristol ones.



Crystallized Sulphate of Strontian. Bristol.

Tab. 111.

Plumbum sulphureum; var. antimoniatum.

Antimoniated Galena or Sulphuret of Lead.

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 15. Lead. Spec. 3. Sulphuret of Lead.
Div. 2 Similative. Var. Antimoniated.
Syn. Plomb sulfuré antimonifère. Haüy, 3.462.

This is often found accompanying common Galena. It is
externally known to Mineralogists by the peculiar small striated
appearance which is attributed to the nature of the crystallization
of the Antimony, and which seems to derange the primitives
of common Galena; so that one substance interrupting an-
-other may be recognized here; and perhaps in some other
place we may be able to show something more impor-
-tant in the nature of the laws of mixed crystallization.
This specimen seems to be less antimoniated towards the
base, and somewhat resembling tab. 114.

Sulphuret of Lead containing a small portion of Antimony.

Tab. 112.

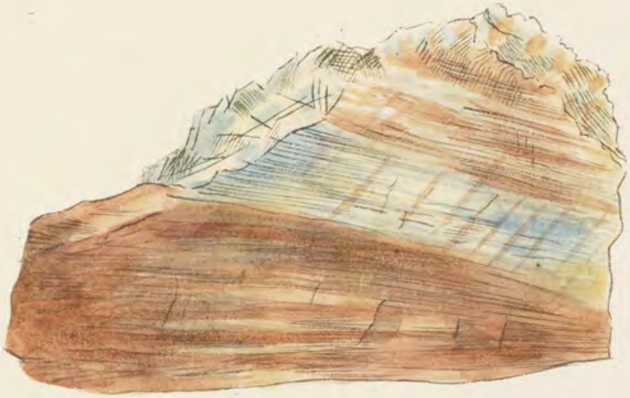
Strontia sulphata.

Sulphat of Strontian.

Div. 2. Imitative.

The upper figure is from Aust Paſsage near Bristol, and its curved appearance renders it at first sight sufficiently curious, besides its partaking of the blue and red colours. The striated Strontian in the middle figure seems to answer to the Celestine, more generally than the last, as it is here coloured.

The fibres in this sort, which comes from Breslinton, are very straight, and somewhat laminated.



Striated Sulphate of Strontian & Cœlestine.

Tab. 113.

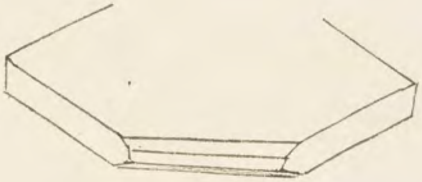
Strontia sulphata.

Sulphate of Strontian.

Div. 1. Crystallized.

The plated Strontian here figured is in a sort of sandy matrix. It is like that in tab . excepting that the latter was in much larger pieces without matrix, & nearly white. The Crystals are more confused, yet are occasionally found very neatly determined at two or three sides, as in this specimen. The geometrical sketch at the bottom shows the bevelling at the corner, between the primitive faces.

This kind is chiefly found at Redland near Bristol.



Plated Sulphate of Strontian. Bristol.

Tab. 114.

Plumbum sulphureum; var. hæmatiticum.

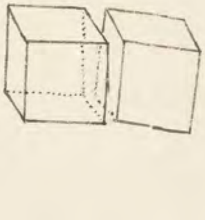
Hæmatitic Sulphuret of Lead, or Hæmatitic Galena.

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 15. Lead. Spec. 3. Sulphuret of Lead.
Div. 2. Imitative.

Sowerby had heard that Galena was to be found in coal at Matlock. he had a piece sent him from thence which being full of decomposing Pyrites fell to pieces. This is not only rare for being among coal, but for being in this curious hæmatitic form, a form which has not yet been noticed in Galena, & which will help more perfectly to show the nature of substances that have a regular primitive crystal, passing into, or placing themselves in, a rounding figure.

The present specimen is radiating from a centre, forming circular and hæmispherical segments, much resembling Hæmatitic Iron Ore — tab. 62. and .

This substance is evidently formed of cubes, and has assumed this particular shape from; certain circumstances; and settling from its solvent with perfect preservation of its nuclei, which are very clear upon examination. although very minute they are distinct cubes: and as any form made up of perfect cubes with level sides would, in forming a radiating figure be loose in its texture, unleſs well closed with others in the interstices; so this, so loosely formed in that particular, is very useful to us to determine other parts of the like nature. The left hand figure is of two nuclei — and the right hand figure shows the manner of its accumulation; and will be useful in analogy.



Sulphuret of Lead, or Galena diverging from a Centre in a hæmatitic form.

Tab. 115

Arsenicum ferrum.

Ironey Arsenic.

Claſs 3. Metals. Ord. 1. Homogeneous.
Gen. Arsenic. Spec. Combined w.th Iron.
Var. 1. Crystallized.
Spec. Char. Arsenic in combination with Iron.
Syn. Fer arsenical. Haüy, 4. 56.
Arsenic pyriteuse. Mispickel. Born. 2. 197.
Native Arsenic alloyed with Iron. Kirw. 2. 256.

This substance much resembles the whitish Iron Pyrites or arsenical Sulphuret of Iron, & seems to have been partly confounded with it by Kirwan; who observes, that "the Marcasite found near Dublin, called Irish-Diamonds, is of this species." This latter is however to be most readily distinguished by the crystals being right-angled, {A small portion of arsenic may be found in them, but not sufficient to alter the crystal} whereas the present is an acutely rhomboidal prism. It is perhaps not unnatural for Irish Pyrites to have a little arsenic, but not in sufficient quantity to characterize a species. The colour is different in the interior; one being a grayish white, the other yellowish. This specimen came from Cornwall, & is remarkable for having somewhat acicular crystals collected in divaricating bunches, which pervade Blende, Copper Pyrites, & Quartz. Before the blowpipe it melts easily, gives out copious white fumes strongly scented with Garlic, and highly noxious to the lungs; what remains is a small gray globule of magnetic Iron.

The right hand figure shows the primitive rhomboidal termination of an elongated crystal, with a decrement upon the obtuse solid angle. The face produced by this decrement gives for its incidence upon the rhomboidal face 149° or thereabouts: this modification seems to be new. as Haüy has not mentioned it.

The left hand figure represents another view of the primitive, with ~~the~~ a decrement on the acute angle which agrees with letter s of Haüy's fig. 137.

Arsenical Iron Ore.

Tab. 116.

Ferrum oxygenizatum.

Wood like Iron Ore.

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 8. Iron. Spec. 3. Oxide of.
Div. 2. Imitative. Var. Wood like.

This specimen came from Bristol. found in a ploughed field. It is of that variety often called Woodlike Iron Ore and much resembles Woodlike Tin Ore. It however is much lighter & softer, & much larger than Wood Tin has ever been found. Its weight is about 7℔, & its diameter about 6 inchs by 5 inches. The figure being smaller, the many centres from which the radii form give it a pretty variegated appearance, and the radii are relieved by the darker tints of the striæ which are least ochry. the circles are so regular as to seem forced in the drawing. but it is not so. It may be curious to observe how reciprocal the force of formation is in this specimen as each centre has terminated its radii with as little disturbance to its neighbour as possible. The primitive crystal of Oxide of Iron is not yet known; Whatever it is it must have some affinity to the Galena — tab. 114.

Wood-like Oxide of Iron. Bristol.

Tab. 117.

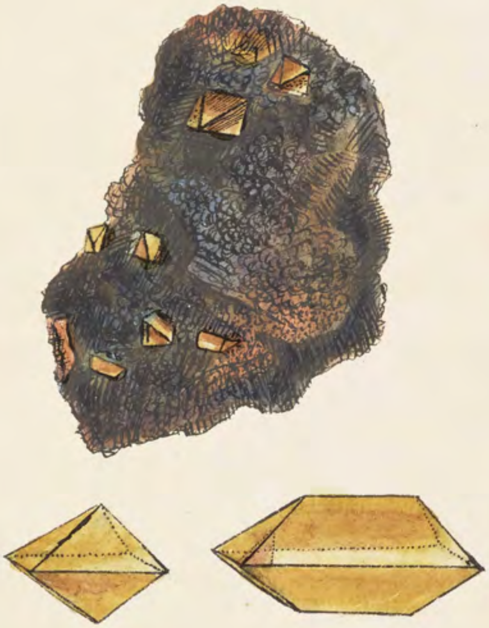
Plumbum sulphatum crystallizatum.

Crystallized Sulphate of Lead.

Class 3. Metals   Ord. 1. Homogeneous.
Gen. 15. Lead.   Spec. 4. Sulphate of Lead.
Div. 1 Crystallized.   Var. 1. Primitive.

Syn. Plomb sulfate primitif P.   Haüy, 3.504.
Naturlischer blei vitriol.   Emmerl. 3.413.
Native Vitriol of Lead.   Kirw., 2.211.

Anglesea is the only place that produces this substance, it comes from the Parys mine. The present specimen is not so brilliant as many, but of the kind is one of the largest and best crystals yet procured. Its fracture in some directions is laminated parallel to the primitive, in others vitreous. Perhaps one of its characters may be taken from its odour, which is similar to the smell of the place in which white lead is prepared, with a peculiar pungency. It is easily reduced on Charcoal, — the forms are in general somewhat neat, & the crystals sometimes as clear as the finest glass; at other times they are coloured with an oxide of Iron, from a yellowish to a rusty brown, — they are brittle and soft enough to be scratched by sulphate of Barytes, but not carbonate of lime, and are mostly found on an ochraceous gangue.



Crystallized Sulphate of Lead, or Vitriolated Lead
On. Anglesea.

Tab. 118.

Ferrum oxygenizatum, var. crystallizatum.

Crystallized Oxide of Iron.

Class 3. Metals. Order 1. Homogeneous.
Gen. 7. Iron. Spec. 3. Oxide of Iron.
Div. 1. Crystallized.

Gen: Char. Colour Gray. Harder than most other metals. attractible by the magnet. Spec. Grav. 7.2 – 7.84. Kirw. Capable of combustion by collision. Hab. Soluble in all the acids; precipitable from its solutions, the precipitate being of a blue colour, by prussiate of potash.

Spec. Char. In combination with above 24 per cent. of oxygen.

Syn. Specular Iron Ore. Kirw. v. 2. 162.
Fer oligiste. Haüy, v. 4. 38.

The sort of iron ores from Lancashire, on which these crystals are sometimes found, is not uncommon: there are also minute quartz crystals, frequently very transparent, attached to this one, which on the dark ground deceive us with the idea of crystallized iron ore: however with the help of a lens the forms of the crystals may be seen. The latter although a seeming modification of carbonate of Lime, appear to be slightly magnetic. It is curious that this should so generally resemble, in the form of its crystal, the carbonates of lime, this being like a flattened equiaxe with various modifications. Romé de Lisle's, p. 4. f. 62. is the nearest resembling it, wanting only the 6 alternating narrow faces. The fracture is intermediate between glassy and splintery, & when fresh broken it shows an iron or steel-like lustre. The outside of the crystals are of a darker iron with much gloss or polish; the edges of some resemble blued steel, and sometimes reflect other colours. They stand edgeways on the matrix; which makes this hue more conspicuous, & adds much to the beauty of the specimen especially when magnified.

We presume this is the same as the beautiful iron ore from Elba, now first noticed in England.

Tabular Crystallized Iron Ore with iridescent Edges.

Tab. 119.

Carbo oxygenizatus.
Oxygenized Carbon.

Class 1. Combustibles. Order 1. Homogeneous.
Gen. 6. Carbon. Spec. 2. Oxygenized Carbon.

Gen. Char. Hardest of all known substances.

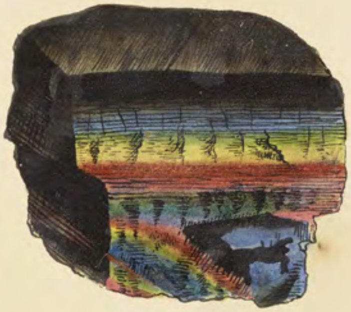
Spec. Char. Carbon combined with such a proportion of Oxygen as to remain in a solid state, mostly opaque black.

Syn. Native Mineral Carbon. Kir. 2.49.{When Kir. wrote this, common charcoal was thought to be pure carbon: it is since found to be an Oxide of carbon, and that Dia-mond is the only native mineral carbon known. Mr Kir description agrees with oxide of carbon, for which we quote him.}

Kirw. description of Native mineral Carbon {see above} Blende-Kohle of Werner. {Jameson calls this Kohle-Blende, & observes that it does not stain the fingers} so well agrees with the Denbigh coal, that in general his expressions may be made use of. This specimen he observes is the purest known and came from ~~Flanders~~ Flonme; There is little doubt of the

Denbigh coal being nearly as pure an Oxide of Carbon as is likely to be found." Its colour is black: its lustre from 3 to 4, approaching the metallic. Transparency 0. Hardness 4 to 5: brittle: stains the fingers." It could only be the softer part occasionally that stained the fingers: as in that from Swansea, resembling charred Wood; dusty and with less lustre, than above described.

Denbigh Coal is seldom stratified, and is apt to separate with a reedy structure or impression, in irregular striæ. The cross fracture is often conchoidal & undulating. This fracture & the prismatic hues for which this coal is famous, give it the apellation of Peacock Coal; a piece of which may be repeatedly heated red hot & on cooling the colours return. All coals commonly so called produce a black powder.



Dembigh Coal.

Tab. 120.

Carbo oxygenizatus.

Oxygenized Carbon.

The Swansea & Denbigh coals are nearly allied. This Upper figure has the Charcoaly & stratified part in various directions. Some parts resemble burnt straw in regular rows: others form conical appearances, converging or diverging from a centre. some in horizontal & oblique strata. The shining part has a shattered & confused appearance. some of the striated parts were slightly covered with charcoal in fine dust, easily rubbed off. In other parts were thick layers of charcoal in irregular strata, but somewhat horizontal to the other parts. all looking confused. very brittle and easily shattered to pieces. The lower piece is much tougher, and the striæ have not a vestige of charcoal about them, nor will they stain the fingers. They are difficult to ignite, & burn without flame, remaining a long, and giving great heat, without much apparent change: whence they have been called Stone Coal. They are used for malting, & burning lime, & often mixed with such coals as easily flame, to assist in burning. They are supposed to contain less oxygen with the carbon than other coals so require the assistance of those which contain more.

Diamonds require oxygen to aſsist their burning, in the proportion of 4 parts to 5 in a strong heat; & in burning they paſs into the black state of Charcoal, continuing to burn the it, and giving out carbonic acid ~~gaſs~~ gas (see description. Tab. 83.). (It is found native in some caverns, wells and mines, & is called choke damp of the miners. It is often fatal to them) in the same way, the carbon being aërated by the caloric or matter of heat. Although Diamond has always been of high value, and well known from the earliest ages, yet it was left for Mr. Tennant in the year 1796 to prove it to be a pure carbon. See Phil. Trans. 1797. p. 123. There are other sorts of Coals about Swansea mentioned in another part of this work. Coals mostly appear to be the combustible remains of vegetation. They are mostly formed in the Striæ of plains, composed of marle, sand-stones, & limestones, most of which shew the remains of animal or vegetable petrifactions or impreſsions. See Sand-Stones Tab. 71. The blackened parts in those figures are apparently the remains of bituminous carbon, as it were in the last stage of infiltration.

Swansea Coal.

1-50

Tab. 121.

Bitumen Gagas.

Jet.

Claſs 1. Inflammables. Ord. 2. Mixed.
Gen. 2. Bitumen. Spec. 1. Bitumen with oxygenized carbon.

Spec. Char. Bitumen combined with about 30 per cent. of oxygenized carbon.

Syn. Jet. Kirw. 2. 64.
Jais. Daubenton 30. De Born. 2.79.
Variété du Schlackiges erdpech. Emmerl. 2.30.
Jayet. Haüy 3. 324.
Bitumen Gagas. Linn. Syst. Nat. ed. 13. 1. 3. p. 111.

The upper figure represents a curious piece of jet, remarkable for the remains & impreſsions of shells about it: it came from Lowestoft where amber & curious pebbles are found. We shall consider jet to have paſsed from the remains of some sort of wood, as the lignous fibre is in some instances seen; in other specimens it is so condensed and compact as not to be discernible. This substance appears also to be saturated with bitumen, so that it readily inflames, losing about 14 grains in 20, with much smoke and a slight bituminous odour. The remaining cinder, if continued to burn leaves a very trifling residuum. Opaque black. powder always brown. takes a fine polish. The surface when rubbed is electric, which distinguishes it from cannel coal. It may be scratched by common calcareous spar, & will itself scratch amber and gypsum. The fracture is conchoidal, occasionally retaining that of wood. Lustre 3 to 4: transparency 0. Its Spec. Grav. 1·104 to 1·744. Kirw. It has generally been said to swim on water. Thin pieces, indeed, laid lightly on the water will float for a short space. Linn. called it Bitumen Gagas, from the river Gages in Lycia near which it is found. The presence of shells and the impression of the Cornu-Ammonis, indicate its former less indurated state. The lower piece has some signs of incumbent strata having been on the upper surface, in an obsolete impression, and also some obscured crystals of carbonate of lime underneath. The fracture is in part largely conchoidal. we may observe the woody stratification. Sowerby has a piece where the woody texture is evident, with small cubic pyrites on one side. With heat & water he decomposed a bit of it so as to expose its woody structure. It comes very near to the most indurated Bovey Coal & Surturbrand (These also produce brown powder) evidently belonging to that division.

(-5)

Jet, with an impression of a Cornu Ammonis.

Tab. 122.

Calx sulphata.

Crystallized Sulphate of Lime, or Gypsum.

Class 2. Earths. Ord. 1. Homogeneous.
Gen. 3. Lime. Spec. 6. Sulphate of Lime.

Spec. Char. Lime combined with sulphuric acid.

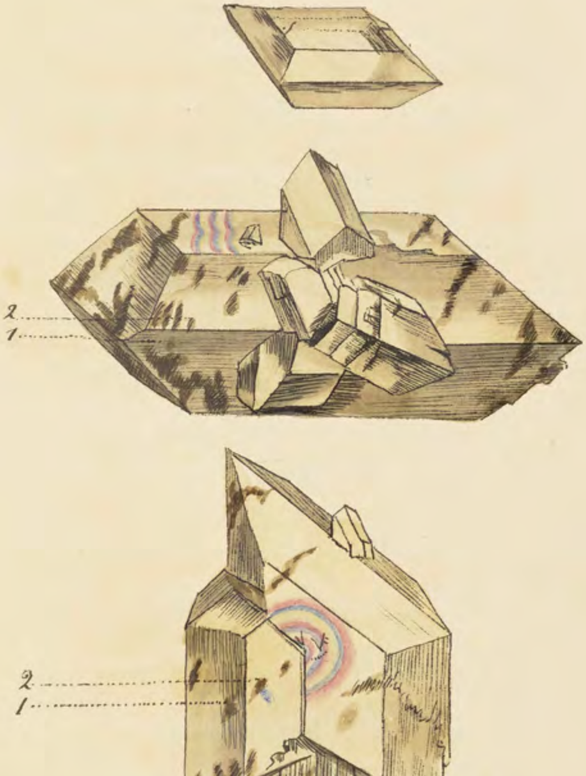
Syn. Broad foliated Gypsum. Kirw. v. 1. 123.
Gips et Fraueneis. Emmerl. v. 1. 527. 540.
Chaux sulfatée trapézienne. $\overset{2}{C}\overset{1}{E}P$. Haüy, v. 2. 207.
Natrum selenites. Linn. Syst. Nat. v. 3. 91.

Shotover Hill, Oxfordshire, seems to afford the clearest and cleanest specimens of crystallized gypsum in the greatest variety. They are mostly found in a clayey gangue. The upper figure is what Haüy calls trapezienne. Although this would by extending the lateral faces, which might be easily done by piling plates on the summit, each smaller than the last, form an Octaëdron: yet of a great many varieties we have not observed this modification. The middle figure is a common variety from the same place, heightening towards an Octaëdron but seldom extending farther than this figure.

They often have their angles a little irregular, so as not to meet: see the left hand corner near figures 1 and 2, also having other crystals sticking in them in different directions. If the laminæ are opened in the manner of a flaw or crack, when not too wide, they admit the prismatic rays: see the upper ~~rays~~ face of middle figure and middle face of lower figure. They are said by most to admit of double refraction. Fig 1. is a darkish spot of clay or soil naturally in the subject, and fig. 2. is the same seen a little duller through the other face at the same time: but this is common to all transparent substances. It is somewhat curious that the clayey stripes or spots have a peculiar direction diagonally to the acute angles. Spec. Grav. 2·2642 — 2·3117. Kirw. & Haüy. They are laminated, the laminæ somewhat flexible; easily separated.

Hardneſs — Yields to the finger nail.

The bottom figure shows three crystals mixed together, and forming what is commonly called a macle.



Crystallized Sulphate of Lime or Gypsum.

Tab. 123.

Strontia carbonata.

Carbonate of Strontia.

Claſs 2. Earths. Order 1. Homogeneous.
Gen. 5 Strontia. Spec. 1. Carbonate.
Div. 1. Crystallized.

Gen. Char. Soluble in 200 parts of water at a temperature of 60.° Separates from a saturated solution in nitric acid, in the form of rhomboidal crystals. Promotes the fusibility of most other earths. Most of its salts tinge flame red.

Spec. Char. Combined with carbonic acid.

Syn. Strontian earth combined with fixed air. Kirw. v. 1. 332.

Strontian carbonaté. Haüy, v. 2. 327.

This curious mineral was found at Strontian in Scotland in a lead mine which is now given up. We do not know that it has been found any where else. Its crystals are confusedly grouped, more or leſs diverging from a centre. They are sometimes of a 6-sided prism, vide Haüy.
This came from Norwich. It has 6-sided prisms terminated at one end with 3 faces, resembling those of Carbonate of Lime,

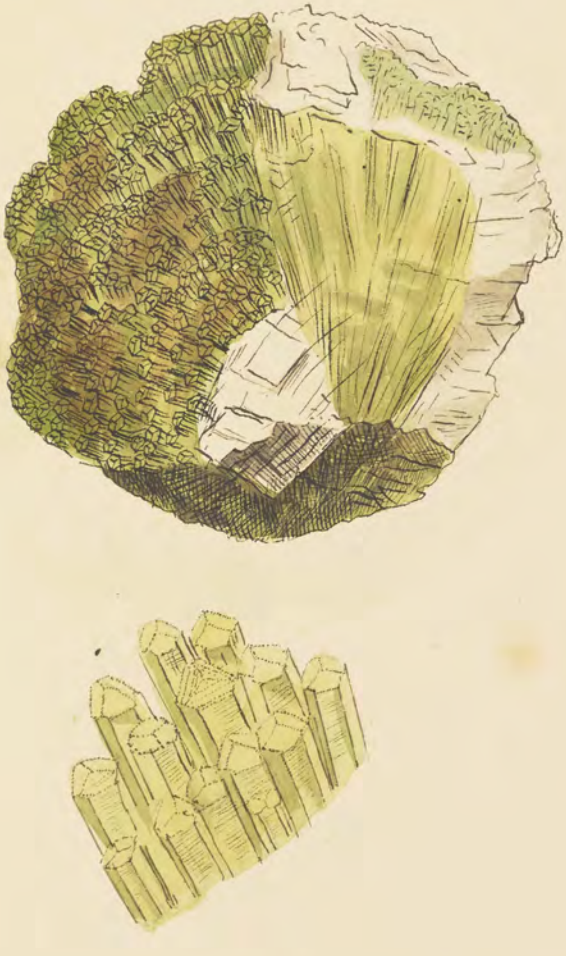
with the obtuse æquiaxe termination. We have a specimen of with 6-sided bars quite relieved croſsing a hollow. 3 faces of the prism are generally broader than the other 3, showing faint longitudinal striæ & fractures parallel to them; but most readily to the 3 broader faces with transverse striæ, which continue to the apex of the pyramid, & occasionally form an equilateral triangle. The pyramid may be divided in a direction contrary to its faces; therefore the nucleus is a dodecaëdron with rhomboidal faces.

They vary in colour from a brightish watery green to a palish brown. It differs from carbonate of barytes (with which it was once confounded), by its weight, as well as by diſsolving quickly, & with great effervescence, in nitric acid, without leaving a precipitate: & it is curious that a bit of paper or a wick of a candle, dipped in this solution, after being dried, causes the flame to burn beautifully red; or the substance itself in fusion by the blowpipe will do the same thing. Spec. Grav. from 3.4 — 3.675. Hardneſs 5, Kirw. Scratches carbonate of Lime, & is scratched by fluate of Lime.

Analysis by Pelletier:

Strontia - - -	62.
Carbonic Acid - -	30.
Water - - - - -	8.
	100.

It is accompanied by carbonate of lime, sulphuret of barytes, sulphuret of lead, & harmotome of Haüy, or Staurolite of Kirwan.

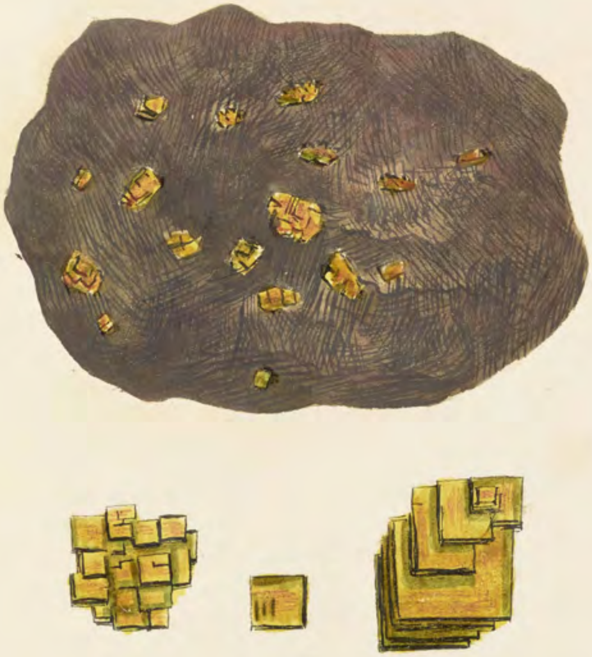


1-65

Crystallized Carbonate of Strontia.

Tab. 124

This variety is of a yellower hue and appears to be splitting and decomposing, as it seems to decay at the edges, becoming rounded as if worn by oxygenizement. The gangue is chiefly a black Oxide of Copper. Its Spec. Grav. is 3·1212.



Yellow Oxide of Uranite crystallized.

Tab. 125.

Silex magnesiatus; var. amianthiformis.

Amianthus.

Class 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. Magnesiatus.
Div. 2. Imitative.

Spec. Char. Silex in combination with Magnesia.

Syn. Amianth. Kirw. v. 1. 161. Emmerl. 1. 402.
Jameson, 1. 442. Wern.
Asbestus maturus, Amianthus. Waller. 1. 408.
410.
Asbeste. Haüy 3. 245.

Amianthus is probably a decomposition, or change performed perhaps by some yet unknown chemical agent, as its situations in solid rocks seem to evince. This unknown chemical agent does not appear to be common, as the Amianthus is not an universal substance in the silky filamentous form. This came from Portsoy. It is partly what is called Mountain Cork in a rather dense state, including some very fine transparent Carbonate of Lime, in which there are extremely slender filaments of Amianthus, seemingly passing through it, and in some parts so incorporated ~~in~~ with it, that it is not to be discerned where they end or where the Carbonate of Lime begins. The filaments run perpendicularly to the more dense or cork-like surface of the upper & lower sides of the Specimen, which however has more of a cottony texture, but that is much finer than any cotton or vegetable thread; the first seems infinitely fine; the latter may be seen by a microscope to show a finally confirmed hollow filament. {I was highly pleased to find in Mr. Carlisle's Croonian lecture read to the royal Society, Nov. 8. 1804, that he had determined the final filament in muscular flesh. I had been much puzzled with the assertion that Lewenhoek had found them infinitely divisible: having long since taken the pains to examine a piece of Mutton flesh, I found the smallest filaments easily discernible, and according with Mr. Carlisle's accurate account, as far as I examined, but they are not so in Asbestus or any filamentous earth.} It generally is found in Serpentine rocks.

Thready, Woolly, and Paper-like Asbestos.

Tab. 126.

This forms in appearance not unlike Mortar, with the green Chlorite among it. When it has a more perfect appearance of mortar without the green it is considered as good manure and provincially called Gault. It is often found about a foot from the surface. This is generally used to make the best white bricks of in Cambridgeshire. That with granular talc or chlorite is of a dull hue, & found deeper. The same substance somewhat more compact is called Mulatto Stone: See tab . The petrifactions in this stone appear mostly dark brown with rugose lumps of various sizes of nearly the same substance, somewhat similar to the Swampy Iron Ore of Shins, v. 2. 183. The petrifactions are coloured like it, sometimes nearly approaching that of Pyrites. These petrifactions are the round one on the left hand, supposed a grinder tooth of some fish; the right hand is considered as a fossil bony palate; the middle upper figure is a bivalve shell, the upper valve remaining in the state of Carbonate of Lime, the lower one browned with the ore. It is a kind of Anomia called Gryphite, very frequent among petrifactions, On the left ~~ufter~~ under that, is part of a Coral, near which is a fishes palate, such as often extends to the form of Lupin pod. The left hand figure is part of a Cornu Ammonis. The rude lump of the brown ore on the right, with the adhering shells like those of the Anomia Squamula, found clinging on Crabs &c. has the impression of a small Gryphite.

Chlorite with Sand, &c. Cambridge.

Tab. 127.

Calx carbonata.

?Fasciculated Carbonate of Lime.

Div. 1. Crystallized.

These crystals of Carbonate of Lime are rather scarce. The representation of a regular Crystal so neatly formed by a bundle of Spiculæ is truly curious: and it is generally found that they have an ochraceous or brown tint with an opaque glaucous appearance, prettily contrasted with the brilliancy of the Quartz on which they lie. This is the unders. and one of the rarest of the numerous productions of Derbyshire, and is found at a considerable depth in the ground.

Fasciculated Carbonate of Lime on Quartz.

Tab. 128.

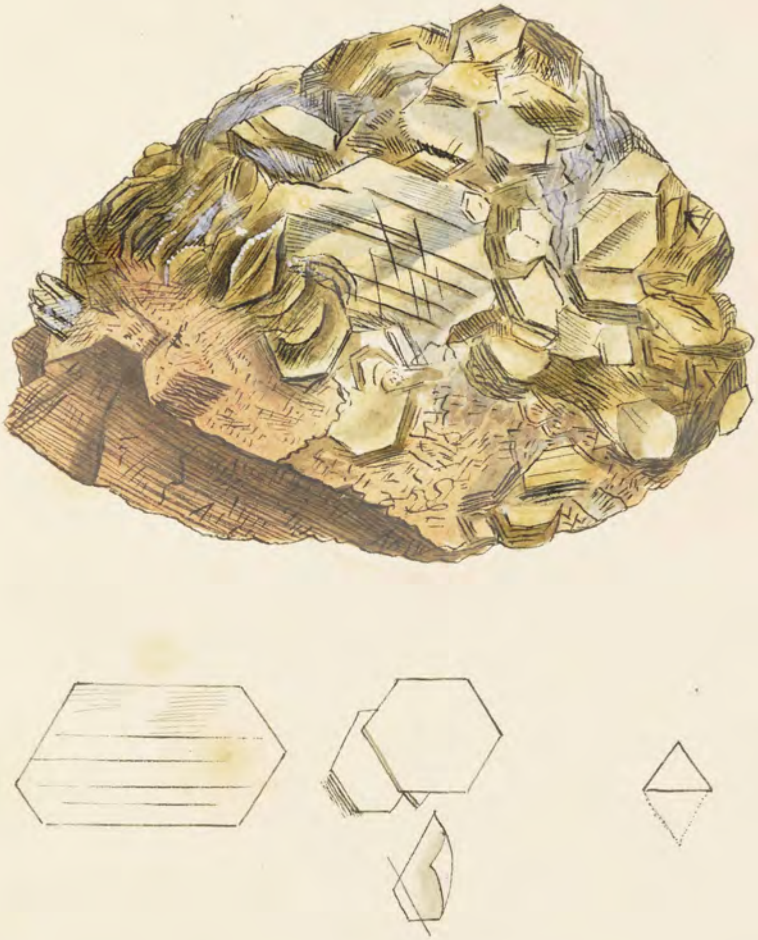
Silex Mica.

Mica.

Gen. 4. Silex

Syn. Mica, or Muscovy Talc. Kirw, v. 1. 210.
Mica. Haüy, v. 3. 208.
Mica membranacea. M. laminosa, &c. Linn.
ed. 13. t. 3. 28.
Glimmer of the Germans.

Mica, μικκὸς, or μικρῶς, has been long noticed as a glittering substance, and often serves to countenance the idea that our streets are paved with gold, & silver. It is one of the first things that takes the attention when fragments of the granite stones from Aberdeen, are lying in our streets for paving, or building, which has been frequent since the improvement of forming such durable stones into shape for that purpose; an improvement not much above half a century old. it has been confounded with Talc: see tab, 150. . The present specimen has most of the characters belonging to this very curious substance; It has signs of the integrant molecule, a ~~tet~~ triëdral, prism whose base is equilateral, and of the rhomboidal prism formed of two of these its primitive with various lengthened rhomboids, hexagons, &c.: see figures. It sometimes has the laminæ bent. Its lustre is of the changeable kind; the upper plates showing the accumulated refracted silvery opacity between those beneath, each plate being transparent if separated. {Its fine lustre we cannot imitate without hazard of the colour changing; we therefore must request our friends to consider the shining parts of the plate as of a fine silvery or pearly lustre.} It is flexible and elastic; the plates when bent, will return to their places with a considerable spring {see bottom figure, a plate bent thus much will return – the straight line seen through shows its transparency}: this elasticity, and its being destitute of unctuosity, distinguish it from Talc, as hitherto the varieties of one species have been placed among those of the other by several mineralogists. Muscovy Talc of the older authors is undoubtedly Mica, so named in contradiction to Venetian Talc; which, although nearly allied, is yet a distinct species, and may be looked on as a good sample of Talc.



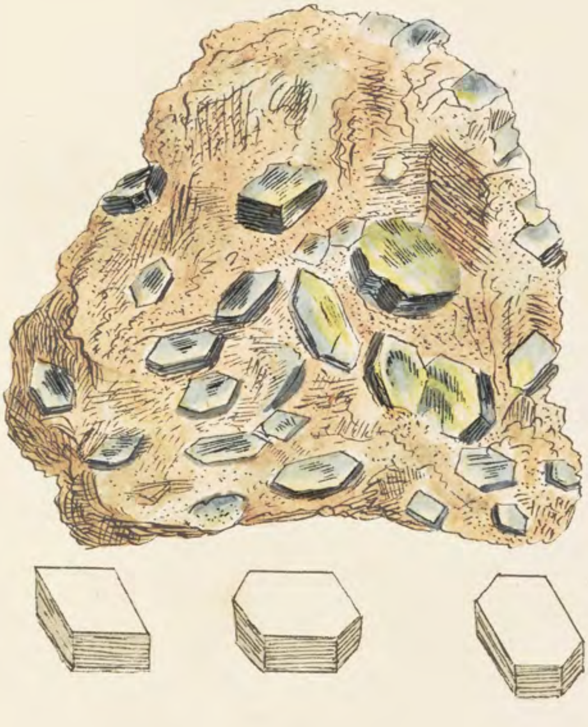
Mica in Plates, &c.

Tab. 129

This specimen differs very little from the Mica from Muscovy, which is occasionally found seven feet in diameter. Scotland & Cornwall produce it three or 4 inches square, or even larger. This kind of Mica is used for Lanterns &c. and is very convenient for Ships, as it bears the explosion of cannon without cracking. It is however liable to get scratched, and becomes rather opaque by heat, which opacity is not removed by water. This substance is spoken of as introduced into Rome in the time of Seneca to admit light into their apartments; but Agricola considered what was then used as a plaister-stone; {It seems to have been used in Agricola's time to shelter plants; in which case it would be much exposed to weather.} Sulphate of Lime. tab. 122.} saying that although it was not affected by the heat of Summer or cold of Winter, yet wet wasted it considerably. Sulphate of Lime is found in France in crystallized masses sufficiently large to form, when split & cut, squares of many inches diameter. The name Talc has been applied to any laminated substance.

Mica analysed by Vauquelin was found to contain:

Silica	50·0
Argilla	35.0
Oxide of Iron ..	7·0
Magnesia	1·35
Lime	1·33
	94·68
Loss	5·32
	100·00



Mica somewhat columnar, &c.

Tab. 130.

Silex magnesiatus; var. amianthiformis.
Leather-like Amianthus.

Div. 2. Imitation.

This bears a strong resemblance to the Oak Leather or Xylostroma Giganteum of English Fungi. tab. 358. so as hardly to be known by outward appearance, unleſs with a microscope; when we find the one formed of exceeding fine of exceeding fine filaments, & the other of hollow filaments. They are both flexible like leather, and to the touch equally soft. In cutting they require much the same force and sharpneſs of the instrument; they also tear nearly alike, with a shaggy filamentous appearance. One very sure test remains, that the one being heated red hot does not apparently undergo any change, but recovers its former appearance when taken from the fire; while the other burns away like touchwood or a fusee, or like the spunk prepared from Bol. ignarious, E.F. 132, or Fungus Tinder.

Mountain Leather.

Tab. 131.

Uranium oxygenizatum.

Oxide of Uranite

Class 3. Metals. Order 1. Homogeneous.
Gen. 3. Uranium. Spec. 1. Oxygenizatum.
Div. 1. Crystallized.

Gen. Char. Dark brownish gray, dull, soft, brittle, Spec. Grav. 6'44. difficultly fusible. Soluble in nitric acid.

Spec. Char. Combined with a large portion of Oxygen.

Syn.	Uranitic ochre.	Kirw. 2. 303.
	Grun Uranerz.	Emmerl. 2. 584.
	Urane oxidé.	Haüy, 4. 283.
	Uran mica.	Jameson.
	Uranglimmer.	Werner.

Cornwall has produced this substance but very sparingly. It is mostly imported from Bohemia, Saska in the Bannat, and Saxony, on a gangue composed of Pech-blende in a decomposing state, and was first discovered by Klaproth in 1789. It has been confounded by many with Muriate of Copper, & with Green Mica. Ours was labelled as Muriate of Copper from Cornwall, and it appears not to have been well known when

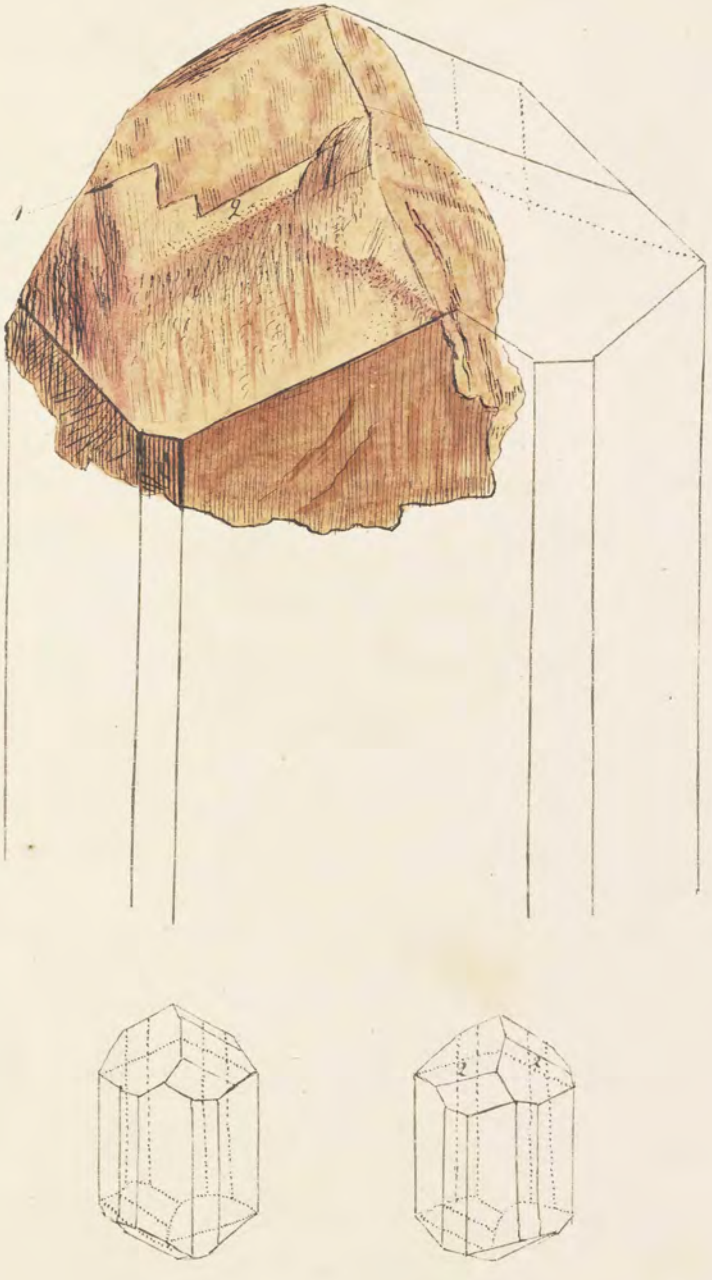
Mr. Rashleigh published his first part of Specimens of British Minerals, &c., for it was there called "Thin 4-sided Crystals of bright Green Copper One from Carharrack." Mr. Kirwan informs us of its being first taken for Green Mica &c by Werner, and afterwards for Calcolite.

The matrix of this specimen is Quartz, Arseniate of Copper, &c. Under the blowpipe it melts, becoming black.

Green Oxide of Uranite crystallized.

Tab. 132.

Perhaps one of the most curious circumstances which happens in this substance, is that of its crystals macling, which here they do, according to the literal sense of that word, as distinguished from the hemitrope. { A crystal one half of which is turned upon the other. — Haüy } this same from Aberdeen. It is part of a large Crystal, which includes some Quartz & a few specks of Mica, appearing at first a rude mis-shapen portion, to which I have added the outline for explanation. The Crystal is formed of two similar halves of different crystals, locked as it were into each other; — see the zigzag line No. 1. The lower left hand figure represents a single crystal, in which the same faces are seen as are mentioned in tab. 21^c; the largest terminal face being the primitive one; but the small faces are greatly increased in size. If this crystal were divided in the middle in the direction of the dotted line, & one half turned round, it would not be in the least changed in form, answering to Haüy's remark, 3.602. The right hand figure is formed of 2 halves taken from the similar sides of 2 different crystals (or, which is exactly the same thing, of two pieces cast in the same mould) each exactly corresponding with one half of the left hand figure. In this the primitive face is divided into two parts. and each part is brought to correspond with part of a secondary face fig. 2,



Macled Crystals of Feldspar.

Tab. 133.

Silex Quartzum.

Flints

Class 2 Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. 1. Quartz.
Div. 2. Imitative.

This coralloid flint was found at the bottom of the Chalk cliff on the easternside, at Rotten-dean Sussex; It is generally the nature of flints to be formed in some shape expressive of its having been in a state of solution. for although it is in a sort of stalactitic form, running like a gelatinous substance, yet it is always in a hard state, and looks as if it were almost recent, although it may have been many ages in the same state. Sowerby has a piece of Coral from Bristol which has flint & some Calcedony passing into its interstices. The figure No. 1 is from Sussex. No. 2 sent him by Col. Walford - No. 3 came from the Isle of Dogs. No. 4 shows the inside of the same, No. 5 picked up in a gravel pit at Tennington.

Some have considered these as parts of Mushrooms, such as Morels, &c petrified, some like marrow bones. others taken for a petrified Agaricus, shewing, as it were, the impressions of the edges of the lamellae, 3 or 4 inches in diameter and 8 or nine in circumference.

Imitative Flint Pebbles.

Tab. 134.

Silex Talcum.

Talc.

Div. 2. Imitative, in grains.

When it is found in a state as if it had suffered a change after it paſsing with the original rock and with the remains of other subjects and animal exuviæ, it aſsumes a new appearance. Thus it is found heaped in abundance in strata that seem to have originated from the fragments of rocks, as in the sandy marle {called there green sand} of many parts of Somersetshire, &c. The upper specimen came from Stourhead. The shell is formed of Lime, and the sand has some fragments of Lime amongst it, probably composed of broken shells &c., while the Chlorite is interspersed forming dark green specks. The shell is curiously divided by 5 large ridges, between each of which are 3 small ones. Sowerby found some sand nearly of the same nature at Charlton in Kent. curiously mottled or stratified with Chlorite: see the under figure; Woodward mentions greenish sand from Woolwich, p. 11. Dr. Clarke & Mr. Warburton have given Sowd. some sandy Lime from Castle Hill near Cambridge, where it is very abundant, & contains many petrifactions.

Chlorite Sand, Wiltshire and Charlton.

Tab. 135.

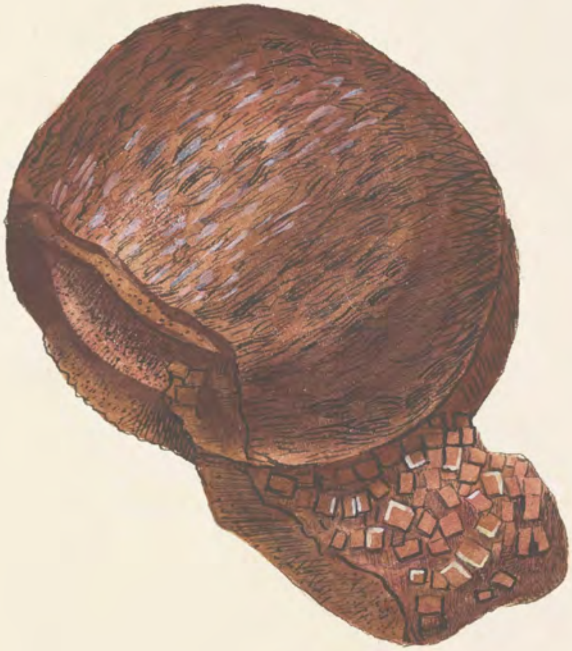
Ferrum oxygenizatum.

Oxide of Iron.

Div. 2. Imitative.

This specimen, although generally speaking it might be called an Hæmatitic Iron Ore, having most of the characters belonging to it differs from that substance in not being striated & in having more of an earthy fracture; it may however be placed near the Hæmatites. Whether it is a cast or change after crystallization may be difficult to determine. The lump at first looks like a globular Sulphate of Barytes (see tab 160.) with the plated or tabular crystals standing edgways, but these are probably derived from the decomposition of Pyrites; they are however each of them so much blistered or covered with bubbles (see the right hand side of the lower figure, tab. . a formation common to many Hæmatites) that they cannot be made out. The Hollow is lined very thin-edged, probably tabular, crystals, belonging to those of tab: . These are covered with a dark red or somewhat crimson powdery glimmer, sparkling like that of tab 165. and . .

The Stalk, or lower part seems to have been cubical Iron Pyrites: see tab. . and. . which are externally covered with bubbles. possibly the whole once formed a Sulphuret of Iron or Pyrites, and having lost the the Sulphur has become a mere oxide of Iron. Such fortuitous circumstances as this was formed by, sometimes give the shapes of pears, apples, lemons, &c. which are as highly valued as if true petrifactions, and are very often difficult to be accounted for, especially by those who have not seen a series of specimens. This specimen was found about the year 1799 near Staunton, about 5 miles from Ulverstone. Lancashire, where smaller balls have been found with the appearance of the inner part of this, which has been called velvety, downy, &c.



Red Oxide of Iron. Lancashire.

Tab. 136.

(Dr. Buchanan, whose researches in the East Indies are well known, brought some of the Breccia Rock, from Callender in Scotland, in which were found pebbles of Feldspath. As Feldspar of this description has not been y^t mentioned before, Sowerby was gratified in having the power to show it here, where he has added some other amorphous Feldspar, known by the name of Petunse in Scotland, found in various parts of the Pentland Hills S.W. of Edinburgh. This is of some esteem in manufactories of porcelain, being a fusible composition of Silex & Alumine, but varying in the proportion or quality. It often disappoints the workmen that gather it, as well as the manufacturers, and Quartz nearly pure has been sent to them as Petunse, especially for the white or gray sort, which has least Iron, and would consequently be of most value for their purposes.

Petuntse.

Tab. 137.

Argilla electrica.

Tourmaline, or Schorl.

Claſs 2. Earths. Order 1. Homogeneous.
Gen. 4. Argilla. Spec. electrica.

Syn. Tourmaline . Kirw. 1. 271.
Le Schorl . Broch. 1. 226.
Schwarzer Schorl. Emmerl. 1. 95.
Tourmaline. Haüy, 3. 31.
Borax electricus. Linn. Syst. Nat. ed. 12. 1. 3 . 96.

This substance came from Penzance. Some curious curvilinear varieties of it from the Logan Rock. Some from Devonshire. This is remarkable for the largeneſs of the Crystals {Crystals of this are found more perfect at the Brazils, in Spain, Switzerland, &c.} though they are somewhat confused; but more so still from one end paſsing by fine straight fibres into the Quartz which accompanies it, giving it an appearance of a termination. The crystallized end is shown at the upper part of the geometrical figure on the left hand of the plate, and the other end on the lower part of the same figure in fibres.

The other figure is one out of a gangue of Mica from the neighbourhood of Aberdeen. These crystals are not very regular, but are remarkable for holding some garnets, imbedded in them; see the lower figure. Tourmaline by some is said to be distinct from Schorl, some think them only varieties of each other.

Tourmaline generally present straight prisms } Sir J. St Aubin is said to possess one crystal without a prism – a great variety { mostly blackish or dark-coloured sometimes showing a greenish or brownish colour at the transparent edges or flaws. The specimens from the Logan Rock are greenish, but those imbedded in Mica brownish. Some foreign specimens are remarkable for varying their colour according to the direction in which they are viewed. Tourmaline is well known for its electrical properties. The crystals have mostly a rich gloss, are smoothish, with more or less numerous striæ placed longitudinally on the prism, and horizontally on the pyramids, excepting when they are approaching to fibrous, as ~~below~~ above observed.

Crystallized Tourmalines in the Gangue.

Tab. 138.

Silex Quartzum
Laminated Quartz.

Div. 1. Crystallized.

The nuclei of crystallization often form in plates; but in the present instance, it should seem that, by some interruption of a particular nature in the diſsolving menstruum, the crystal could not be formed so smoothly and regularly as is common with crystallizing Quartz. and tab. . shows that it may be mixed with much foreign matter without altering the regularity of the crystallization. Thus the present subject is the more remarkable. This sort of Quartz has been found pretty frequently at Glaſsteening, in Cornwall, but I do not know if it has been found elsewhere. It has often Tin and decomposing Felſpar about it; and whether these or any other decomposible substances have been originally formed with it, and have since caused its decomposing as seems to be partly the case with the pebbles at tab. either way it is a curious circumstance, and may lead to some useful truth in the investigation of the nature of Crystallography, or to some other part of mineralogical science.

These are the usual 18-sided crystals interrupted in a peculiar manner.

The right hand figure is in plates a little oblique to the base of the pyramid or to the transverse section of the column. The middle figure shows them still more oblique: & the left-hand one shows the laminæ disposed lengthwise to the column, with an interruption of another set of laminæ towards the top. The upper figure has many other varieties.

Plated Quartz.

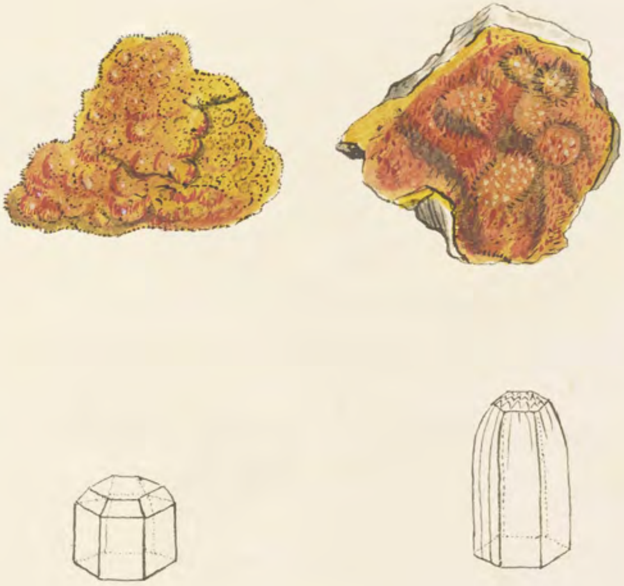
Tab. 139.

Plumbum phosphatum.

Phosphate of Lead.

Class 3. Metals. Order 1. Homogeneous.
Gen. 14. Plumbum. Spec. 2. Phosphatum.
Div. 1. Crystallized.

We have already figured Phosphate of Lead tab. 82. of this work. These beautiful little specimens show the yellow and oragaoge varieties, and two different modifications of the crystals, one bevelled on the horizontal edges of the column (see the right-hand figure), the other rounded on the same edges, approaching such as form spiculæ, formed of spiculæ side by side, by which we see an example of crystals forming of spiculæ or lengthening in their modifications to spiculæ; which often happens, according to circumstances, as other substances do in plates, as has been most commonly observed. These specimens came from Wanlockhead.



Crystallized Phosphate of Lead.

Tab. 140.

Barytes sulphata; var. stellata.

Stellata Sulphate of Barytes.

Div. 2. Imitative.

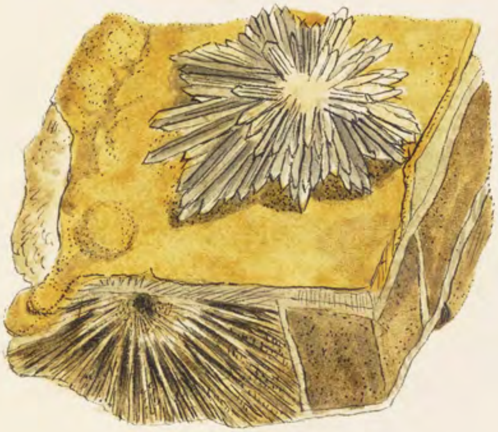
Syn. White semi-pellucid Spar. Woodward, 88. spec. a. 16.
Starred waxen-vein. Grew's Museum, p. 312.
Lepastrum. Hill. p. 146. tab. 2. spec. 1. 2.

This substance was once taken for Gypsum, or Sulphate of Lime; but is since found to be Sulphate of Barytes. To those that examine the crystallization it will be easier distinguishable, than by any other external character that we know of.

These varieties of Sulphate of Barytes are chiefly found on the Western side of Sheppy, in Kent; The marly cliffs of that place, perhaps raised by the deluge, and full of a great variety of antidiluvian relics, have been for years falling down in small or large masses. And from these cliffs are to be seen lumps of marle from the size of an Ostrich egg{ Those about this size are some-

-times called sea eggs by some of the guides; and when the divisions are lined with the yellower carbonate of lime, they have a more apt resemblance to eggs.} to several feet in diameter; in which these Sulphates of Barytes are concealed till the masses break to pieces. The larger lumps (commonly called Septaria, and formerly Ludus Helmontii), {mentioned in another place} most generally contain them in greatest perfection among the divisions or sort of cracks in the insides.

The upper figure is prettily relieved by the delicate yellow carbonate of lime, or waxen vein, as it is commonly called, which fills up the divisions, and the Lepas &c are generally fixed on the calcareous partitions, which are often crystallized, varying in colour and thickness, and number of coats. This specimen is remarkable for having a Star on the side, placed immediately on the argillaceous marle, which is represented divided by the carbonate of Lime.



Stellated Sulphate of Barytes.

Tab. 141.

Calx carbonata; var. inversa.

Inverted Carbonate of Lime.

Div. 2. Crystallized; var. inverted rhomb.

When there is much Carbonate of Lime, as at Portland Island, there may be expected much variety. Thus there are some varieties of that sort used for building, see tab. 59. 2 also some of the crystallized, see tab.107·2216 as well as tab.142 the present specimen is rather a whimsical one, showing how nature sports, yet conformable to a certain regularity. The last aggregation of molecules had apparently formed nuclei of inverted rhombs, arranging themselves something like an inverted pyramid - see left hand figure, tab.142. The present specimen has a great variety of three sided pyramids, nearly regular, or with prominent sides, { see the left hand lower figure, } and with various kinds of bases, as in the other separate figures.

Pyramidal Carbonate of Lime.

Tab. 142.

Calx carbonata; var. radiata.

Madreporite? or Radiated Carbonate of Lime.

Div. 2. Imitative.

Syn. Madrepor-stein. Journal des Mines, n°. 47.
p. 831.
Madreporite. Haüy, 4. 378.

This has been rendered of more consequence, since it is a curious example of the utility of the knowledge of crystallization, which in this case distinguishing it from a coral; and might have made the substance called Madreporite better understood. It is said "The Madreporite belonging to the claſs of calcareous stones, found by M. de Mollé some years ago at Ruſsbach thall, in the county of Salzburg, is a stone of transportation. Some specimens weigh from twenty to thirty pounds." "Externally it resembles basaltes, so much, that some

Mineralogists considered it to be the same; others believed that it was produced from Madrepores; but it discovers no certain characters of a primitive organic formation: besides it has no great a resemblance to the real Madrepores, that it has thence borrowed its name. It is of a gray colour, composed of divergent prisms, brilliant on their transverse fracture, and of a black and duller colour on the longitudinal fracture. The fracture exhibits a tissue of small bent laminæ; it is entirely opaque, brittle, rough to the touch, and moderate hardness; the intervals between the bundles which compose it are in part filled with small white leaves of calcareous Spar." There are three or four analysis of this substance. according to Motté, a hundred grains of it contain,

Lime	$63\frac{4}{10}$
Alumine	$30\frac{2}{10}$
Iron	$10\frac{10}{15}$

Analysed by Klaproth, it was found to contain,

Carbonate of Lime	90 00
——— Magnesia	0 50
——— Iron	1 25
Charcoal	0 50
Sandy Silex	4 50
An atom of Oxide of Manganese	
	99 75

Like the Madreporite at first sight it looks like Basalt and somewhat resembles a Coral, or Madrepore, and shines one the transverse fracture; viz. on the faces of the primitive rhomb which discover it: indeed we know of nothing in the description that does not sufficiently accord with ours. The small bent laminae are a consequence of the radiation — see tab. 114 This is an example of one of the dullest specimens of Carbonate of Lime of the crystallized and divergent kind, dulled with adventitious matter: thence the variations of the analysis.

Radiating Carbonate of Lime, or Madreporite.

Tab. 143.

The Lepastri vary in general form; but not much in their crystallization; that is to say they vary in the height, largeneſs, and ſpreading of the group. Thus there are 4 the most general appearances of these aggregated stellæ, which perhaps ſufficiently are described by the figures. It may however be observed, that the ends of the crystals generally incline downwards; indeed they are rarely otherwise. The piece of Septarium is covered with two coats in this ſpecimen, as well as the last, but is of the more usual colour. The coat on the left hand side appears to be just forming.

Stellated Sulphate of Barytes.

Tab. 144.

Calx Carbonata.

Crystallized Carbonate of Lime

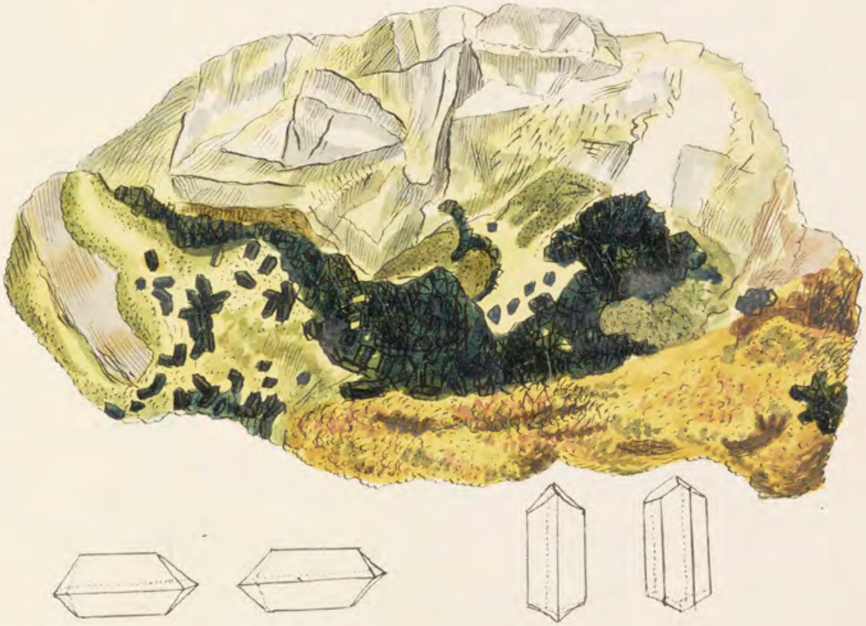
Class 2. Earths. Order 1. Homogeneous.
Gen. 3. Lime. Spec. 5. Carbonate of Lime.

This curious specimen is from Wanlockhead in Scotland. Besides the whole group being formed like a cone, the individuals are a curious crystallization with a three sided column somewhat rounding and truncated at the apex, and a central depression. The sides of the column are again divided into 4 facets, better understood by the figure. The apex is formed by a 6-sided facet. It does not resemble hard Carbonate of Lime. It is formed from the edges of the nucleus or primitive rhomb, with the obtuse angle upwards; the laminæ decrease less than in the metastatic, and consequently form a longer pyramid, which, as it is inclined to be rounding, cannot be measured. The truncations nearly on the column & those on the pyramid give it an odd appearance more especially that on the apex, which has a rising margin. The specimen towards the bottom is a little coloured with ochraceous Oxide of Iron, & in some parts are a few blotches of decomposing Pyrites.

Crystallized Carbonate of Lime.

Tab. 145.

In describing the crystals on this specimen I may use the words of Count Bournon, who after speaking of the elongated octaëdron of the other arseniate of Copper mentioned in another place, says "The angles of 96° are replaced by a plane which is equally inclined on the adjacent sides, and is frequently very broad. Then the tetraedral prism is changed into a flat hexaëdral prism having two angles of 84° ~~replaced~~ and the others of 138°." The Count never saw the angles of 84 °replaced." The average Spec. Grav. of this Arseniate of Copper taken on five pure pieces was 4·280."



Arseniate of Copper.

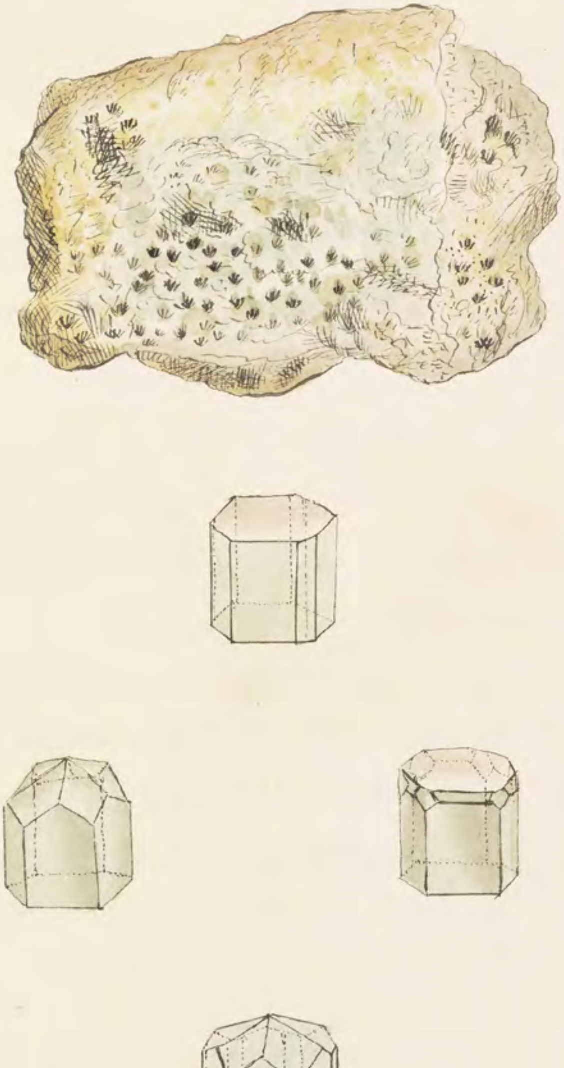
Tab. 146.

Calx phosphata.

Phosphate of Lime.

Div. 1. Crystallized.

This specimen shows some of the varieties in the truncations & bevillings of the hexaëdral prism, from the alternating truncated edges — see the upper geometrical figure — to the more complicated. — see lower figure. The gangue is commonly talcose with oxide of Tin and with Quartz, sometimes with Fluor, Felspar, & rarely white Topaz, as in this specimen. The prevalent quality of Talc often gives it a waxy appearance, & this is peculiar to this rock, which, thus differing from the general appearance of rocks, has been supposed to be & even sold for Apatite itself. Apatite has been confounded with Beryl by the Chemist Trommsdorf, who thought it to contain a new earth, which he named Augustine, but now altered. The upper geometrical figure shows the prism truncated on the three alternate vertical edges. The left hand figure below shows an hexaëdral pyramid placed on the solid angles of the prism. The right hand figure shows facets that are on the horizontal edges & solid angles. The lower figure shows both ends, forming the alternating pyramid, giving 4- and 6-sided facets to the prism.



Varieties of Phosphate of Lime, or Apatite, crystallized.

Tab. 147.

Plumbum sulphureum.

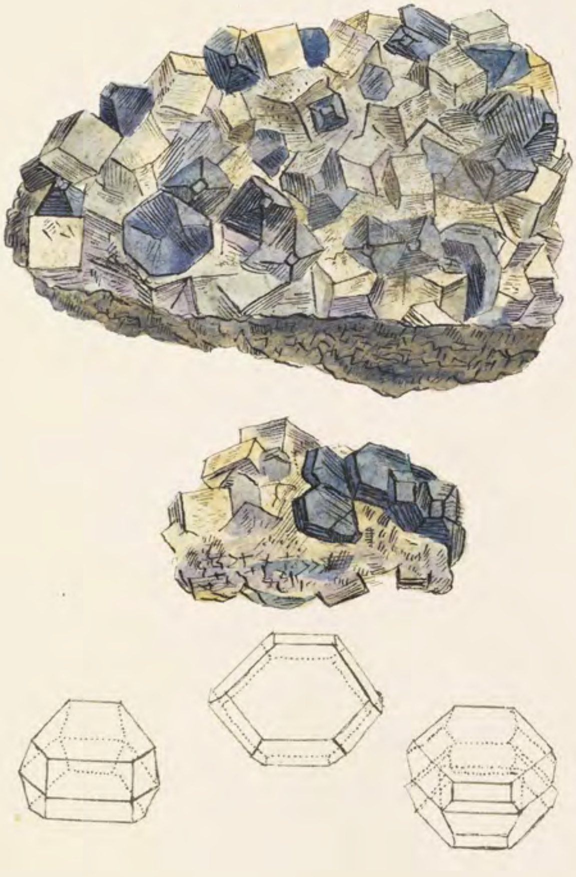
Sulphuret of Lead.

Div. 1. Crystallized: var. Cubo-octaëdron compreſsed and mackled.

The primitive cubic crystals of this substance are seen in tab.87. It is not rare to see the corners truncated, which are the faces of the octaëdron; thus it paſses to what has been called the cubo-octaëdron - see the description, and tab.181. It has been lately observed that Sulphuret of Lead, or Galana, has rarely been found in 6-sided tables; and those who have the few so found, think much of them on that account; and it is certainly a curiosity when we see a substance so decidedly fracturing in cubes to find it forming the octaëdron, which it often approaches, and sometimes does most perfectly - that a combination of these forms should be deposited, and at the same time with two of the faces, much broader than the rest, or other 12; viz. six hexangular faces of the octaëdron, and 6 - rectangular faces of the cube - see the middle geometrical figure: that these should again be be so deposited in crystallizing, as for two to meet with two of the broader faces as a basis to each, of the nature of that of the marble, tab. 91.; and like that they will meet at opposite angles, as if turned on an axis.

Thus the 6-sided faces of the octaëdral formation, and the right-angled ones of the cube formation, may meet opposite, as at the right hand figure, or alternate as on the left hand figure.

The upper figure is from the Marchioneſs of Bath
cabinet, and contains most of these modifications.
The lower one is from a specimen in my own cab.
both came from Derbyshire.



Hexangular, or 6-sided Sulphuret of Lead.

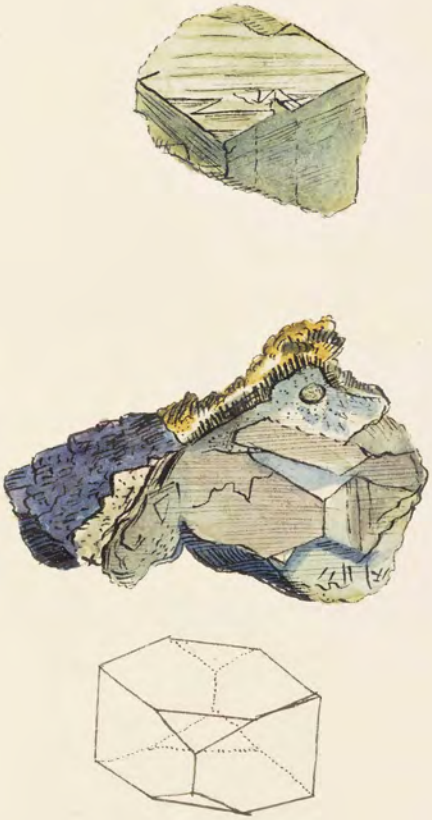
Tab. 148.

Plumbum carbonatum primitivum.

Primitive Crystallized Carbonate of Lead.

Class 3. Metals. Order 1. Homogeneous.
Gen. 15. Lead. Spec. 4. Carbonate of Lead.
Div. 1. Crystallized.

This specimen is a great curiosity, as it does not seem to have been before known that Carbonate of Lead crystallized in rhomboidal prisms. Haüy seems to think the octaëdron to be the primitive figure; indeed we have been able in some specimens to trace all but 4 of its fractures; in some respects it is similar to Sulphate of Barytes. The angles of this rhomboidal prism are 76° and 104°; the laminæ are very distinct on all the faces. Carbonate of Lead, when we find it so nearly resembling this substance, may soon be discovered by the help of the blowpipe in procuring a little globule of Lead from it on the charcoal. They both form a nearly opaque glass: but if the heat is continued, the one will of course be reduced to Lead, and the other will remain unaltered.



Primitive crystallized Carbonate of Lead.

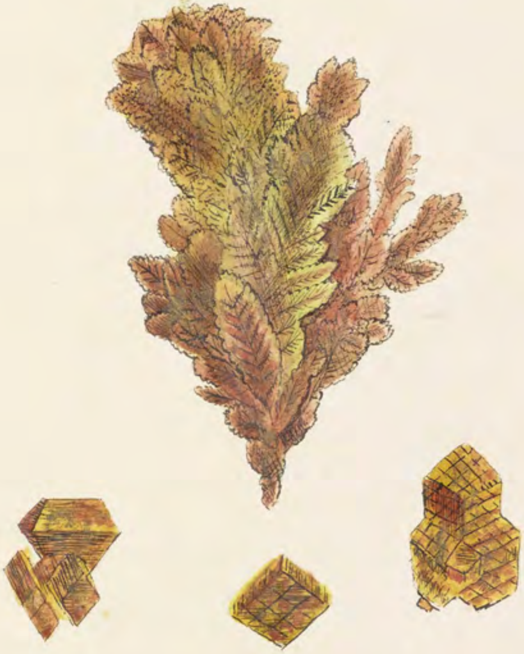
Tab. 149.

Cuprum nativum.

Native Copper, Leaf-like.

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 10. Cuprum. Spec. 1. Nativum.
Div. 2. Imitative.

This is nearly in a pure state, comes from Huelvor near Redruth in Cornwall. curiously shows how the Copper is held in solution, and the solvent subsiding from it, leaving it in a state to explain the nature of the particles cohering, while supported by a sort of reciprocal gravity in the solvent, which allowed it to expand almost in distinct nuclei, by masses in the form of leaves (Minerals approach nearer to vegetables than have generally been suspected. The present specimen resembles the Fucus Hypoglossum, or ruscifolius, in the leaflets coming from the middle of the larger foliage.) the primitive rhomb has not been before noticed; it seems in this instance to form into the octaëdron; — see the left hand figure. The other figure shows the 2 sides of the plates chiefly formed of rhombs. these being irregular could not be measured. The octaëdron — see the left hand fig. — and the rhombs in its direction seem to agree with the native coppers, and partly modify hexangular plates as they partly do in these specimens, and into consequently double hexaëdral pyramids; see tab. .



Native Copper formed into Leaflets, from Cornwall.

Tab. 150.

Silex Talcum.

Talc.

Div. 1. Crystallized.

Syn. Talc, Venetian Talc. Kirw; v. 1. 150.
Talc. Haüy, t. 3. 252.
Chlorite. Kirw. v. 1. 147.
Talcum viridans. T. lamellare, and many others. Linn, ed. 13. t. 3. 51 et seq.
Mica Talcosa. Ibid. t. 3. 59.
Talk. Emmerl. t. 1. 391.

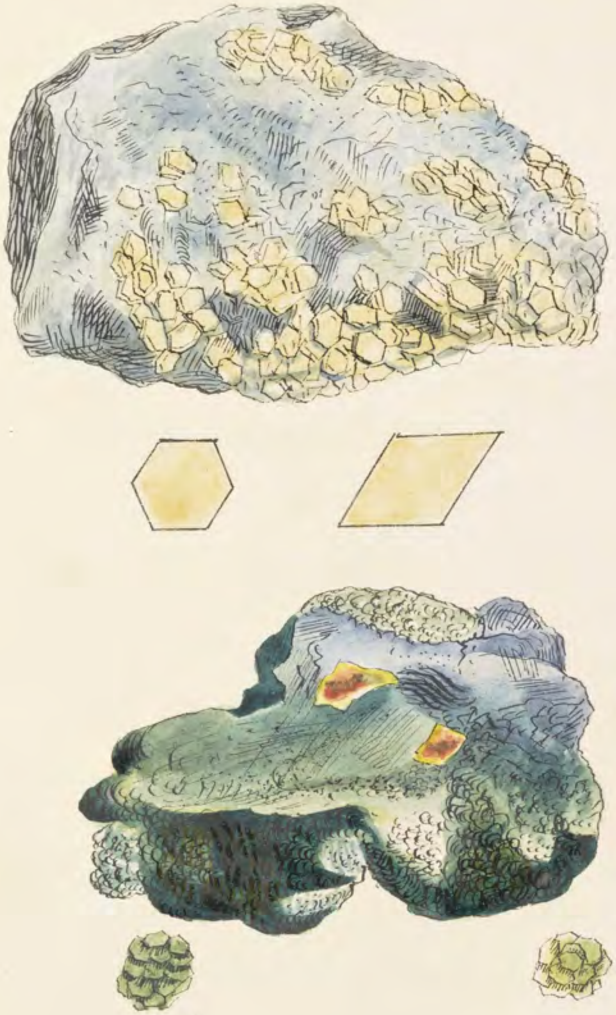
Chlorite is not a scientific name, according to our present improvements in mineralogy, as it is perfectly confined to a green variety of Talc, found either in small laminated crystals, granular fragments or masses, or disseminated through Quartz, &c. Its grain is sometimes very fine. I find in this latter state it is scarcely known by any one, or any green earthy substance may be confounded with it. Talc and Mica, as observed under tab. 128., have been till lately much confounded; but Mr. Kirw. has since more defined it. The Upper specimen came from

Stenna - Gwyn in Cornwall, where it is found in abundance, often holding Phosphate of Lime, among Quartz, and decomposing Feltspar; whence the rock itself is often called Apetite, the old name of Lime. Abundance of Oxide of Tin often accompanies it. This is a variety of Talc, agreeing whith that called Chlorite in every external character except colour, which instead of being green is that of cream. The lower specimen has the usual colour of Chlorite, which is undoubtedly to be attributed to a large adventitious mixture of Iron, which at the same time renders it easily fusible. Mica and Talc seem to have the same forms in their crystals, but Mica is not so well defined. These Crystals are very soapy to the touch, particularly if bruised. The laminæ are easily broken, and divide in minute greasy scales; which property has rendered this fossil an ingredient in cosmetics. The white varieties are difficultly fusible. White Talc analysed by Hoëpffner was found to contain:

Silex	50
Magnesia	44
Argil	6
	100

Chlorite by Vauquelin:

Silica	26·0
Argilla	18·5
Magnesia	8·0
Oxide of Iron . . .	43·0
Muriate of Soda & Potash	2·0
Water	2·0
Loss	0·5



Crystallized Talc, Chlorite, &c.

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Tab. 151.

Calx carbonata.

Phosphate of Lime, or Apatite.

Class 2. Earths. Ord. 1. Homogeneous.
Gen. 3. Calx. Spec. 3. Phosphata.
Div. 1. Crystallized.

Syn. Gemeiner apatit. Emmerl. 1.502.
Chaux phosphorée, Apatite. De Born, 1.363.
Calx, combined with Phosphoric Acid. Kirw. 1.128.
Amethyste basaltine, De Lisle, 2.254.
Chaux phosphatée. Haüy 2.234.

Apatite has not long been known as a native substance of Gt. Brit.n it has only been found at Stenna-Gwyn, Corn.l In many instances the crystals are so small & so much imbedded in talcose rock as scarcely to be seen, & not uncommon for the Rock itself or Gangue to be thought Phosphate of Lime altogether. this specimen is curious as it shows the primitive crystal, & the nature of its fracture which is distinctly seen. it also shows some of the various tints, such as purplish, blueish and greenish, natural to it though rather paley { Since rec.d a fine opaque white specimen-water blue 4 in. in length }. Apatite is infusible by the blowpipe. Powdered, & thrown on red hot coals it emits a ~~red hot~~ yellowish green phosphorescent light. soluble in muriatic acid & the solution becomes gelatinous. This plate shows the integrant molecule, a regular triangular prism. fractures distinct & also the primitive hexangular prism. in Spain & Germany it constitutes large mountains.

Phosphate of Lime, or Apatite, crystallized.

Tab. 152.

Ferrum suboxygenatum.

Suboxide of Iron. Magnetic Iron Ore.

Div. 3. Amorphous, in Grains.

Sowerby received some sand from Hunstanton, in Norfolk, of a blackish appearance. On looking attentively at it he thought attractible iron might be the cause of its blackness & found it to be so.

Some was found in a common looking bog at Scarborough, some when he received some Iron Sand from Wicklow. In examining this it evidently betrayed its habitat by minute particles of gold, besides which it has Octaëdral Iron Ore more or less oxidated and some cubic Pyrites, Pebbles &c.

Sowerby also received some Arena ponderosa as it is called from the Ferry of Ardentinny in Argyleshire, where it is found in great abundance washed out of the banks of the sea. it was together with octaëdral crystals, small, black, abundant, and very attractible.

The right hand upper figure is of the pebbles and sand from Hunstanton in a heap, and the particles of Iron of the size generally found, by the side. The figure underneath is such as is found when the Sea has washed it and oxidated it. The five pebbles on the side magnified are three common Quartz pebbles, which compose common sand, and two darker, chiefly Oxide of Iron. The left hand upper figure is the Irish Sand, and the figures on the side show the octaedron Cube, Gold, and Pyrites. Beneath is the outline of a magnet, and the Iron in common as attached by it at the base. The middle figure is a parcel like that from Scotland, or such as has been separated from the other sands.

Thus it appears that this sort of Sand which was supposed to be only found in America, has now been produced from England, Scotland, Ireland.

Magnetic Iron Sands from different places.

Silex Prehnites

Tab. 153.

Prehnite

Class 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. Prehnite.

Syn. Prehnite. Haüy. 3.167. Kirw. 1. 274.
Schorl en gerbes de Schreiber. Prehnit. Emmerl. 1.192.
Zeolithe verdatre. De Born, 1.203.
Chrysolite du Cap. De Lisle, 2.275.

Prehnite was said to have been first discovered by Col: Prehn, who brought it from the Cape of Good Hope; Haüy says citizen Rochon was before hand with him. It is now found in many parts of Scotland. This specimen came from Dumbarton; and when examined exhibits a curious arrangement of crystals, in groups, forming hemisphærically, and showing faces which are the edges of tabular crystals arranged somewhat in segments of circles, having the larger crystals in the centre; see the Left-hand lower figure. These crystals seem to betray signs of 8 faces besides the two broader ones, like the right-hand figures. The nucleus could not be determined; it seems however, to be a nearly rectangular table, as expressed by the dotted lines; thus the corners are as it were unfinished, or truncated. The Upper figure is of the natural size; the lower one, for the sake of explanation is magnified. This fossil lines the cavities of a sort of Kragg of Kirwan. The Crystals are also found at Salisbury Craig. The substance is sometimes found amorphous, as at Kings Park.

Crystallized Prehnite

Tab. 154.

Calx carbonata, var. ferrifera.

Ferriferous Carbonate of Lime.

This specimen came from Andtjin mine 8 miles from Bodmin, Cornwall. curious as some have said Carbonate of Lime was not to be found in that County. The whiter part of the specimen is a cavity handsomely filled with crystallized Carbonate of Lime of a very uncommon modification, being nearly a hexaëdral plate with the equiaxe and primitive bevellings, if they may so be called. It is curious the external surfaces of these crystals are whitish and the inside a rich dark brown, as the darker surrounding parts show. Tab 162 British Mineralogy is nearly of the same nature, but under common exposure to the air becomes blacker. This specimen has many other curious circumstances of change and position of mineral substances attending it: viz. the redder parts are a sort of Carnelian Quartz somewhat approaching Chalcedony, coloured by a rich Oxide of Iron, and this is sometimes covered by Cachalon: see British Miny. tab. 188

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Besides this there are yellow spiculated tubes. almost crystallized, radiating, &c. These are to be con- as forming over wire-shaped Pyrites; see British Min. tab. This has decomposed in some parts, leaving the hollow where it has been with enough to show the appearance of a wire as the fracture in some parts on the opposite side shows; perhaps it may be between Eisen Kiesel, or the German Iron flint, and Carnelian. Some gray Calchalon covers the carnelian in the hollow as represented at the top of the figure. The yellow Quartz seem to be coloured by yellow oxide of Iron, probably the decomposed Pyrites.

Ferriferous Carbonate of lime with calcedony and quartz.

Cuprum carbonatum. Tab. 155.

Carbonate of Copper.

Class 3. Metals. Order 1. Homogeneous.
Gen. 9. Copper. Spec. 3. Carbonate.
Div. 2. Imitative.

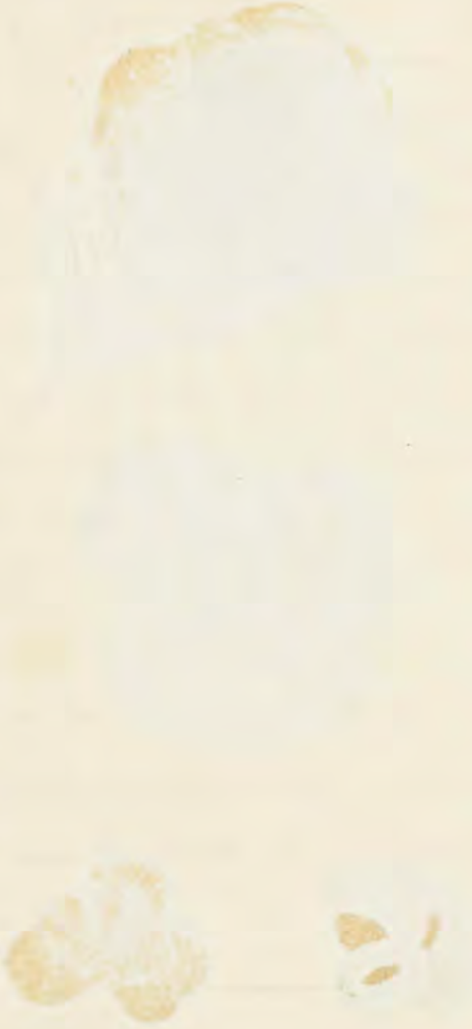
This specimen is a rare modification of carbonate of copper. The upper figure is remarkable for being on the broken end of a large milky rock crystal. The other stands on the crystallized ends of the rock crystal, & is a much larger specimen; part of it only being figured.

This mineral was first considered as an arseniate of copper, but we have every reason to suppose it to be a carbonate.

The spiculæ are curiously disposed like radii round the edges of a thickish lenticular nucleus.

Both specimens are accompanied by a few crystals of each variety of arseniate of copper, fig. at Tab. 97.

Peculiarly Radiated Carbonate of Copper
Cornwall.



Tab. 156.

Barytes sulfata.

Sulphate of Barytes.

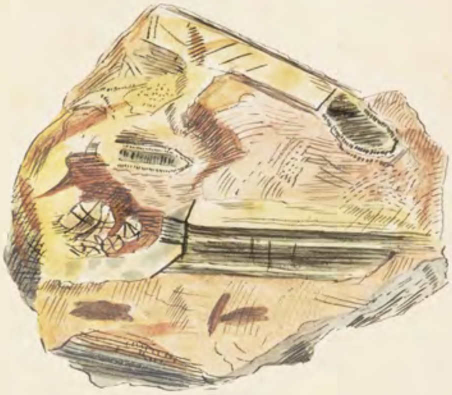
Class 2. Earths. Order 1. Homogeneous.
Gen. 6. Barytes. Spec. 2 Sulphate
Var. 1. Crystallized.

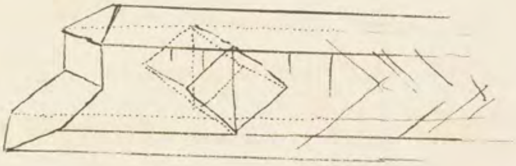
This curious specimen came from Cumberhead lead mine, at the head of Nethan river in Ayr-shire.

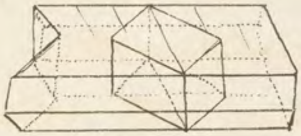
It is remarkable for the crystallized sulphate of barytes being immersed in amorphous sulphate of barytes. Not having before seen a fracture that indicates the integrant molecule, this is made use of to show the form of one. It is certainly very rarely to be fractured parallel to all its faces, some of which are not to be seen, & it should seem that Haüy had only observed them by the scintillations within the crystal. To explain the nature of the crystals formed in the upper figure, a distinct outline is drawn in the middle one, including the nucleus, to show its situation. It will be easily seen that the perpendicular face at the left hand end (the faces at this end are all fractured ones) is parallel to the diagonal division of the nucleus, and the oblique fracture is parallel to one of the faces of the rhomboidal prism; the perpendicular lines indicate a continuance of the diagonal fracture, the others a continuation of the rhomboidal fracture. These are extended in the specimen more or leſs perceptibly until lost in small nuclei, at the right hand end of the crystallization.

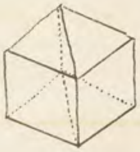
The third figure may help to familiarise these things by its being placed in another position, and showing similar facts. The lower figure shows the geometrical divisions of the nucleus into two molecules, by means of this fracture parallel to the shortest diagonal of the rhomb.

Having seen this, we cannot doubt the opinion of Haüy, that there may be a fracture parallel to the longer diagonal, dividing the molecules above mentioned into two: thus four upright triangular prisms form the rhomboidal prism or nucleus, each being an integrant molecule.









Sulphate of Barytes in transparent crystals, included in amorphous Sulphate of Barytes.

Scotland.

Silex Quartzum. — Tab. 157.

Div. 1. Crystallized.

These curious specimens are said to contain Arsenical Cobalt. They came from Poultney mine, and are rare, on account of the mine having been destroyed by the overflowing of a river. The Quartz are more regularly 18-sided than usual, although it is as it were clogged up with such abundance of a metal, that it otherwise would be nearly obliterated in its character; and that it should crystallize under such circumstances, distinctly and at both ends regularly, many as if heaped on each other, as in the top figure is very remarkable. There appears to be little else than Arsenical Iron among them, but capillary Silver and flowers of Cobalt are sometimes to be seen very distinctly about the gangue.

Crystallized Quartz said to contain Cobalt.

Tab. 158.

This specimen came from Hartfield near Paisley, and leads to a curious modification. The crystals are arranged in double stellated groups, the radii of each extending so as to meet at the edges, like the spokes of two wheels placed against each other, contrary to their position on carriages; the periphery of the wheels coming together; the edge forming one circular face; see the left and right hand figures. These are grouped among roughish indistinct semi-orbicular masses. The colour is not so attracting as the formation being dull and brownish. This mineral is formed in the cavities of Kraggrock somewhat approaching Porphyry.

The crystals are nearly similar to those of Tab. 153. but the secondary faces being larger, the terminal one is lost in an edge.

Crystallized Prehnite, a variety.

Tab. 159.

Cuprum arseniatum.

Arseniate of Copper.

Class 3.. Metals. Order 1. Homogeneous.
Gen. 9. Copper. Spec. 8. Arseniate.

Syn. Bournon. Phil. Trans. for 1802.

This beautiful specimen of Arseniate of Copper came from near Gwenap. The crystals are spoken of by Count de Bournon as his third variety, "perfectly regular for a part of their length, and fibrous at their extremity." The present specimen has these crystals with apparently 4 sides of the octaëdron, lengthened into filaments, and divaricating a little from the centre, forming altogether a sort of brush, narrow at the base, widening towards the apex, and terminating a little abruptly in a sharp or angular point. They are of a dark dull green, some-what transparent, the ends being generally more opaque and lighter, owing to their fibrous nature: some crystals are of a darker green colour and more confused: see the left hand figure.

The gangue is chiefly quartz, somewhat plated and ochrey, and has intermixed with it bright green arseniate ? of copper in irregular granulæ: see the right hand figure.

Pencillated Arseniate of Copper.

Tab. 160.

Div. 2. Imitative.

This variety of Sulphate of Barytes has obtained the name of cauk among the miners; but for what reason Sowerby knows not. It has also been called terra ponderosa. This sort here figured is frequent in Ecton mine, Staffordshire. It is not uncommon in other places, but of a less regular spherical form. It is generally accompanied by carbonate of Lime, fluor, galena, blend, iron, and copper pyrites, &c. and is most frequently white. Sometimes it is coloured by oxide of iron, & is then yellowish or reddish. The Upper Specimen came from Ecton mine, and is accompanied by calcareous spar and pyrites of various forms & hues. The internal Structure is confusedly laminated, showing signs of crystallization, arranged in the form of a ship sphere; these laminæ are extremely close, & often confused, or so thin that no determinate form can be made out having only the appearance of segments of circular plates, sticking edgeways by the side of each other: see tab. 100.

The whole are sometimes attached by a greater or smaller base, so as to be nearly detached spheres; at other times only half a sphere or leſs.

At Buxton in Derbyshire, detached balls are found, not far underneath the surface of the common earth: see the three figures in the middle.

They seem to formed among loam, and partake of an ochraceous hue: the edges are frequently more separated, and leſs regularly rounded. They have occasionally attached to them single cubic crystals of fluor in a decomposing state: These are somewhat related to the celebrated Bolognian stone, which shines like phosphorus in the dark; & if heated hot in the fire does the same. They are allied to the liver-stone {found in Adrarium, in Scania} which has its name from its hepatic scent, derived from sulphuret of ammonia, or liver of sulphur. Varieties are found in Great Britain, which when rubbed give nearly the odour of Stink-stone: see Tab. 80.

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Sulphate of Barytes in irregular crystallized nodules commonly called Cauk. Staffordshire.

Tab. 161.

Silex baryticus.

Harmotome or Staurolite.

Class 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. Barytic.

Spec. Char. Combined with Barytes and Argil, fusible into a frothy enamel, with a greenish phosphorescence.

Syn. Staurolite. Kirw. 1. 282.
Harmotome. Haüy, 3. 191.
Kreuzstein. Emmerl, 1. 209.
Hyacinthe blanche cruciforme. DeLisle, 2. 299.
De Born, 1. 79.

British Staurolite has only been observed hitherto at Strontian in Scotland, a place famous for Carbonate of Strontian – see tab. . It is generally found on a gangue of Carbonate of Lime, which is mostly crystallized. Its common form is a quadrangular prism, with the lateral solid angles truncated and forming a 4-sided pyramid, alternating at each end; or in other words, making an elongated dodecaëdron, similar to that of garnet, but not of the same angle. Two of the opposite edges of the pyramids are mostly truncated, in British specimens. The Crystals are generally larger than in those of Andreasberg, and more nearly resemble those of Oberstein.

Harmotite is chiefly admired for often aſsuming a cruci-form appearance; looking like five crystals, four being united round a fifth. It appears however to be a regularity in the aggregating of the sides, without a sufficiency to fill up the lateral edges — see lower figure.

They have been called twin crystals, as if two had paſsd acroſs each other. The whole appearance is somewhat glaſsy, of a bluish pearly lustre, having a foliated fracture on the broader faces. In other respects it is somewhat conchoidal, and hard enough to scratch glaſs.

Fusible by the blowpipe into a frothy enamel. It does not form a jelly when combined with acids. But if thrown on charcoal it emits a yellow phosphoric light.

On analysis by Klaproth it was found to contain

Silex - - - 49
Baryt - - - 18
Argil - - - 16
Water - - - 15
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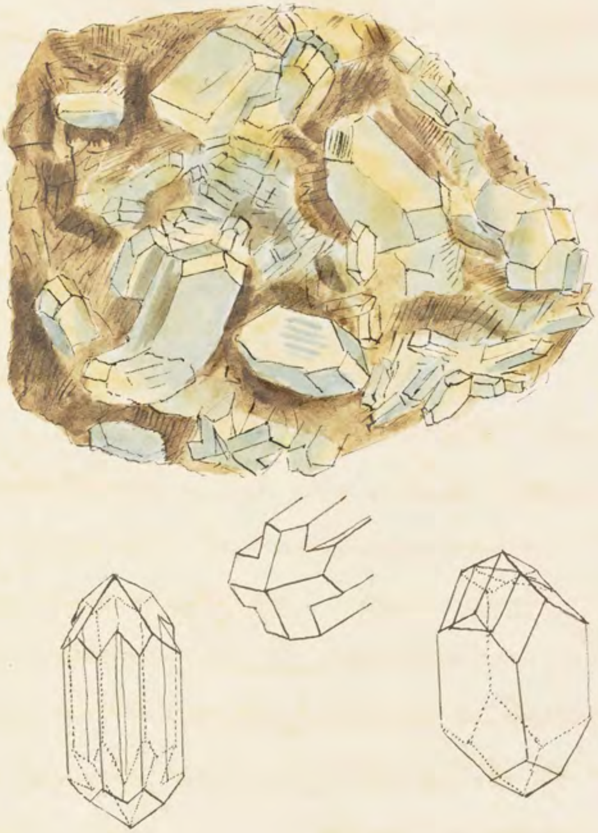
Its primitive form is said to be an octaëdron, divisible in the direction of the ~~diagnol~~ diagonals of the mutual base of the pyramids, so as to form 4 irregular tetraëdrons, or separate 4 solid angles, leaving a rhomboidal dodecaëdron, which might perhaps with more propriety have been called the primitive, to save confusion.



Staurolite or Croſs Stone.

Tab. 162.

This is nearly the same as. Calx carbonata ferrifera, var. lenticularis see p. 239. with very flat lenticular crystals standing edgeways, of a dull rusty appearance the matrix nearly of a similar substance, with some lustre. The whole shows the gradation of tints, and the fresh fractures are lightest, as is common in these varieties. The left hand fig. has some signs of the triangular and other faces partly remaining; in the right hand figure they are entirely lost; The middle figure exhibits a transverse section, fresh broken, with signs of the confused rhomboidal fracture.

Lenticular Crystallized Carbonate of Lime.

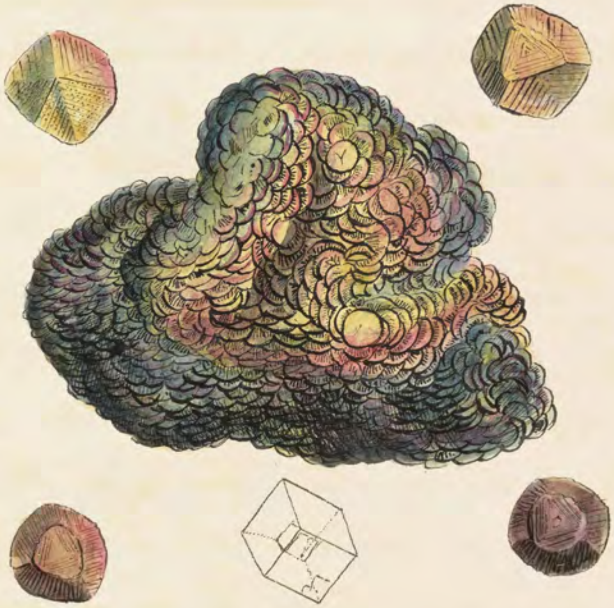
Tavistock.

Tab. 163.

Calx carbonata ferrifera, var. lenticularis.
Spathose Iron Ore; Lenticular crystallized Carbonate of Lime.

Class 2. Earths. Order 1. Homogeneous.
Gen. 2. Lime. Spec. 4. Carbonate of Lime.
Syn. Calcareous or Sparry Iron Ore. Kirw. v. 2. 190.
Spathose Iron Ore. Bab. 201.
Spathiger eisenstein. Emmerl. v. 2.329.
Chaux carbonatée ferrifère lenticulaire. Haüy, v. 2. 178.
Mine de fer spathique. De Lisle, v. 2. 281.

This singular group of spathose iron ore, as it is often called when gathered with the iron ores of Devonshire, may with as much propriety be called calcareous spar. The crystallization is found to be as it were intermediate between the latter and the former. The top left hand figure shows the primitive rhomb somewhat flattened, formed by aggregations of the primitive rhombs of calcareous spar. See Tab. 38. 39. 61 The right hand upper figure differs only in having the apex truncated, and the edges having rounded facets. The lower left hand figure shows the same with the rounded facets having become the principal faces of the crystal. It is altogether rather flatter and rounder, The lower figure on the right hand is still flatter and rounder, and approaches more to the irony appearance. The first is a pearl spar of the usual light appearance, the second more coloured with iron, the next more so still, and the last most of all. They may perhaps contain a little manganese. The outline shows the position of the primitive rhomb in the upper figures. in the others it is situated as in the equiaxe. Some specimens came from Devonshire, some from the Isle of Man. They seem to indicate iron in their neighbourhood and may be useful in smelting it; but are themselves very deceitful, their appearance giving a stronger indication of iron then belongs to them: which will in general be detected by breaking, as the fresh fragment discovers them to be a mere lime-stone with a slight pearly tinge, which on being exposed to the common air and water will assume the same deceitful tinge as the former exposed parts. These have generally been reckoned among the lenticular ores, and may have deceived many by their external appearance.



Carbonate of Lime, variously coloured by Oxide of Iron. approaching the Lenticular. Crystallized with various modifications. Tavistock.

Tab. 164.

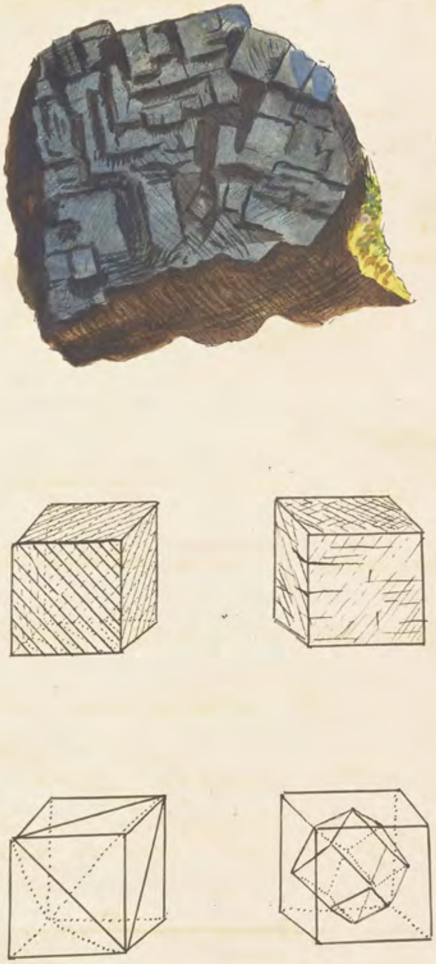
Zincum sulphureum; Var. cubicum.
Cubical Sulphuret of Zinc, or Blend.

Claſs 3. Metals. Order 1. Homogeneous.
Gen. 6. Zinc. Spec. 2. Sulphuret of.
Div. 1. Crystallized.

The rectangular or cubical formation of these crystals of Blend is, quite new to the Mineralogical World. Two specimenes have been sent from Cornwall, one marked from Tincroft, the other from Polgooth, and were probably from the stores of a miner who did not exactly know from what mine they were brought. The cubes of this specimen curiously show the diagonal striæ, and indicate the accumulation of plates upon the tetraëdrons, or more common modification {It may not be amiſs to remark that several other substances are striated in the direction of their principal modification, as Fluor, whose primitive is an octaëdron, but is generally striated in the direction of a cube; Oxide of Tin, &c. This arrangement of striæ is apt to mislead inexperienced observers.} See these more plainly marked on the upper right hand geometrical figure.

The right hand figure shows these marks more faintly like the original with the marks of the fracture parallel to the edges — see the figure beneath, which if carried regularly on every edge, would produce the rhomboidal dodecaëdron, one of the characters of Blend. The gangue is mostly copper Pyrites.

Since figuring this specimen Sowerby has met with a finer one from Cornwall with smaller distinct cubic crystals, or rather separate ones, much resembling Pyrites: the diagonal striæ however help to detect it. they are nearly gold-coloured, and iridescent externally, but dark like Blend within.



Cubical Blend. Cornwall.

Tab. 165.

Ferrum oxygenizatum.

Foliated Oxide of Iron.

Claſs 3. Metals. Ord. 1. Homogeneous.
Gen. 7. Iron. Spec. 3. Oxide of Iron.

Syn. Plumbaginous or Micaceous Iron Ore. Kirw. v. 2. 184.
Eisen-Glimmer. Emmerl. v. 2. 306.
Fer oligiste écailleux. Haüy v. 4. 45.

This curious variety of Iron ore is found in Wales, Scotland, Cornwall &c. It has the appearance of Iron with somewhat of the gloſs and the blackish grey tint of black lead, occasionally with the blue, purple and sometimes the other iridescent colours. It is more or leſs flat, irregular or undulating, in very thin broad laminæ, one over another. They have two sets of parallel lines croſsing each other obliquely, and forming the plain of a rhomboid~~al~~. It is found in rocks of quartz, and the Upper figure has some yellowish mica about it. The right and left hand middle figures show the parallel lines croſsing some fragments, and the undulating structure. It is not attracted by the magnet. It is very brittle, and easily breaks into small irregular fragments. The sparkling middle fig. is known by the common name of glimmer, or scaly iron ore, and often accompanies the above, as well as the black and red hæmatites. It is blackish or red occasionally. The little bright faces of the scales reflect the light with great brilliancy, particularly by candle light. { The engraving I copied this from the very substance was used to represent it } The biggest figure is among broken quartz or rock, covering the surface or filling little holes in a scattered manner. The lower figures are aggregated bundles, which are often found much larger: they have sometimes a tendency to crystallize in small rhombs, but Sowerby never saw any distinct enough to be measured. The angles appear to be the same as in the foliated part above, to which the lower evidently belongs. It is found in Devonshire. the same from Scotland The upper one was received from Wales.

Specular or Micaceous Iron Ore. North Wales and

Devonshire, &c.

Tab. 166.

Silex analcimus primitivus.

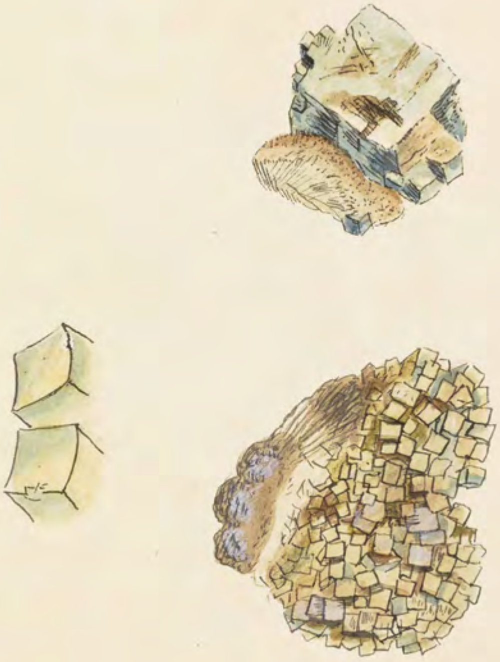
Cubical Analcime.

Claſs 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. Analcime.
Div. 1. Crystallized.

Although the Cubic Analcime of Haüy, or what is still by some called Cubic Zeolite, is not rare in some parts of Ireland, especially among basaltic rocks, yet we have had very little account of it. The present specimen came from Cave Hill near Belfast. Haüy distinguishes this foſsil as having fractures on the six faces {Those of the cube}, or in three directions only; but these specimens are not always easily procured; It is however sufficiently distinct from Fluor by its superior hardneſs, easy fusion into a transparent White Glaſs without ebullition, and want of phosphorescence; having indeed all the characters of tab. . except as to form. Sowerby has met with impreſsions of this with other Analcime, as well as small crystals imbedded in the radiated Analcime, or what is by some called radiated Zeolite, in the holes of basaltic Trap, if it may be so called, for it certainly is not Lava, with which this sort of Trap has been confounded. Sowerby hopes soon to be able to explain the difference. as to the nature of Basalt & Volcanic Trap which has caused so much argument.

The upper specimen shows an almost independent largish crystal. The lower specimen is a considerable group of small crystals, with sometimes curved or concave faces marked with diagonal striæ; see the lateral magnified figure.

This substance in these shapes occurs in many parts abroad, as well as in Scotland; but Sowerby does not think it has ever been mentioned as found in Ireland before.



Cubical Analcime.

Tab. 167.

This is the same substance as Zincum sulphuratum see tab. 196. The crystallization is a very curious one. The edges being truncated adding 6 faces which, with the truncations and the solid angles spoken of in tab. . make 14 faces. The latter faces may be triangular, like the three bottom ones, or hexangular like that at the top.

These are on a gangue of somewhat dirty green chlorite and quartz with Pyrites. The nature of the accumulation will be seen ~~when~~ where the primitive form is figured.

The well known semimetal Zinc, is often used as a principal agent in galvanism, for making of brass, &c. is extracted from this ore.

1-75

Tetraëdral Blend or Sulphuret of Zinc, truncated.

Tab. 168.

Cuprum arseniatum.

Arseniate of Copper.

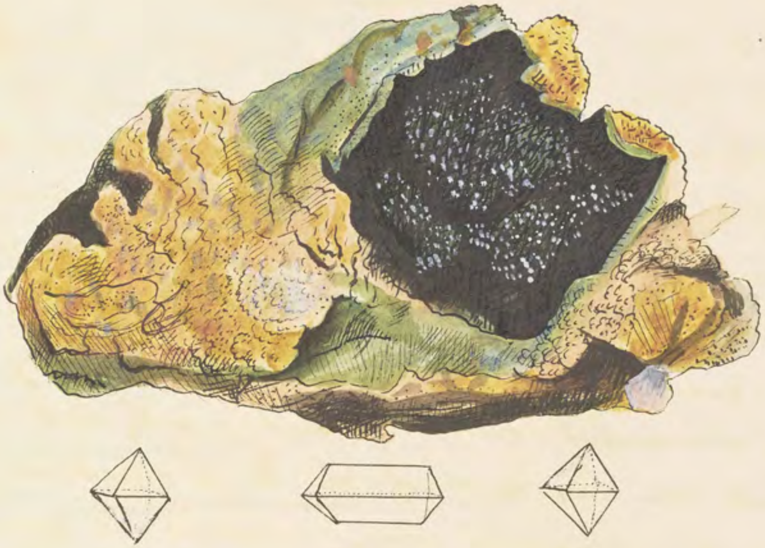
Class 3. Metals. Ord. 1. Homogeneous.
Gen. 10. Copper. Spec. 8. Arseniate of.
Div. 1. Crystallized.

Syn. Arseniate of Copper. Bourn. Phil. Trans. 1801.

This is the 3d variety of Arseniate of Copper, which the Count de Bournon calls the acute octaëdron, in which the more inclined planes meet at an angle of 84°, and the others at an angle of 68°. The first variety or obtuse octaedron is fig. in tab. 97. and 90 and the second variety in hexaëdral plates tab. 66. The present is mostly of a darker colour than the others, commonly a bottle green. Like many crystallizations it is somewhat rounding but mostly with concave faces, which are here noticed in the geometrical figure as well as the straighter one, and also the manner of the elongation of the octaëdron towards forming a prism, which it often assumes by being placed on one end; thus at first sight giving a new idea, and forming a 4-sided prism with a diëdral summit.

By the analysis of Mr. Chenevix, this species is found to contain

Oxide of Copper	60
Arsenic Acid	39·7
	99·7



Arseniate of Copper.

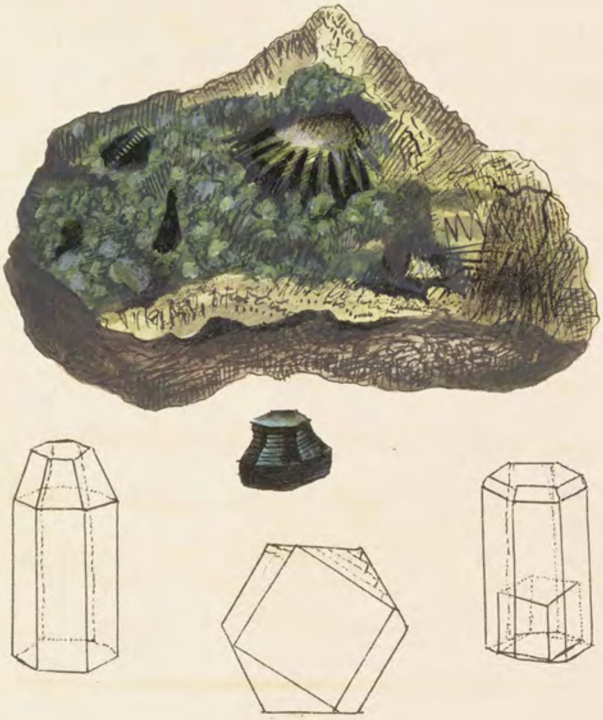
Tab. 169.

The rarity of this substance in determined crystals, especially in Great Britain, is a sufficient excuse for figuring a specimen of the present appearance, which has no pretentions at first sight to value.

Experience, however has shown us that in some things that rarely crystallize a characteristic specimen is a tolerable prize. The present has some small but determined crystals when examined carefully with a lens, and the little middle figure is a singular formation of hexangular plates, which being deposited at the lower part regularly in equal-sized plates, form an hexaëdral column. Those immediately above the column, diminishing by degrees, form part of a pyramid; and a few plates of a little larger dimentions, hanging slightly over at the apex, seem to explain by this small irregularity, that the plates formed before they were deposited. The lower middle outline explains the primitive rectangular figure, and the accumulation on the sides, forming the hexaëdral plates. The right hand geometrical figure shows the rectangular primitive or cubic form within the column, which by a little thought may by a tyro be comprehended as the primitive form that accumulates to that of the left hand figure. The hexangular colourn has 4 angles of 121° and 2 of 118°.

The gangue is composed of Chlorite, Quartz, Oxide of Tin, and Arsenical Iron, or Mispickel. The specimen comes from Cornwall.

Tungstate of Iron has not, that Sowerby knows of, been found otherwise than crystallized, although the crystals are almost always interrupted. It may be known from most other substances by its peculiar fracture, which in the tabular crystals is perpendicular to their larger faces. It may be scraped by a knife giving a chocolate brown powder.



Scheelate of Iron, or Wolfram.

Tab. 169.

Barytes carbonata.

Carbonate of Barytes.

Class 2. Earths. Order 1. Homogeneous.
Gen. 6. Barytes. Spec. 1. Carbonate of Barytes.
Var. 1. Crystallized.

Gen. Char. Pulverulent, white somewhat pungent. Grav. 400. Soluble in most of the acids, & in 900 times its weight of water. Its nitrate does not tinge flame red. Its sulphate is nearly soluble. It forms a hepar with sulphur, which is poisonous. Bab.

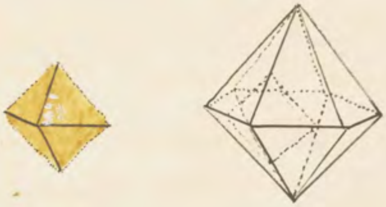
Spec. Char. Combined with carbonic acid.

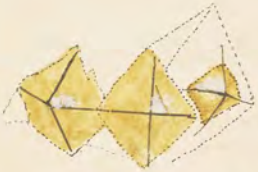
Syn. Barolite or aërated barytes. Kir. v.1.134.
Witherite. Syst. Min. Jameson, p. 573.
Witherite. Emmerl. v.1. 546. Werner.
Baryte carbonatée. Haüy, v. 2. 308.

This fine specimen came from T. Hall, Esqr.
Lead mine, in Arkendale, near Richmond, Yorks

It was first found at Anglesark in Lancashire, but since in other places.

Carbonate of barytes was first discovered by Dr. Withering (see Phil. Trans. 1784, 301.), when it was called aërated barytes; but Mr. Werner wishing to honor Dr. Withering named it Witherite. It has since very properly been called Carbonate of Barytes. Radiating carbonate of barytes in its weight and appearance very much resembles carbonate of Stronzia: however it differs from it never being of a greenish colour, and in having its radii larger, more compact and flatter. The upper figure represents carbonate of barytes in dodecaëdral crystals, formed of two hexaëdral pyramids joined base to base, like quartz. These are the largest Sowerby ever saw and are rare at present. They are covered with a light ochraceous substance, perhaps calamine. The Matrix is carbonate of Barytes, in part decomposed and of a chalky appearance. The figures below show the geometrical plan, and in what manner one of the solid angles of the base has been mistaken for part of an octaëdron, or has given the idea of two 4-sided pyramids joined base to base, which many have described as one of its forms of crystallization.





Carbonate of Barytes in Quartziform or Dodecaedral

Crystals. Yorkshire?

Tab. 170.

Ferrum Scheelatum.

Scheelate of Iron, or Wolfram.

Syn. Wolfram. De Lisle, t. ii. 311. and iii. 262.
Scheelin ferruginé. Haüy.

This substance had long retained the German name of Wolfram, although mineralogists were much divided about what class to refer it to, until Scheele had discovered Tungsten. It is found in tolerable quantity in Cornwall, & other Tin-Countries. from the Isle of Man - which formerly produced Tin. Much Spathose Iron Ore has been found there, very much of the same nature and kind as that figured in tab. 68. The present specimen on account of the crystallized parts is curious, the crystals being clear enough to allow them to be described, which is rare.

The primitive crystal is a cube which may be fractured parallel to one of its faces, commonly with great ease, & parallel to another with some difficulty; but in the direction of a third with much irregularity. The crystals on the upper specimen cannot be seen without a lens.

It is accordingly represented by an outline on the left hand of the plate to show its modification, and another more complicated on the right. By examining these it will be found that they modify principally on one side of the crystal, leaving the other sometimes unchanged. The right hand one is compound than any of Haüy's crystals.

The lower specimen has part of a pyramidal face exposed, and the plated fracture is very distinct as well as the shining lustre of the surface: This somewhat resembles the specimen from the Isle of Man, and is the most usual form of large ones.

Scheelate of Iron, or Wolfram.

Tab. 171.

Stannum oxygenizatum.

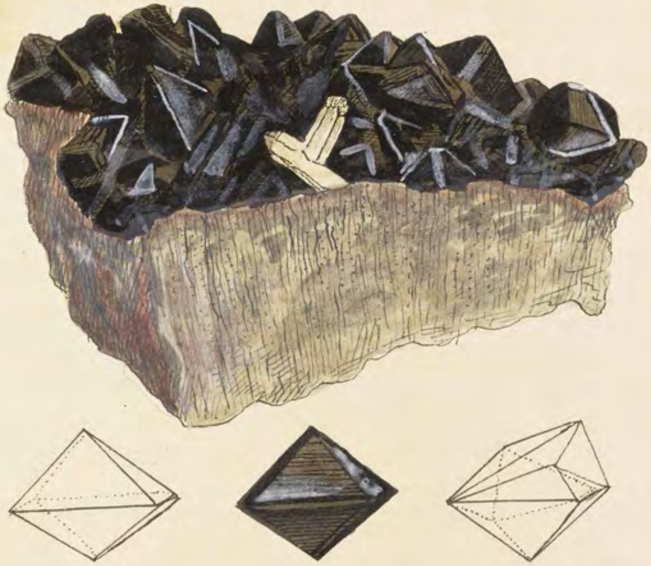
Oxygenized Tin.

Claſs 3. Metals. Ord. 1. Homogeneous.
Gen. 6. Tin. Spec. 2. Oxygenized Tin.
Div. 1. Crystallized.
SPEC. CHAR. Combined with oxygen.

Octaedral crystals of oxygenized tin, destitute of any truncations, bevellings, or other modifications, have never yet been found; these represented are nearest that simple figure: this came from Cornwall. They are very black with much lustre, lying in every direction; some are macled or transposed with various truncations, bevellings &c. The middle figure shows the most perfect octaëdron Sowerby has seen. The edges of the pyramids are truncated more or leſs; the prism is perhaps shorter than here represented. The left-hand outline shows what it should be as a perfect octaëdron. The angles of the base of the two pyramids are 90°.

Those of the face at the summit are 70° 31′ 44″, and at the base 54° 44′ 8″.

There have been two opinions concerning the primitive form of oxide of tin: the one that it is an octaëdron; and the other that it is a cube. We have obtained very neat fractures & parallel to four faces of the latter, and signs of faces inclined upon them, so as to form a rhomboidal dodecaëdron.



Oxygenized Tin, with Modifications of the Octaëdron.

Tab. 172.

The other specimen see tab. . is externally very much allied to a sandstone, although somewhat more condensed in the middle or centre; which often happens. The upper specimen is part of a piece found in Fleet Street in repairing the Sewer there. It was very loose in the outward texture, and is quite solid within, losing the appearance of wood, having the hardness and fracture of Flint, with a colour like that of Wood. It is stained black in some places, appearing like burnt wood. In this Specimen it can be hadly seen whether it had been scorched or blackened by artificial fire, (as is sometimes done to give it durability.) or by a natural process, more gentle. The piece figured below came from Derbyshire, it is nearly black all over excepting the outside, where it seems the bark may have covered it. this blackness gives it the appearance of having been charred by fire; but fire in the usual way must have affected the outside by stains or smoke &c.: this therefore is an extraordinary appearance, and difficult to be accounted for with certainty.

It is however to be seen, in some specimens, that the charring proceſs may be effected by the natural progreſs or decomposition, which is continually seen to take place as far as our limits extend, and all over the surface of the globe. The Silex in this specimen, by attempting to crystallize has rendered it somewhat granular, and has in some measure destroyed the finer and more delicate parts of the Wood. It cannot be determined what kind of Woods these are. In Coal-countries, and sometimes in other places, the Carbon and Bitumen often paſses into Coal, or new combinations under the influence of their particular situations.

Wood-like Quartz, or Petrified Wood.

Tab. 173.

Silex Analcimus, var, compactus.

Compact Analcime.

Class 2. Earths. Ord. 1. Homogeneous.
Gen. 4. Silex. Spec. 8. Analcime.
Div. 3. Amorphous.
Syn. Analcime. Haüy, v. 3. 180.

This curious substance is not uncommon in Great Britain, wherever basalt, and trap are found. We have some specimens from different parts of Scotland, which contain it in nodules. This specimen came from the Isle of Isla. and is somewhat Stalactitical, and extremely various in its shapes, sometimes forming roundish drops from the size of a pins head to that of a large pea, and often of a knotty elongated figure like a potatoe. It seems to be a transition from quartz, and decomposes into filaments forming Zeolite. This specimen exhibits it beginning to form filaments. The bottom of the larger mass, which somewhat resembles the humerus, or thigh bone of an animal, appears once to have been in a thick fluid state, and might have give some idea of the forming of the flints in chalky rocks (see page 234 vol. 1st) More of this is mentioned in another place. They may be found somewhat various in their colours. The most common are nearly as here represented; transparent white or glaſsy, and often pearly or greyish within; the outside being coated with a light brown crust often nearly opaque; which gives an idea of fresh cast wax. The fracture is irregular, glaſsy or flinty. Analcime may be found in most of these appearances so hard as to resist a knife, like quartz; but in the state of compact Zeolite or paſsing into fibres, it may be scratched with a knife or any steel instrument, though it resists Iron or braſs. We are not sure that this is the true hyalite of Kirwan; who says it does not fuse per se at 150°. Ours fuses per se at the heat which turns carnelian white, which Kirw. observes was 160°.

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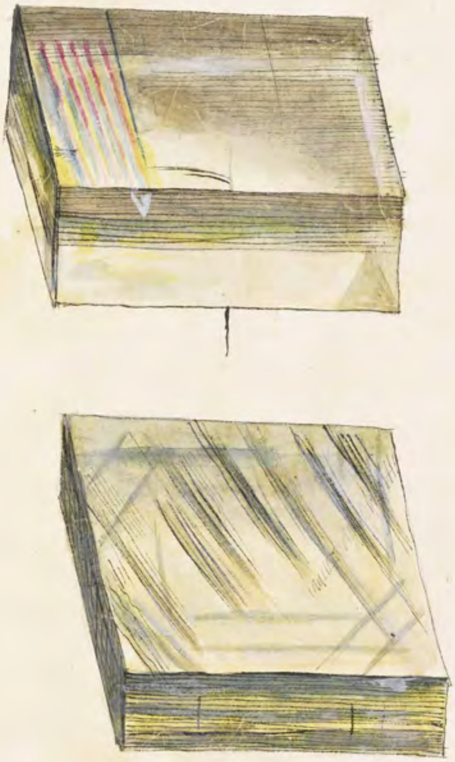
Hyalite in Trap, Scotland.

Tab. 174.

The upper fragment is in the form of the nucleus, or an upright parallelopiped; and as the faces are the same with the primitive, it is placed with the upright faces on a line, to show the refraction is not double in that direction: & it is to be observed that it requires a large depth of crystal to see the refraction through the other faces without the aſsistance of a lens. The flaws show the prismatic tints, like other laminated crystals; this shows the depth of the flaw, and it is so sufficiently elastic that we can, by preſsure, dilate the prismatic lines, so that 1 or 2 sets may take place of the 5 sets represented. This came from Durham - but did not know of the value till lately - having discovered that it contains many small drops of Water, or other liquid in little hollows, which as far as we know have never been discovered in any other substance except quartz, or rock crystal.

The lower one is another fragment with a curious pearly appearance, and has somewhat the appearance of sulphate of lime or gyps, but may be readily discovered by the weight.



Fragments of Sulphate of Barytes.

Tab. 175.

These specimens are from Salisbury Craigs, Edinburgh, and show the conical wheel-like formation nearly in perfection, but very small. Sowerby has greatly magnified the right-hand outline, which shows a narrow primitive edge, bounded by two lines. A similar crystallization is found at Kings park Edin^r. The lower sort came from Frisky Hall near the banks of the Clyde, about three miles from Glasgow; and also from Arthur's seat Edin^r. It shows a broad primitive face on the edge of the crystals, bounded by two acute ridges, which are placed very confusedly on the specimens. The R^t. Hon^ble C. Greville has in his collection a specimen from Dauphiné with crystals, not much unlike the magnified left-hand bottom figure, in size & colour.

Crystallized Prehnite a variety.

Tab. 176.

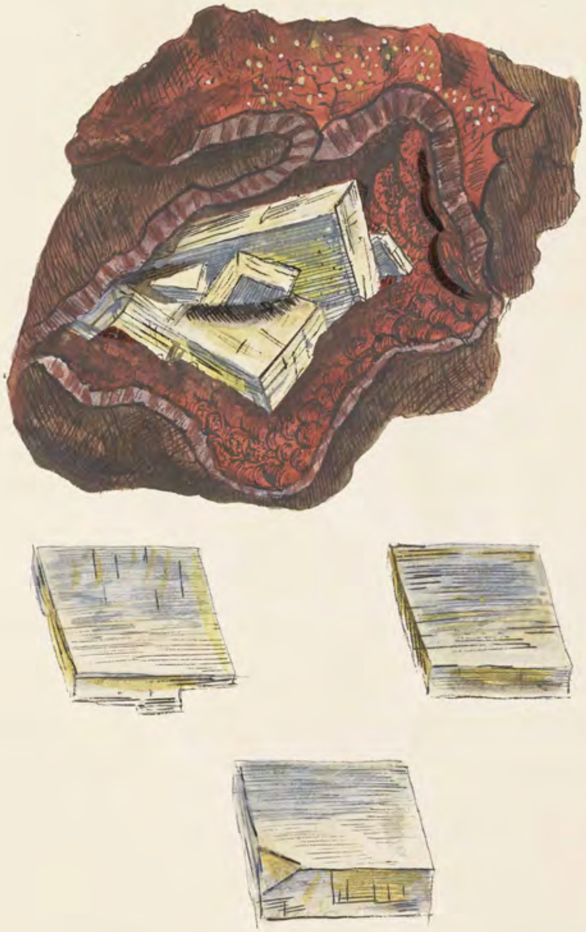
Barytes sulphata, var. primitiva.

Sulphate of Barytes.

Class 2. Earths. Ord. 1. Homogeneous.
Gen. 6. Barytes. Spec. 2. Sulphate.

SPEC. CHAR. Combined with sulphuric acid.
SYN. Baroselenite. Kirw. v. 1. 136.
Schwer-spath. Emmerl. v. 1. 550.
Baryte sulphatée. Haüy, v. 2. 295.
Natrum cristatum. Linn. Syst. Nat. v. 3. 90.

Ponderous Spar, as this was commonly called in England, agrees with the Greek term βαρυτης, heavy. The uncommon weight of this substance in comparison to that of other stones gives it that name. Frequent in or near lead mines in Derbyshire, Cumberland, &c. — When transparent, it is generally crystallized and separable into laminæ, much resembling carbonate of lime, and gives a double refraction through the rectangular faces only, but somewhat weaker than that of carbonate of lime. This is a curious circumstance, & perhaps has not yet been noticed. It may lead to the true nature of double refraction. Haüy had recourse to the ingenious method of forming artificial faces to discover this property. This specimen is an Iron Ore from Lancashire, and is as near the primitive as is generally seen in Great Britain.



Primitive Crystallized Sulphate of Barytes, &c, formed on a variety of Hæmatite Iron from Lancashire.

Tab. 177.

Argilla durissima.

Scotch Corundum.

Class 2. Earths. Order 1. Homogeneous.
Gen. 2. Argil. Spec. 8. Corundums.

Gen. Char. Unctuous to the touch. Easily diffusible in Water. Adheres to the tongue. Spec. Grav. 2. Kirw. combines difficultly with acids, forming with most of them deliquescent salts, soluble in borax: Bab.

Spec. Char. Nearly pure argil, hardest of all minerals except the Diamond. Divisible parallel to a rhomb, the angles of which are 86° 26'. 93° 34'.

This curious substance came from Achen-door sent by a dealer at Aberdeen under the name of Red Schorle, it appears to be new to British writers. Sowerby says it is not to be found in any mineralogical collection in London. It occurs in long columns or bars from an eighth of an inch to 3/4 thick, mostly confused, often diverging & with transverse flaws, having the matrix intervening abruptly. Its fractures are longitudinal and splintery. The columns are 4-sided, with faces replacing the edges in the centre of the angles: on one two or more sides the ends approach towards a pyramid with 4 rhomboidal faces. Among a tolerable quantity few were found with crystallized terminations, as figured the faces however are very distinct.

We find this foſsil has been taken for a rubellite, and Kirwan's description in a great measure accords with that idea see Kirw. v.1. 288. sometimes confounded with the volcanite of Kirw. May the radiating variety be the substance of which Macquart says the garnets are formed? He describes it as consisting of straight fibres diverging from a common centre. see Kirw. v.1. 261. Its common appearance resembles garnet much, but it is not fusible by the blowpipe, whereas garnet is fusible into a black enamel.

Kirwan mentions red Schorls, p 271, rubellites he says are also so called. another substance resembling this, according to the short description of Kirw. was found by Morveau in Poitou, v.1.336, which he presumed to be adamantine spar. Again as Haüy observes, another mentioned by M. Morveau, found in Le Forez, resembles it greatly, and very hard. Kirw 337.

Hardneſs of ours nearly the same as that of spinelle. found the harder spinelles would scratch it; but the softer scratched by it. This seems undoubtedly the "Spath adamantin d'un rouge violet" of Bournon he described in the year 1789 from specimens found in Le Forez. (Journal de Physique 453.) and now considers as a variety of corundum. Other authors have had a similar idea. We here subjoin a part of his description: see Phil. Trans. for 1802, 323. where quoting Haüy, v.4. 562. who observes "that it scratches quartz; that its specific gravity is 3·165, and that it is infusible by means of the blowpipe;" Bournon observes, "that it is red with a purplish tinge {some of our also are of a greenish tinge especially when between the eye and light.} that the appearance of the substance was entirely different from that of felspar; and that where it came in contact with the felspar it seemed to mix itself with it in such an insensible manner, that after having sawed and polished a piece of composed partly of felspar & partly of this substance, it could not be seen where one began or the other ended. Ours is readily distinguished from felspar, which it invests occasionally so that it is formed round it like a tube, see the middle figure at the bottom: it is also often running among it in the directions of the fragments, often passing abruptly across it. The nearest approach to mixing insensibly is by fibres, which in ours are however sufficiently distinct. The Count continues to observe," that the pieces he had collected varied considerably in their degree of hardneſs, although all of them were harder than felspar usually is, for many of these pieces would scarcely scratch felspar; whereas others could scarcely be scratched by the greatest number of gems, or precious stones. The characters of the last mentioned or hardest pieces appeared to be very similar to those of the imperfect corundum from China, a crystal of which Romé de Lisle had sent him a short time before. The above observations, joined to the remarkable manner in which this substance was mixed with the felspar made him adopt the erroneous opinion mentioned by the able Haüy in his observations upon corundum; namely that this substance might be nothing more than a dense variety of felspar. He soon quite gave up the idea, when he examined the corundum."

Upon comparing the mechanical divisions of the corundum of Ceylon with the Scotch one, we find that it is not only parallel to the 6 faces of the rhomb, as described both by Bournon & Haüy, but also parallel to 8 other faces all mentioned in Haüy's description of his felspath apyre, 2 are mentioned by him in his Telesie, & other 6 not mentioned any where as existing in the corundum of Ceylon, but wh.ch we find in some of our specimens. These faces are not so neat, or so easily obtained as those parallel to the rhomb. The gangue is chiefly composed of a coarse granite intermixed with indurated asbestos.

Mr. Jameson mentions the corundum of Tirie; which differs from this, & he quotes Mr. Greville's memoirs in Trans. of Royal Society for 1798, 40, who observes that it scratches glass readily but not rock crystal. Jamson says "I believe there are specimens of this corundum in the Museum of the University, and of these I shall probably communicate an account in the close of this volume." but as he says no more about it we hope it will be settled in his new work. We presume this is no more thought of as a corundum, as C. Bournon in Phil. Trans. 1802 makes no mention of it as such: therefore ours is the only thing known at present as a corundum from Scotland.

Red Schorle. Scotland.

Tab. 178.

This came from Hartfield near Paisley. a fine specimen showing the green side of the radii, and the crystals in nearly regular 4-sided columns, with 2 opposite truncations at the apex; these truncations, or secondary faces, are the same as those in another description, tab 153. on the upper edges, and ought to be particularly remembered, as they assist in forming a very singular modification, which is shown in tab. 158 .

Crystallized Prehnite a variety.

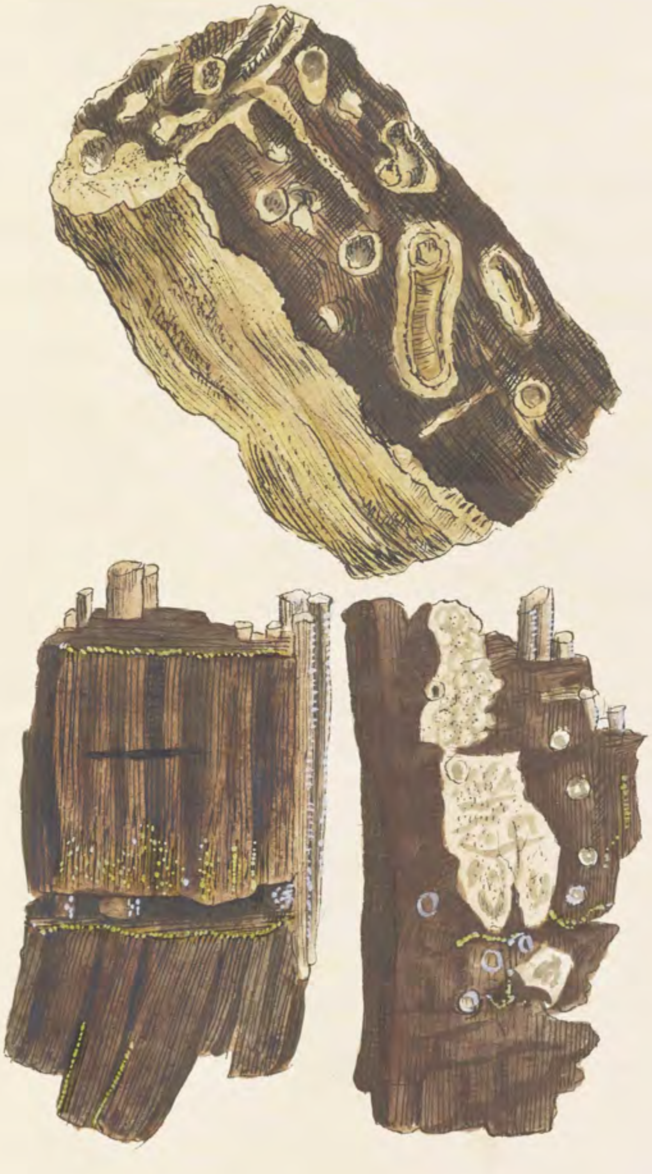
3/10

Tab. 179.

Ferrum sulphureum.

Iron Pyrites in petrified Wood.

The upper specimen seems to have been part of a cylindrical piece of wood, and was found 260 feet below the surface of the earth in digging a well in Richmond Park in 1804. It appears to have had worm-holes, or holes of Terebellæ perforating it in various directions, which may be presumed to have happened before the proceſs of petrifaction had taken place. This may more properly be called Pyritaceous Wood, as the Pyrites or Sulphuret of Iron has filled the pores of the Wood so perfectly, that the shape & somewhat of the texture of wood was seen, such as if formed of pyrites. The worm holes some lined with pyrites and others doubly lined. One side being nearly covered with Pyrites makes it a beautiful specimen, as well as an instructive one. The lower piece was perhaps of different Wood, appearing like part of a plank. This was found 100 feet deep in digging a Well for Mr. Truman's brewhouse, Spital-fields London. The worm holes are lined like the other; but they seem to have been a particular species which prefer a straight direction, croſsing the fibres of the wood. It is somewhat remarkable that the woody nature remains, and being found damp and fully saturated with the pyrites, it cracked and contracted from it, and is held together in some parts as if artificially done with wires, and is in some parts curved and warped. Thus although these pieces of wood seem to have been many years under this proceſs, they are not much changed, but rather preserved, as, now it is exposed to the common air, these changes which show its nature become evident, It will soon fall to decay, in the same manner as some part has already done. The Iron and Sulphur decomposing the water of the atmosphere, the sulphur becoming acidified diſsolves the Iron, forming green vitriol or Sulphate of Iron which is very deliquescent.

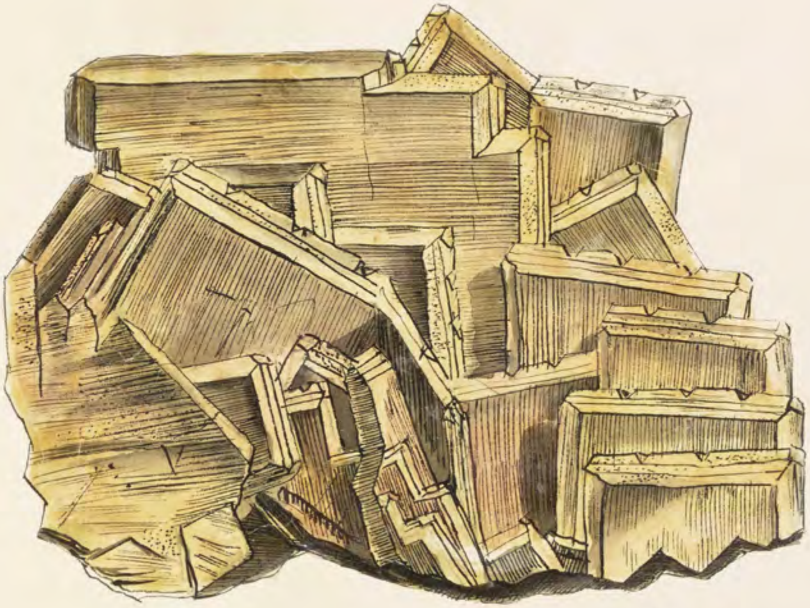


Pyritaceous Wood.

Tab. 180.

Tabular sulphate of barytes is the most common variety. The finest specimens generally come from Cumberland.

The tabular crystals are sometimes transparent, & often more or less stained with ochre; they mostly stand upon their edges often very distinct & in every direction. It may be observed that their edges are parallel to the diagonal of the nucleus, therefore it becomes rectangular. The present specimen has small corner facets, parallel to the faces of the primitive or nucleus. One end has bevelled faces on either side, the angles measuring about 128°, which are parallel to the small triangular facets on the lower figure of Tab. 176. The other has three bevillings. See the geometrical figure.



1-72

Tabular Crystallized Sulphate of Barytes with 22 Faces.

Tab. 181.

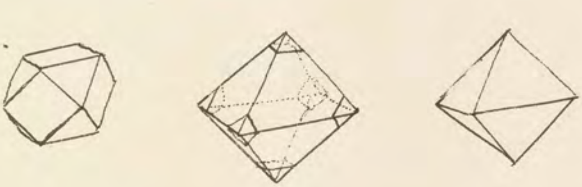
Ferrum sulphureum.

Sulphuret of Iron; Iron Pyrites

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 6. Iron. Spec. 6. Sulphuret.
Div. 1. Crystallized. Var. Octaëdral, &c.
Syn. Fer sulfuré octaëdre. Haüy, v. 4. 69.

Octaëdral pyrites is not so common as cubical pyrites; we have it however along with various substances, as calcareous spar, limestone, coal, &c. The present figures are designed to show this modification from the cubic passing into what Haüy calls cubo-octaëdre, thence into the perfect octaëdron. At the commencement of this change the corners of this cube are replaced by triangular faces - see the left hand figure - which as the modification goes on, becomes planes of six sides each - see the middle figure - and at last the primitive faces are lost. These six-sided planes are reduced again to triangular ones, forming the octaëdron. The upper & right hand specimens came from Bath. The first is the cast of a shell of the Trochus genus; and it should seem that the crystals are on the cast

in place of a shell, as the rock is about the thickness of the shell
from the cast, and is a mould of the outside of the shell.
On the left hand side remains a bit of the rock and on the
right hand are exhibited the thickness and calcareous re-
mains of the shells, sufficient to indicate the species to a
~~conicog~~ conchologist, which appears to be different from
any shells of the ancient age. This came from Bath. The
pyrites on this are octaëdrons, some of the solid angles slightly
truncated. It nearest resembles Trochus niloticus Linn, but
we do not think it is of that species. The cast of the shell on
the right hand, of a golden hue covered with pyrites, gener-
ally deeply truncated seems a species of the Mytilus cut off
in the manner of Donax denticulata Linn. The shell on
the left hand seems to be a Tellina, includes pyrites, chiefly
cubo-octaëdral - see left hand bottom fig. - as if hermetically
sealed in, & not found till the shell was broken. This shell
resembles Listers Tellina lata rugosa, tab. 390. f. 229. These
fossils are found in quantities at Woolwich & Carlton, 9 feet from
the surface of the hill, in a loose marly stratum from 1 to 6
feet thick. soon decay when exposed to the air. The other
sort of shells are two species of Turbo. Of Oyster shells there is
great plenty, these do not decay so soon as the others.
There are other shells in this curious place.



1-99

Sulphuret of Iron, crystallized in Cubico-octaëdrons.

Bath, &c.

Tab. 182.

Barytes carbonata.

Crystallized Carbonate of Barytes.

Class 2. Earths. Order 1. Homogeneous.
Gen. 6. Barytes. Spec. 2. Carbonata.

This specimen came from Mr. Halls mine in Arkendale; and as it is the first time that it has been noticed with elongated Spiculæ so distinctly seen in hexaëdral pyramids, I am pleased at the opportunity of exhibiting a figure of them. They are on a gangue Galæna of Sulphuret of Lead, forming an irregular sphere, echinated as it were with spiculæ: see the upper figure. The lower figure on the right hand is a group of the spiculated crystals: on the left hand is a geometrical outline distinguishing the facets, three of which are continued to the apex, alternating these last are scarcely to be seen, and the spiculæ seem to have only three sides.

Carbonate of Barytes crystallized in determinate hexaëdral Spiculæ.

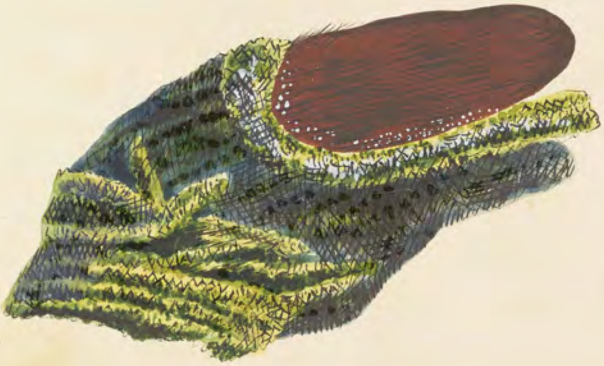
Tab. 183.

Ferrum arseniatum.

Arseniate of Iron.

Class 3. Metals. Order 1. Homogeneous.
Gen. 6. Iron. Spec. 8. Arseniate.
Div. 1. Crystallized. Var. 7. Primitive.

This arseniate of Iron is one of the richest that has been seen hitherto; and what adds most to the beauty of the specimen is, that the lighter green cubes are accumulated in groups, forming threads, lying on darker ones, all of which are very pellucid. To add to the rarety of this specimen we find extremely fine fibres of an oxide of iron? partly encircled by a band as it were of the arseniate, which relieves the reddish brown dusty appearance of the oxide; and this last, in return, relieves the glittering arseniate. The fibres of the oxide are so fine that it requires a high magnifier to see them; we could not discover any other than simple fibres. The top figure is of the natural size; the middle one, somewhat magnified; the lower are more magnified. The gangue is chiefly quartz, with various coloured ochres and some arsenical iron, or what has been called mispickel: see the metallic parts in the upper figure. This is in Mr. Rashleigh's collection.



1-97

Arseniate of Iron. Cornwall.

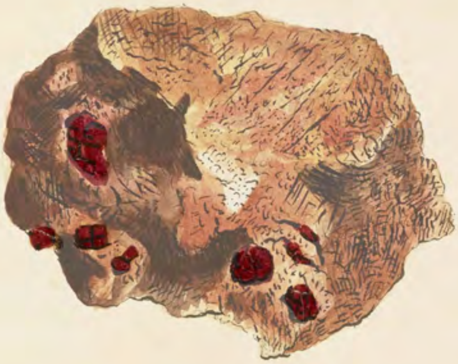
Tab. 184.

Cuprum oxygenizatum; var. cubicum.

Cubical Red Oxide of Copper.

Syn. Cuivre oxydé rouge cubique. Haüy; v. 3.557.

Good cubical crystallizations of Red oxide of Copper are much rarer than octaëdrons: see tab.68. This specimen came from Redruth in Cornwall. It is crystallized in distinct cubes sometimes, but oftener in rather irregular groups, yet with their edges and planes parallel to each other, seldom like fluor, tab. . or Galena tab. . &c. which are generally more confused. It rarely forms large cubes, although I understand that some have been found ¼ inch in diameter. They are often truncated at their solid angles, forming the cubo-octaëdre of Haüy, tab.68 : and 71. The magnified figure represents a group somewhat like one on the specimen, which has a large cubo-octaëdre at the left hand corner, and the rest consists of various sized cubes, and one or two of another group, showing that the different groups may stand in different directions. These are more generally of a more beautiful Bohemian or Scotch garnet {Now called Pyrope differing from the common garnet in colour transparency, and in never being crystallized. It should seem also that they may be still further subdivided.} colour than the octaëdrons. We know of no difference in their substances.



1-100

Ruby Copper in Cubical Crystals. Cornwall.

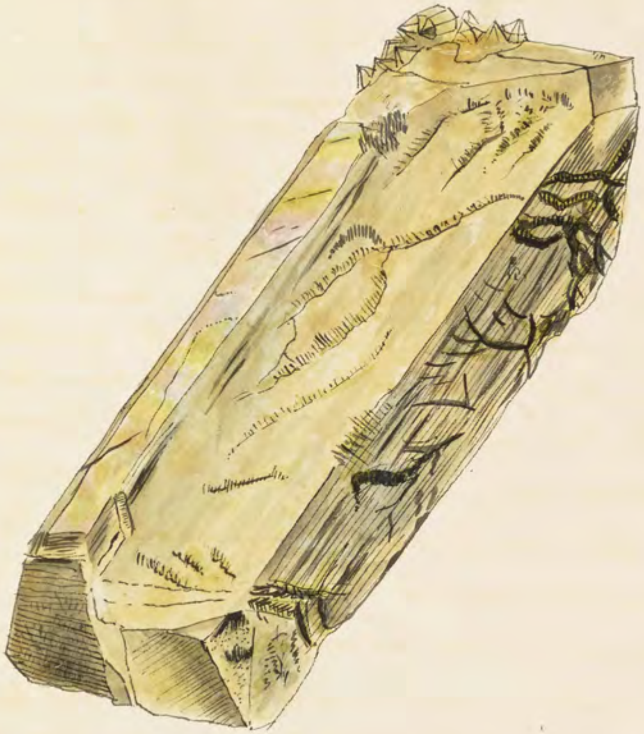
Tab. 185.

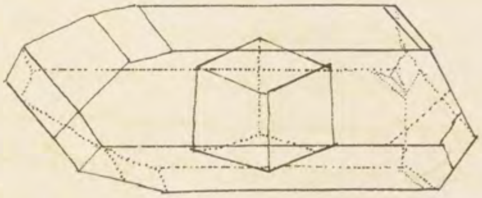
Barytes sulphata.

Sulphate of Barytes.

Class 2. Earths. Order 1. Homogeneous.
Gen. 6. Barytes. Spec. Sulphate.
Div. 1. Crystallized.

The specimen from which this figure was taken, is in the collection of Mr. Professor Hailstone at Cambridge, to whom it was presented by John Probart Esqr. of Copthorne near Shrewsbury, in whose interesting museum the professor saw several other crystals of the same kind, but of larger dimentions, and understood that they were found in same part of Shropshire; but he had no opportunity of ascertaining any further particulars respecting their native beds, and situation in the earth. It is a valuable specimen, to show the nature of a crystal terminated on all sides, and independent, or not fixed on any gangue. This is not common to sulphate of barytes. It has only a few quartz crystals at the upper corner, as expressed in the figure. The modification is altogether singular, and is a variety not figured. we find it has 23 faces, some scarcely distinct. The crystal is lengthened parallel to the obtuse angles of the rhomb, and the upper primitive face, which shows the prismatic lines somewhat below the surface. It has little hollows as it were unsupplied by molecules; this is the case also in other parts giving the crystal a rough appearance. These hollows agree very well, when narrowly examined, with the shape of the nucleus. The general form will be better understood by examing the geometrical figure at the bottom containing a figure of the primitive or rhomboidal prism: see tab. ; allowing for the perspective, and conceiving the sharp angles as the obtuse ones, viz. the right and left hand angles; the upper and lower faces and the 4 corners are primitive faces, corresponding with the 6 faces of the nucleus. The four larger octangular faces are evidently parallel to the acute corners of the rhomb (allowing for the perspective). In their formation, the lamina are as it were arranged on the upper and under primitive faces, decreasing from the 4 acute angles of the nucleus from 4 obtuse angles; the same also forming 2 long quadrangular faces at the left hand end, and 2 large hexangular ones at the other end of the geometrical figure coming in contact with the primitive faces at the corners, at an angle of about 123° with the upper or under primitive faces. Next to these on the same angle of the nucleus, are 2 other 4-sided faces above & below, the larger at an angle of 140°59'2" upon the primitive, and the smaller at one of 162°2'44". These may be distinctly seen at on the top of the upper figure. The Cumberland specimens seem to have the face of 123°, which appears not to have been seen by Haüy. Mr Hailstone's specimen has two small faces marked by dotted lines on the right hand front corner, and one on the right hand corner at the back which agree with the faces y of Haüy. This Sow:d has not seen in any other english specimen.





Crystallized Sulphate of Barytes. Shropshire.

Tab. 186.

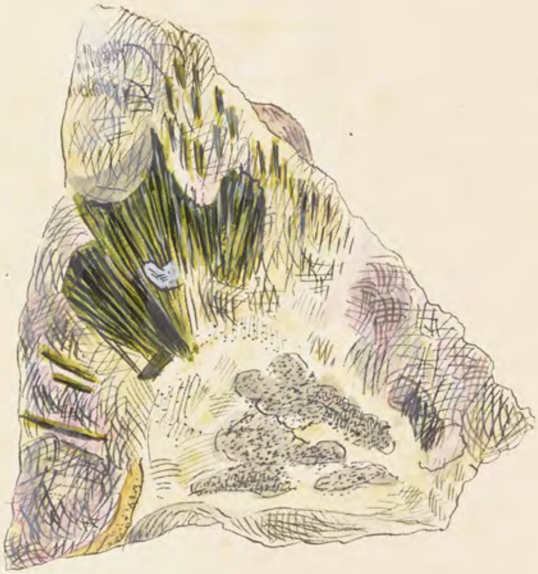
Ferrum sulphureum; var.

Hair-like Pyrites, or Sulphuret of Iron.

Class 3. Metals. Order 1. Homogeneous.
Gen. 8. Iron. Spec. 5. Sulphuret.
Div. 2. Imitative.

This beautiful specimen was found many years ago in the magnificent Lime Quarries of Ld. Elgin, at Broomhall in Fifeshire, and is the only one of the kind which has been discovered.

The appearance of so many radiating, straight bristle-like forms has a remarkable effect, and is very striking. Although they are extremely attenuated, they seem to be square, and are probably elongated octaëdrons. Their passing through and among the pearl spar {see tab. 42.} so uninterruptedly is worthy of notice, and will give us reason to believe that both substances settled from their solvents at the same time, or nearly so, without disturbing each other. They are both upon shelly grayish Lime Stone. It is with much pleasure that I introduce this as a British specimen as it is not at all generally known to be found any where but at Joachimsthal in Bohemia, and even there very seldom.



Hair-like Pyrites, or Sulphuret of Iron.

Tab. 187.

Manganesium oxygenizatum.

Oxide of Manganese.

Class 3. Metals. Order 1. Homogeneous.
Gen. 5. Manganese. Spec. 2. Oxide of.
Div. 3. Amorphous.

In tab: . of this work we have figured a rare specimen of Oxide of Manganese in columnar crystals. The present amorphous specimen is curious on account of the variety which it exhibits. It is supposed to be mostly Oxide of Manganese in different states, white brown and black; and the manner of its mixture adds to its beauty. This specimen came from Devonshire. Sowerby has specimens of Zed Manganese from the same place, where there is a great variety. Besides Oxide of Manganese this specimen contains in the whiter parts a tolerable proportion of Carbonate of Lime; which in some is crystallized like Pearl Spar, tab. 42.

Oxide of Manganese.

Tab. 188.

Silex Quartzum; Var. opalinum.
Opal.

Class 2. Earths. Ord. 1. Homogenious.
Gen. 4. Silex. Spec. 1. Quartz.
Div. 3. Amorphous.

Syn. Quartz resinite opalin. Haüy, 2. 434.
Opale. De Lisle, 2. 145. De Born, 1. 81.
Edler Opal. Emmerl. 1. 277.
Calcedoine irisée, Opale. Daub. 3.
Halb-opal. Werneri.

We cannot boast of very beautiful Opals in England. The variety of this gem matter is worthy of notice, and the present specimen shows it passing from Chalcedony to Cacholong, and from thence to Hydrophanous Opal, or what has been called Oculus mundi. Lastly it forms the semi-opal or common Opal. The ~~that~~ calcedony is hardly to be distinguished in a drawing, it is the darker part mixed with copper pyrites in the figure. The name Cacholong applies to the opaque whiter and softer part, which may be scraped with the finger nail, and will like all agates and Calcedony, become more transparent in water. Hydrophanous Opal is the less opaque part of a greenish hue, and in water becomes like the opal or bluish green part. In this state it resists the finger nail, and, while in Water, is not to be distinguished from the Opal, but becomes opaque again when dry. Common Opal is nearly the same in appearance, either wet or dry, and comprises the grayish, bluish, greenish, and yellowish parts with a milky or waxy lustre, (like the Semi- or Halb-Opal of Werner,) with a virescent effulgence or yellowish fiery glare; in some lights, especially in the flaws. Fracture glassy. Hardness sufficient to cut glass. The most beautiful Specimen ever discovered of this substance is in the possession of J. M. Cripps, Esq.r of Lewes, in Sussex: It came from Constantinople. but was found at Bulgaria. Unlike the common Specimens, in which Opaline wood appears in small veins intersecting the common Fossil Wood, or in a fragile state like pitch stone, It has throughout the whiteness of Cacholong & in some parts the lustre and colour of the genuine opal. It is larger than a Mans body & weighs 148lb. 9¾ oz. avoirdupois. It presents half the trunk of a large tree, with the node of one of the principal branches. The timber the bark, & every part of the mass is perfectly opaline. The Rt. Honble: Sir J. Banks had a Mammoths grinder, lately found on our coast, opalised. Sowerby saw a Mammoth's tooth from America somewhat opalized. in the late Mr. John Hunters museum. There are some also in the British Museum. Sir Hans Sloane gave £200, for an Oculus mundi now in the British Museum.

Opaline Calcedony. Cornwall.

Tab. 189.

Cuprum sulphuratum.

Sulphuret of Copper

Claſs 3. Metals. Order 1. Homogeneous.
Gen. 10. Copper. Spec. 4. Sulphuret of Copper.
Div. 1. Crystallized.

Syn. Yellow Copper Ore. Kirw. v. 2. 140.
Copper pyrites. Syst. Min. Jameson.
Kupfer-kies. Emmerl. v. 2. 232. Werner.
Cuivre pyriteux. Haüy, v. 3. 529.

This copper ore is not uncommon, but this form has not been spoken of by any mineralogical writer. Tetraëdrons have been mentioned, but not with lenticular convex faces, which seems a character of this one when crystallized in tetraëdrons; most British specimens incline to convexity. These will tarnish, often aſsuming a coat, either like blue steel, or bluish black; and it often has the green platina, or oxide of copper, on the surface, mentioned by Count Bournon in his description of yellow copper, Phil. Trans. for 1801. When fresh broken it is of a bright greenish yellow colour with a metallic lustre, and the flaws tarnish to the various colours of what is commonly called Peacock Ore. The fracture is smoothish, having more or leſs of a fine-grained surface, sometimes like the finest sand. The crystals are brittle. too tender to strike fire with steel.

The left hand sides of the two figures show the inclination to form three trapezoidal faces on the triangular ones;

and the figure between two columns of quartz shows them more plainly, as it does also the signs of the triangular laminae of superposition. This is taken from another Cornish specimen. The geometrical figure shows the somewhat obtuse tetraëdron; each face of which is replaced by three trapezoidal ones making a dodecaëdron. The nearest modification to this kind is in Romé de l'Isle, tab. 1. fig. 28. but this has 12 additional isosceles triangular faces. Haüy has a crystal something like this in sulphuret of Zinc, which he derives from the rhomboidal dodecaëdron. See his fig. 197. The rounded tetraëdral crystals are therefore passing to the dodecaëdron, in an almost imperceptible manner as the three figures on the 2d line show. This specimen has some more perfectly marked, and some truncated like the two left-hand figures.

Sulphuret of Copper, with the Trapezoidal Dodecaëdron and other Modifications.

Tab. 190.

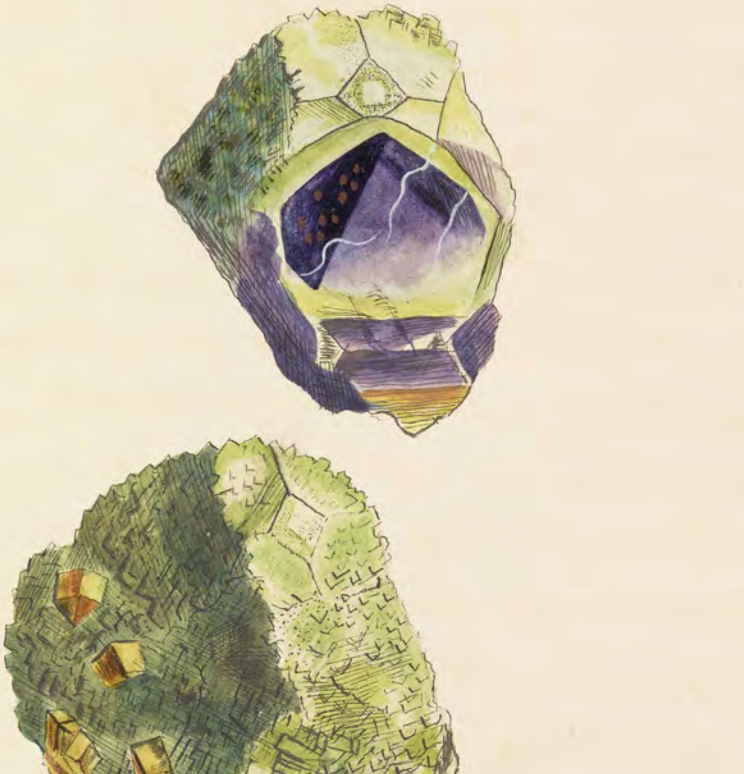
Calx ? Fluor, var.

Fluate of Lime, or Fluor.

Class 2. Earths. Order 1. Homogeneous.
Gen. 3. Lime. Spec. 3. Fluate.

These specimens are among the rarest of the fluors known in Great Britain. It is an instructive specimen, having the form of a purple octaëdral nucleus within side, and the green modification in order about it, which adds to its beauty as well as curiosity. One side of this octaedron has many small but perfect cubico-octaëdrons (or cubes with the corners truncated) of pyrites. Sowerby has a specimen. It is somewhat rougher and rather duller, standing on a confused octaëdron, the corners of which are rather prominent, forming, as it were, irregular steps; it includes a small octaëdron greener than the rest, but rather obscure, within which is a smaller purple one but which is not to be seen without turning the specimen about many ways. They both come from St. Agnes in Cornwall.

The Lower geometrical figure explains this modification complete, in a position to make it familiar, and to show the placing of the octaedron, which is in the position of the common fractures of all fluates of lime. See Tab. 78. and the latter part of the corresponding description. The upper middle 4-sided face in all the figures will be found to agree with the face of the cube common to fluate of lime: the 4 sides of which are bevelled off, and the corners as before mentioned, are parallel to the faces of the octaedron, they forming six square faces of the cube, eight faces of the octaedron, and 24 bevellings; in all 38 faces.



1-73

38-sided Crystals of green fluor, containing a purple octaëdral Nucleus of the same substance; very rare. Cornwall.

Tab. 191.

Stannum oxygenizatum.

Oxide of Tin, in Crystals with 8-sided Pyramids.

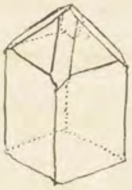
Etain oxydé opposite: Haüy, v.4.141.

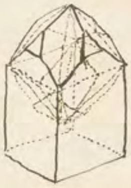
This is a rare modification. It is an incomplete 8-sided pyramid placed upon a 4-sided prism, at an angle of 155° according to Romé de l'Isle, and of 158°45'27" according to Haüy. This pyramid is always terminated by another 4-sided one parallel to the octaëdron. They either stand on the gangue upright, with one end only finished pyramidally, as appears from the middle figure on the right hand, which is a large and curious detached crystal: being, broken at the top, it gives an indication of a point, but on examination we find it cased on an octaëdron, wh:ch probably it once covered regularly; or they lie on their sides and are pointed at both ends: see the left hand figure. seldom large. The gangue is as usual to tin crystals, viz. rock crystal, chlorite, and chlorite schist, or killas of the Cornish miners. The geometrical outline on the left hand shows the commencement of the 8-sided pyramid on the edge of the prism. There are many varieties of this modification on this specimen, & sometimes two of them meet base to base, and form a macle: see the bottom figure.

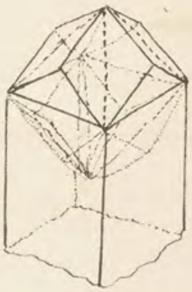
Oxide of Tin in Crystals, with 8-sided Pyramids.

Tab. 192.

The figures here represented approach as near the dodecaedron as any Sowerby has met with of British origin. It will be readily seen that the edges of the 4-sided pyramid, as truncated on the left hand figure, if continued so as to obliterate the octaedral faces, would form, with the help of the 4-sided column, eight of the faces of the dodecaedron, the other 4 faces being hid in the gangue; and, if with a short column, the faces would be all rhomboidal; but if the column be long, the columner faces will be hexagonal. as yet we have not seen a dodecaedron with both pyramids complete. These specimens are not so black as most, and are modified very roughly. They have also somewhat of a rusty ochraceous hue, probably holding more oxidated iron than usual.







Oxide of Tin in Dodecaedrons, with Rhomboidal Faces.

Tab. 193.

Manganesium oxygenizatum, var. Primitivum.

Oxide of Manganese:

Claſs 3. Metals. Ord. 1. Homogeneous.
Gen. 2. Manganese. Spec. 2. Oxide.
Div. 1. Crystallized. Var. 1. Crystal primitive.

Gen. Char. Spec. Grav. 6.85, somewhat malleable. Colour greyish white, very difficult of fusion, even more so than Iron. Colours glaſs violet. Does not combine with Sulphur.

Spec. Char. Combined with oxygen.

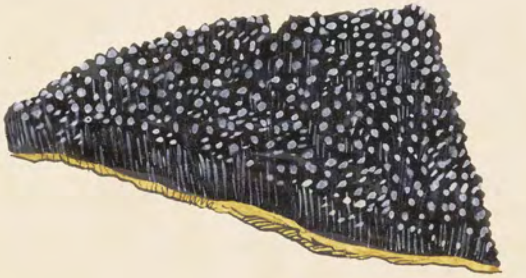
Syn. Manganese mineralized by oxygen, Kirw. v. 2. 291.
Gray manganese ore, Syst. Min. Jameson.
Braunstein. Emmerl. v. 2. 522.
Manganese oxydé. Haüy, v. 4. 243.

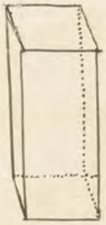
Manganese {which was first discovered to be a new metal by Bergman}, and which has since been found in a native state by Mr. La Perouse, in the Valley of Vicdeſsos, near Sem, in the neighbourhood of Foix, Pyrénees, who says it is imbedded in oxide of manganese; is of a Silver gray colour with a metallic lustre;

divergently foliated texture, somewhat malleable, and that it soils the fingers. We describe with much pleasure the present specimen of crystallized oxyde, as propitious to an expectation that Great Britain nearly includes all that is essential to a knowledge of mineralogy, very few genera excepted. Mines have been worked in many parts of Great Britain for oxide of manganese. Sowerby has some specimens from Mendip Hills in Somersetshire, crystallized in small short rhomboidal prisms. The one figured is crystallized in elongated ones, which have striæ on their sides that agree with the fracture, the apex also show signs of a diedral or tetraëdral summit. The upper right hand figure is nearly the natural appearance and size of the specimen; the prisms standing irregularly and joining near the base; where they stand upon sulphate of barytes, &c. The gangue is a sort of stratified micaceous grit, through a stratum of which it runs in veins. In a mass that came from Aberdeen, the manganese includes crystallized sulphate of barytes, &c. as trap sometimes does other stones.

The left-hand upper figure is magnified, and shows how irregularly the crystals stand on the mass in some parts. The left-hand bottom fig: shows the upright striæ, and on some crystals a slight beginning of the two faces that sometimes meet on the centre. The lefthand figure shows these striæ meeting in 4 directions to the centre, with the cross diagonals giving signs of 4 or more faces. The prism is sometimes truncated so as to form 8 sides. Haüy knew of no other than these 8-sided ones, with 2 or 4 summits at the apex. We first read of short ~~sided~~ tetraëdral prisms of oxide of manganese in Catal. de Raab. v-2.130, from Naila, in the margravate of Bareith, in Germany, and soon after of rhomboidal tetraedal prisms, neatly truncated at their extremities, from Ilmenau in Saxony. These of course are in Mr. Greville's matchless collection; we find the latter mentioned as from Ilfeld, in Dr. Babington's catalogue of the collection, now belonging to Sir John St. Aubin, p. 255. We are glad to be possessed of British specimens from the works near Aberdeen, first discovered by the Revd. — Smith. The present specimen was procured in 1803. It agrees exactly with the two last specimens mentioned in Cat. de Raab., in which the word truncated is certainly superfluous rhomboidal prisms simply, being aſsuredly meant. This is considered as the primitive form by Haüy.

Oxide of manganese is used in glaſs-houses in small quantities, to clear and discolour glaſs by giving up some of its oxygen, and so completing the vitrification of the Iron or other colouring ingredients. It is used as a pigment or an ingredient in printers ink, and to procure oxygen gaſs from, and for many purposes, viz. as a medicine; or for oxygenizing muriatic acid for bleaching, &c. about two quarts of this gaſs may be obtained from an ounce of oxide of manganese.





1-86

Oxide of Manganese crystallized in Rhomboidal Prisms.

Tab. 194.

Silex Quartzum.

Flint Pebbles, &c.

Claſs 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. 1. Quartz.
Div. 3. Amorphous.

Syn. Flint. Kirw. v.1.301.
Feuer Stein. Emmerl. v.1.143.
Quartz agathe pyromaque. Haüy; v.2.427.

The forms and colours of flint pebbles are extremely various, & they give strong indications of being formed by infiltration and aggregation among the softer argillaceous rocks; as the agates, &c. seem to be among the harder rocks of a similar nature; see p205 vol 1st the siliceous infiltration being more or leſs coloured by oxide of iron, gravitates, or aggregates, into various forms. The upper pebble at the right hand is white at one end, gradually becoming grayer towards the other end, with a line or two of interruption, and at length aſsuming the texture & colour of common gray flint. The uncoloured part is sometimes leſs indurated, but insoluble in acid, and seems ~~of~~ only destitute of the colouring matter. The coat appears to have been formed when the proceſs was nearly complete as drops of coloured water, or turpentine, will in general, form a margin in the same manner on substances on which they are put: the others seem formed in a similar way, varying as to regularity. An approach to yellow, with a border of ~~dark~~ dull crimson, is seen in the next stone, and the coat is nearly black with very little variety. The next right hand figure was found near Norwich. It is remarkable for the uniformity of the ochraceous tint all through it, and the dark coat penetrating it in the cracks, which seems to confirm the

The common ingredients are Silex – 80
Argil – 18
Lime – 2
100

idea of the margin being formed as the substance was beginning to harden. The next stone is very regularly formed. In this the yellow is very bright. The air makes the fractures brighter yellow. The upper central one is more irregular, but is in the middle as bright a cinnabar, or vermilion, as to be found in these sort of stones, resembling red jasper. The fragment beneath has been irregularly modified. the centre the brightest crimson. The lower left hand figure is uniformly of a red jasper colour, not frequent. by its fracture it seems not to be so hard & tough as jasper. This is a little covered with an ochraceous hue. The gray and black flints are not rare, mostly found in wet clayey places, often very black, sometimes shining, or blotched with a gray or whitish hue. The black outsides give lighter insides & the gray black. Pebbles from the size of a small to a Windsor Bean are sold at 10 or 12 per load to make walks &c. near London, of a fine ochrey hue. if suddenly exposed to heat or cold if taken from damp pits, they will rot - & then are of no use but for manure. They are often used at Sand Down Castle, to repel the sea. They are of use to protect the vegetable earth from high winds. retaining at the same time night dews and moisture fit for vegetation. Will protect the roots of trees from the scorching heat. as they imbibe heat rather slowly.

When free from flaws they will bear cutting, engraving, and polishing, as well as the oriental carnelians, which they partly resemble in their shining fracture, & almost equal hardness

Variety of common Flint Pebbles.

Tab. 195.

Ferrum arseniatum.
Arseniate of Iron.

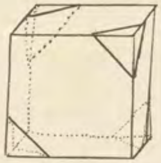
Class 2. Metals. Order 1. Homogeneous.
Gen. 6. Iron. Spec. 8. Arseniate.
Div. 1. Crystallized. Var. Primitive.

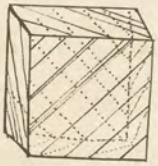
Spec. Char. Combined with arsenic acid.

Syn. Arseniate of Iron. Bournon Phil. Trans. 1801.

This was mostly confounded with arseniate of Copper until the celebrated Chenevix by ~~anylisis~~ analysi, ascertained it to be an arseniate of Iron: see Phil. Trans. 1801 Count Bournon observes that it crystallizes in cubes rarely a little flattened: and rarely lengthened. I, however have it a little so perhaps the 4th of its diameter; and his figure conveys that idea, perhaps unintentionally. The sides he observes are smooth and brilliant. they are diagonally striated in alternate order on each face; this is readily seen in most of my specimens. {see Ferrum sulphureum, tab. 163 in which the striæ are parallel to the edges of the cube; and Count Bournon has discovered a new species of cubic oxide of Iron with the striæ at right angles, parallel to every edge of the cube: perhaps these striæ may become marks of importance} They are often a little concave in the centre, and rising to the edges in the longitudinal direction of the striae, and also show signs of being formed on cubical nuclei. Sowerby has them from a light yellowish green to a bright green, apparently neither inclining to yellow or blue; passing on to deepish blue green, thence to an olive, being heightened with red; then the yellow and red prevailing, they are of a brownish resin colour: some very transparent: all a little. The upper figure shows them of the natural size in a gangue of quartz mixed with oxides of copper and iron &c. The middle figure is magnified to show their construction more readily; and the right-hand geometrical figure shows the striae. In the left hand bottom figure, the only modification known of this substance, according to Count Bournon. "4 of the 8 solid angles of the cube are replaced by an equal number of ~~equilaterical~~ equilateral triangular planes, situated in such a manner that every one of the sides of the cube becomes an elongated hexagon, having two angles of 90° each, and 4 of 135°. Crystals modified in this way are very scarce. Sowerby saw but one specimen, in the collection of Sir J. St Aubin. Its crystals are pretty large and well defined." Sowerby considers as a great rarity a specimen in his museum which exposes 2 crystals thus truncated. It is easily scratched with a pin, but it scratches common calcareous spar. By Chenevix analysis it was it was found to contain

Silica - - - - 4
Arsenic acid - - 31
Oxide of Iron - - 45·5
— of Copper - - 9
Water - - - - 10·5
100·5





1-87

Arseniate of Iron crystallized in Cubes.

Tab. 196.

Zincum sulphuratum.

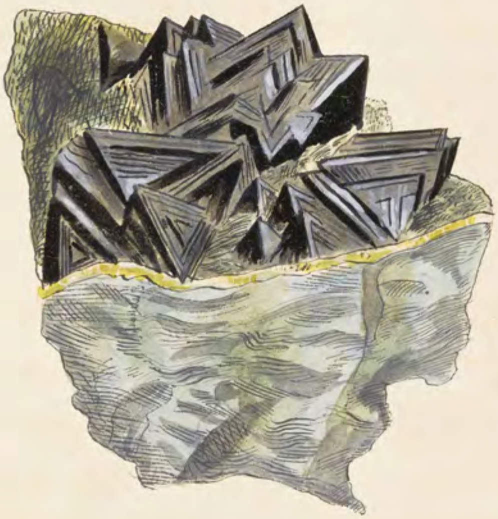
Sulphuret of Zinc, Blend.

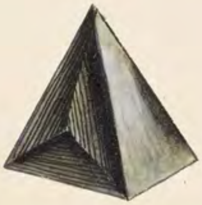
Claſs 3.. Metals   Order 1. Homogeneous.
Gen. Zinc.   Spec. Oxygenized.

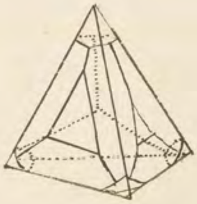
Spec. Char. Zinc in combination with sulphur.
Syn. Zinc mineralized by sulphur with iron.
Kirw. v.1.237.
Blende, Emmerl. v.2.443. Syst. Min. Jameson, v.1.16.
Zinc sulphuré. Haüy, v.4.167.

Blende (commonly called Black jack by the miners) is often found crystallized, but generally in a very confused manner, and most frequently of a deep jet-black. The tetraedral variety, here figured, has something of a deep black lustre, and approaches to a lead like appearance. Except one or two solitary crystals, they are generally in plated clusters or groups; the plates for the most part diminishing from the edges to the centre of the triangular faces, forming three faces, as on the dark side of the right-hand figure. Occasionally each face of the tetraëdron will differ; and one may either be seen plain, as at the base of the lowermost geometrical figure, or have the above-mentioned three faces terminating in a point like the dotted faces on the distant side, or with another triangular face like the right or left hand sides of the same figure. The truncations of the four solid angles, in the left-hand and geometrical figure, are parallel to the octaëdron. These modifications are all evident in the present specimen, which is a cornish one. They rest one a greenish chlorite, on a light sort of schist or slaty rock, commonly called killas by the Cornish miners. They are often accompanied with rock crystals and copper pyrites. The nucleus is a rhomboidal dodecaëdron, and the integrant molecule is a tetraëdron with isosceles triangular faces, according to Haüy. The modification called encadré by that author, among the sulphurets of copper, resembles this very much; but he does not seem to have known such in sulphuret of zinc. Its specific gravity is 4·1665 according to Brisson. It may be scratched with a knife, and it will scratch sulphate of barytes, but not fluor.

Refraction simple, Haüy







1-74

Tetraëdral Blend or Sulphuret of Zinc,

variously modified.

Tab. 197.

Carbo oxygenizatus bituminosus.

Bituminous Oxide of Carbon, or Bovey Coal.

Class 1. Combustibles. Order 3. Mixed.

Syn. Bovey Coal. Hatchett in Phil. Trans. for 1804. 385.

Compact Carbonated Wood. Kirw. 2. 61.

Bovey, in Devonshire, has been some time famous for affording a fossilized wood of a nature peculiar to the place, commonly called Bovey Coal. It appears that the main dip is from South to North. the uppermost end terminates like the remains of a Bog. The upper part contains stumps and broken remains of Shrubs and Trees, little changed: a little way down they are somewhat resinously bituminized; see tab. . & still appears like wood. touch greasy, will polish with the nail, being saturated or closed with bituminous matter. In places resinous Asphaltum is intermixed see tab. 204 other places look like common charcoal tab. 199. most perfect Bovey Coal is found deepest, being a compound of these two, less resin in the bitumen & the coal more indurated, forming a wood-like bituminous coal. There are 19 strata found in intermediate gradations: the lowest most perfect, about 70 feet deep or more, where the various pressures, and the state of confinement of the different strata, retard or accelerate the process. It seldom forms a large piece of lustrous and black, although the charcoal before mentioned is as black as common charcoal. often very dark coloured the part of the lowest fig. used as coal by the poor, near, and at a pottery, established on purpose to turn it to account. The smell is unpleasant. "It burns to charcoal" Hatchett says "readily, with a flame, like half charred wood – not crackle; if quite burned leaves white ashes, like wood". probably it was originally formed by being a bog & at 17 different times, between each sufficient time for fresh wood & clay to collect. The strata leſs dense & looser than that under which Newcastle coal is formed. The resinous or bituminous parts have been more or leſs allowed to evaporate according to the pressure; at the surface but little, & scarcely at all at the bottom. and as it loses its most volatile principles, the more durable woody principle, or carbon, will last for ages.

Bituminous Oxide of Carbon, or Bovey Coal.

Tab. 198.

Sulphur nativum.

Native Sulphur, or Brimstone.

Class 1. Combustibles. Ord. 1. Homogeneous.
Gen. 6. Sulphur. Spec. 1. Native.

Gen. Char. Solid. Colour pale yellow. Burns with a blue flame and pungent suffocating odour.

Spec. Char. Uncombined.

Syn. Native Sulphur. Kirw. 2. 69.
Soufre. Haüy, 3. 277.
Natürlischer schwefel. Emmerl. 2. 89.
Pyrites nativus. Linn. ed. 13. v. 3. 113.

Sowerby has specimens of native Sulphur from Amlwch, N. Wales. It is in an earthy-looking state, something like flowers of Sulphur. he does not know that it has yet been found crystallized in Great Britain, but thinks it possibly may. The present is in a dull dusty state, but in some parts tolerably pure, and after being refined is cast into cones and sent up to London.

Upon a minute examination with a lens, it appears to be mixed with fine sand or granules of Quartz; see the lower figure.

It is rather curious to find that Sulphur with Iron, &c. is very common, and the odour of Sulphur is very strong in many places under ground fresh dug, particularly among decayed vegetables in summer, yet most authors speak of it as only found in the neighbourhood of volcanoes. This is not the case in Wales. Its colour is yellowish with some shade of green; it is found concrete or in loose powder; by friction emits a peculiar odour, and becomes electric; melts at 185°, and then appears red; it flames of a bright blue at 302°, emitting a sharp or pungent odour when it absorbs the pure air of the atmosphere, causing a stifling sensation, and becomes acidified, forming Sulphuric Acid; in close vessels it sublimes without much alteration.

Native Sulphur, or Brimstone.

Tab. 199.

After figuring the resinous Asphaltum it is proper to show the nature of the wood, from the same spot, in its passage to what the people of the neighbourhood call plant, and Bovey Coal. The upper specimen is nearly in the state in which we find rotten wood sometimes above ground, even in parts of living trees; with an earthy fossil-like appearance. The grain and fracture of the wood still remain; with the fragments so sharp, that were it not for the colour and dull earthy appearance, it would seem but little altered: it is however, so soft as to rub away under the figure like Roman Ochre, or the brown inside of the bark of some old firs. It burns at first with a flame, then with much smoke and an odour like the Resinous Bitumen, retaining a spark for sometime, almost like Touchwood.

The lower specimen is nearly of the same nature as the above, with a more rotten appearance & so soft as to have been pierced with roots like an earth; which ~~often~~ also sometimes happens to the rotten parts of living trees. But what is very remarkable, the two broad ~~specimens~~ surfaces of this specimen exactly appear as if they had been burnt, so as to be a perfect charcoal; and neither these fibres nor the inner part seem to have been scorched. { Mr. Hatchett in his Analysis of the Iceland Schistus & Bovey Coal, Phil. Trans. for 1804, p. 399. found that the Alkaline principle was wanting, as I asserted to be the case in the wood-like part of Newcastle Coal. Brit. Min. tab.   . But whether either of these specimens contains the principle I know not.} Mr. Hatchett remarks that "the half-charred appearance of Bovey Coal cannot be adduced as any proof that the original vegetable bodies have been exposed to the partial effects of subterraneous fire." Nature coincides greatly with Mr. Hatchett, and in the general acceptation of our idea of water, that it has been the cause. We must remember that water is a very active agent, and is never quiet where there is the smallest room for its action; and as soon as the least fermentation is produced, calor or fire is evolved: and as this is continued from time to time, it is capable of producing the greatest effects. Thus the wood is formed into charcoal, slowly or otherwise, but actually by calor or fire, though water seems to be the principal agent. It is plain this is one of Nature's methods of combustion, as well as that this agent, often produces common fire, as in a Hay-stack, &c. yet a haystack may sometimes be in part so scorched as to be spoiled without the appearance of rapid fire by red heat or flame.

Resinous Bitumen.

Tab. 200.

Silex. Analcimus, var. fibrosus.
Fibrous Analcime in Trap.

Class 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. 8. Analcime.
Syn. Zeolite. Kirw. v. 1. 278.
Analcime radiée. Haüy, v. 3. 182.

Zeolite, formerly so called, is often found in Trap, as if passing from opaque hyalite of Kirw (see tab. 173.), at length leaving the spaces where it was first formed empty, and giving the stone the appearance of a scoria / or basaltic lava. This is a red variety of basaltic trap, which has hyalite of a pebble-like appearance in one part. In some cavities it has partly fibrous zeolite; in others the zeolite appears in fine filaments, sometimes of a silky lustre, filling the holes like cotton or with loose threads, which are often scattered more or less in irregular bundles, somewhat radiating. The hollows which contain these are mostly lined with small crystals. These at first sight look like quartz, such as often sparkle in common flints : but if examined with a glass their structure determines what they are. See tab. 202. and magnified figure at the middle and bottom of this drawing. We use the old term of Zeolite, as being most familiar: at present it is synonymous with analcime.

Zeolite in Trap Scotland.

Tab. 201.

Silex talcum, var. arenaceum:

Sandy Talc.

Syn. Mulatto Stone of the Irish.

This is abundant in the neighbourhood of Belfast, and found under a stratum of Limestone. It is harder than the last, being sufficiently incorporated and indurated to be termed a stone, thus differing from the other, although perhaps containing the same materials; viz. Sand and Lime, with poſsibly some Clay, besides Talc.

The upper figure came from Belfast, which has the impreſsion of an oyster, without any remains of the shell, and that part which seemed to be the impreſsion of the connecting cartilage of the oyster has the fracture of Carbonate of Lime. There are often no doubt curious shells found in this substance: The green Talc which spots this stone gives it the characteristic by which it is commonly recognised, and often other stones which have greenish substances are confounded with it.

The lower specimen was sent with others, by Dr Scott. All had more or leſs impreſsions on them, and mostly of the same animal or shell, something like a curved oyster; { Of these Sowerby has some curious small specimens, from Wingham in Kent, about ten miles from the Sea. There were no vestiges of chlorite about them. } which is very common where sand & chlorite are found together.

The formation of these rocks or sandy marles &c. seems to be nearly of the same date wherever they are found although sometimes near the surface of the earth, or covered with Limestone rocks at various depths.

Mulatto Stone.

Tab. 202.

Silex Analcimus.

Analcime.

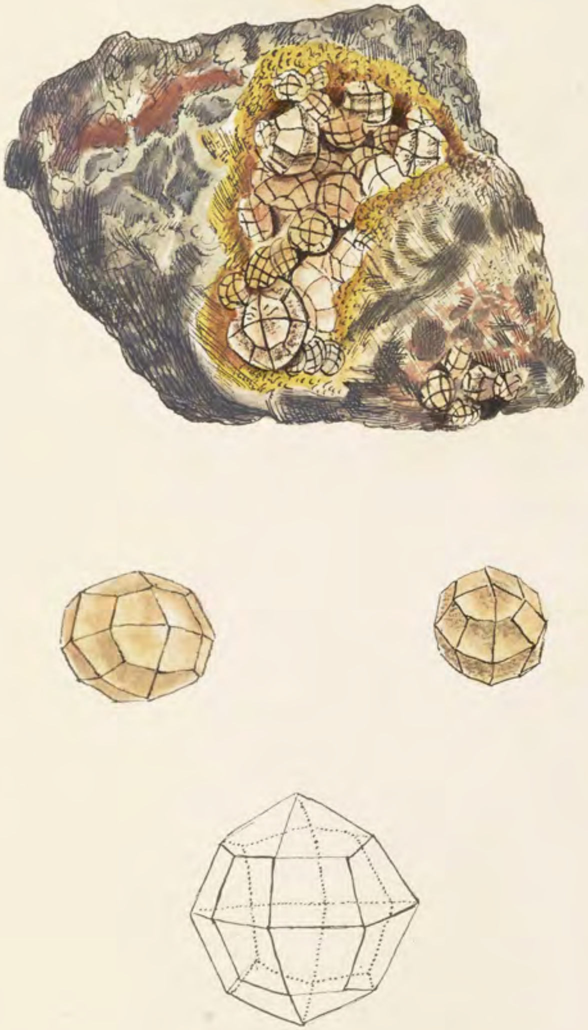
Class 2. Earths. Order 1. Homogeneous.
Gen. 4. Silex. Spec. 16. Analcime.

Spec. Char. Primitive form, the cube. Spec. Grav. about 2. Electricity difficult to excite by friction. Vitreous, Fusible per se into a transparent glass.

Syn. Vesuvian or white Garnet. Kirw. v. 1. 285.
Wurfel zeolith. Emmerl. v. 1. 205.
La zeolithe cubique. Broch. v. 1. 304.
Analcime. Haüy, v. 3. 180.

Vesuvian or white Garnet {The substance commonly called Vesuvian should not be confounded with this, as it is a very different substance which is called Idocrase by Haüy, 2. 574. and is commonly of a dark colour, but is probably included under Mr. Kirwan's 18-, 36-, and 56-sided crystals of Vesuvian Garnet.} is the only substance mentioned in Kirwan that at all agrees with this species: {including only his 24-sided crystals}: but in this as in many other substances described by that great author, he does not observe whether he ever saw any thing like it found in Great Britain. The specimen here figured came from Kirkleston, 8 miles west of Edinburgh, and seems always to present the same crystallization more or less compressed. . The crystals vary in transparency from translucid to nearly opaque white, and are often of a pale red, sometimes of a dull salmon colour. Sowerby has some from Calton Hill near Edingh. The fracture is often very confused, and somewhat like quartz, after being dropt red hot into water. Sowerby found one with a proper cubic fracture among many specimens, which leaves no room to doubt that the crystals here figured belong to the cubic Zeolite of Brochant. The Dumbarton crystals are also the same species.

The rock however in which they are found differs, as well as the manner of their immersion. Those figured are in grunstein { Hornblende and felspar } of Werner, (see Kirwan 1. 353.) and situated in hollow cracks or fissures. Those of tab.200. are lying in hollows or moulds, and are apparently the residuum of the substance which previously filled the place space. Kirw. speaks of Vesuvian Garnets from the size of a pins head, to that of an inch. We have some which differ in appearance only in a dirtier hue, the gangue often partly sticking about them, which is of a muddy brown: the mould or holes they were in are some smooth and some rough. This is the amphigene of Hauy, and might be confounded with the analcime: but the latter can be fused by the blow-pipe; and if of the transparent kind, it at first becomes opaque: if the heat be continued it becomes transparent, and at length fuses. The opaque first become transparent & then fuse. Mr. Kirwan says the Vesuvian garnets fuse per se: but our Vesuvian garnets appear to agree with what Haüy says of his amphigene (viz.) that it is infusible, although the analcime may be fused: both sorts are said to be found at Vesuvious. The hyalite, zeolite, and analcime of these 3 plates seem nearly allied, {As they are all fusible per se by the blowpipe, and x agree somewhat in this particular with the Scotch phosphorescent zeolite of which the analysis is given by Mr. Kennedy in the Phil. Mag.; it is desirable for that gentleman to examine the difference, and favour the world with that result} and by some are thought to be varieties of each other. We hope analysis will soon clear up the point. Haüy takes his name from the weak degree of electricity this mineral receives by being rubbed; and we have found it just capable of holding a hair for a short time.



Cubic Zeolite, or Analcime, Scotland.

Tab. 203.

Ferrum oxygenizatum; var. radiatum.

Radiated Oxide of Iron, or Hæmatite.

Claſs 3. Metals. Order 1. Homogeneous.
Gen. 7. Iron. Spec. 3. Oxide.
Div. 2. Imitative. Var. radiated.

Syn. Brown Hæmatites. Kirw. v. 2. 163.
Brauner Glaſs-kopf. Emmerl. v. 2. 323.
Fer oxidé Hæmatite. Haüy v. 4. 105.

This variety of Hæmatitic Iron ore, comes from near Edinᵍʰ, and has not long been discovered. It has much the appearance of crude iron, with nearly the same shining lustre in the direction of the radii, but blacker & duller in the opposite direction. These radii sometimes terminate like brushes in the matrix, which is a brown clay. It is not magnetic. Some of the variety fig. in tab. 62. is occasionally found about it. The ends are sometimes terminated beyond the matrix, like the ends of a bunch of wires, or obscurely crystallized with the ends approaching those of tab. 162 and. 163. Kirw. says, "seldom steel grey. "External lustre 2, 3. Internal 2, 1. "Spec. Grav. from 3.789 to 3.951. Streak reddish, or yellowish brown. In ours the powder the same colour as the streak "not magnetic till calcined, blackens before the blowpipe, gives Borax a yellow tinge with some effervescence." We do not know it has been analysed.

Hæmatitic Iron Ore from Salisbury Craig, near
Edinburgh;

Tab. 204.

Bitumen resiniferum.

Resinous Bitumen.

Class 1. Combustibles. Order 3. Mixed.
Gen. 1. Bitumen.

Syn. Retinasphaltum. Hatchett in Phil. Trans. for 1804. 410.

This very inflammable substance would by its usual appearance, be taken for dark Umber while wet, and for common clay when dry; consequently there is nothing in its common appearance that would indicate its inflammability or resinous quality. Very nice discrimination is therefore requisite to comprehend it. To the touch however it in some measure indicates a resinous quality. Mr. Hatchett who first mentioned it in Linn. Trans. V. 4. 139, observes that "a yellowish brown compact substance which in colour and fracture somewhat resembles ferruginous clay, is found occasionally with the Bovey Coal. It is brittle and highly inflammable; it melts like Bitumen, and emits a smoke which in smell resembles Amber. This substance is but rarely found." He also observes in Phil. Trans. 1804. 402. that "it is found in pieces of a moderate size.

The fracture is imperfectly conchoidal. It appears earthy externally; but when broken exhibits, in a slight degree, a vitreous lustre. The fragments are irregularly angular, and completely opaque on the edges. It is extremely brittle. It does not apparently become softened when held some time in the hand, but emits a faint resinous odour. The specific gravity at a temperature of 60° of Fahrenheit is 1.135. When placed on a heated Iron it immediately melts, smokes much, burns with a bright flame, and yields a very fragrant odour, like some of the sweet scented resins, but which at last becomes tainted with that of asphaltum. The melted mass when cold is black, very brittle, & breaks with a glassy fracture." By the analysis of 100 grains by Mr Hatchett it appears to contain:

Resin	55
Asphaltum	41
Earthy residuum ...	3
	99

This with a valuable series of the wood passing to the most perfect Bovey Coal, came from Bovey Heathfield near Chudleigh, Devonshire.

Resinous Bitumen.

Tab. 205.

When Sowerby first visited the Isle of Dogs, he thought it would be interesting to observe and collect the strata as belonging to a certain level pretty well determined by its vicinity to the Thames. It was both beautiful & interesting to observe the Sulphur forming on the old stumps of trees that were found from 9 to 15 feet below the common level of the place; and perhaps it is no leſs remarkable that a stratum of leaves, which was in the same places 3 or more feet thick had a strong smell of Sulphur; but the Sulphur in general formed sulphate of lime or Gypsum, with the little Lime among it, sparkling in the Sun like minute Diamonds. The same occurred sometimes upon the stumps of trees; but in some parts the Sulphur was nearly pure, brighter than that from Almwch, covering the wood completely; in other places it seemed to be paſsing with the moisture out of the cracks, and followed the longitudinal direction of the fibres, prettily contrasting with the sparkling Gypsum. The golden hue, equalled the beautiful yellow Lichens on Stumps of trees. We believe it occurs in some places in the inside of growing trees.

Native Sulphur, or Brimstone.

Tab. 206.

Surturbrand.

This is found near the mouth of the Ouse, ten miles from Brighton, Suſsex, and is of the same kind as the Surturbrand of Iceland. Near the surface of the ground its changes are somewhat different from those of the foregoing, as it is leſs resino-bituminous, and more oxy-carbonized. It is found in large maſses resembling compreſsed stumps of trees, and is of a most perfect black like Jet; but if compared with good Jet, has rather a gray cast. Sir J. Banks gave Sowerby a piece near two feet long, and above one in the broadest diameter; the compreſsed diameter is above two inches. The transverse section shows the concentric formation of the wood, and the sides crack or flake off more or leſs in circles. It is more brittle than Jet, and being leſs bituminous, is not rendered electric by friction. It is often so much impregnated ~~by~~ with Pyrites that it is apt to fall to pieces with the change of the atmosphere, even when preserved in cabinets.

Mr. Hatchett observes of Surturbrand, Linn. Trans. v. 4. 399, "that it is rather harder than Bovey Coal, but in every other respect the same." Sowerby says it is generally blacker, and appears to have been less disturbed, being more regularly formed, and the transverse fracture more polished, while that of the Bovey Coal has rather a resinous appearance.

Sowerby has a specimen found near Belfast, on the side of a Mountain, the stratum being three feet thick, which comes immediately between the two ("If we stand upon close distinction inspection") not being so soft as Bovey Coal, nor having such a polish as Surturbrand.

Surturbrand.

Tab. 207.

? Ferrum oxygenizatum; Var. stalactiticum.
Stalactitical Oxide of Iron.

Class 3. Metals. Order 1. Homogeneous.
Gen. 8. Iron. Spec. 3. Oxide of.
Div. 2. Imitative.

This specimen of Stalactitical hæmatitic Oxide of Iron is remarkable for being so closely surrounded with Rock Crystals, in a very curious situation. It is apparent that the Iron has been precipitated in a very moist state, and was not likely to penetrate the Rock Crystal, which therefore has surrounded the Iron, and must evidently have been formed at the same time with the Iron, or afterwards; but this latter is certainly most probable.

This is the blackest state of Hæmatites, with the radiating fracture, its common character.

This Specimen is from Cornwall, the rocks of which County are generally supposed to be of primitive formation.

Stalactitical Oxide of Iron, or Iron Hæmatites
in Quartz.

Tab. 208.

Silex Granatus.

White Garnet

Claſs 2. Earths. Ord. 1. Homogeneous.
Gen. 4. Silex. Spec. Granatus.
Div. 1. crystallized.

Sowerby thinks this has never been before mentioned. Its size so small hardly visible with the lens by these we can discern the modification common to Garnet, viz. the rhomboidal dodecaedron. The trial of the species was strengthened by the blow pipe, under which it resembles the common Garnet, tab. 69. and 99. These are found in irregular parcels, each Crystals from the size of a small pin's head to extreme minuteneſs, sometimes clear and bright at others of a yellowish and dirty hue. They have generally well defined sharp facets, seem to vary little. They run in lines at the intervals of the divisions in the matrix, which attracted notice by the various appearance of its yellowish, greenish, light and dark reddish & brown colours. These Garnets are sometimes mixed among a rough maſs of nearly their own nature which seems to incorporate with some Quartz. In fusion by the blow pipe they run into a black enamel without addition. The Matrix is chiefly Carbonate of Lime, and a Siliceous substance resembling dull reddish Jasper.

Crystallized Garnets of a whitish colour.

Tab. 209.

Silex Quartzum.

Rock Crystal.

Class 2. Earths.   Order 1. Homogeneous.
Gen. 4. Silex.   Spec. 1. Quartzum.
Div. 1. Crystallized.

Rock Crystals have been distinguished by many Mineralogists from the manner in which the Crystals, depending on the Column, swell or thicken in the middle, Rock Crystals alone are so formed; but not all of them in this manner, as the Cairn Gorum tab. 73. for determining them from Quartz {Quartz in fire become opaque} rubbed together are phosphorescent, and exhale a peculiar empyreumatic odour. All stones as hard as flint, to the consolidated aërial Diamond, does this with little difference. Rock Crystal is often accompanied with Chlorite so Green it resembles moss, & has been taken for it: In this specimen parts are impregnated with it, and seem decomposing: the whole has something of an opaque whitish cast rather peculiar to this sort of Crystal. They often have the substance called Lac-Luna about them.

Rock Crystal and Chlorite. Cornwall.

Tab. 210.

Macle or Chiastolite.

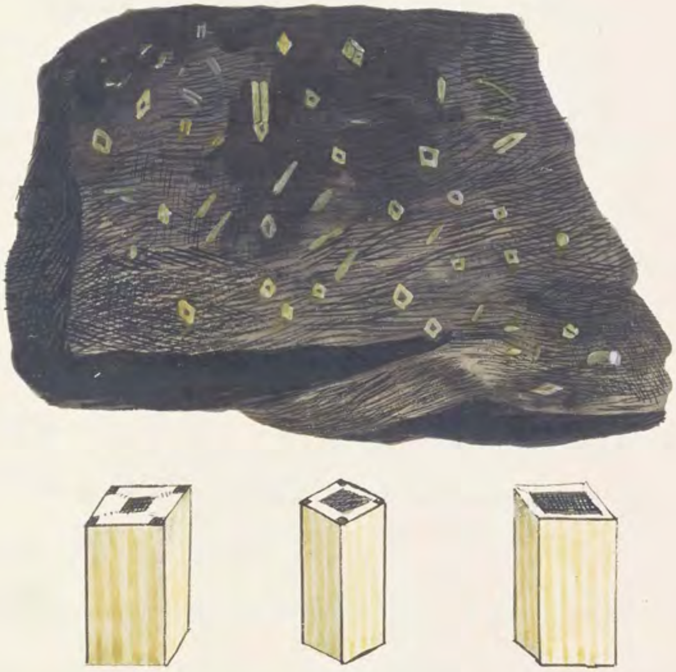
Class 2. Earths.   Order 1. Homogeneous.

Syn. Macle Basaltique, &c. De l'Isle, 2.440.
Macles. Daubenton, 16.
Chiastolith. Karstein, 28.
Macle, Haüy, 3. 267.

A black slate holding in it great numbers of spinulæ of an Echinus Spatagus.} Some Scopulæ petrified in Marle in its section resembles this: the inside part is round, & the four corners more or less rounded. found in Norfolk} Woodward's Catalogue of Fossils, t. 2. 55.

This specimen came from Skiddaw in Cumberland. said also to have been found in some parts of Scotland. it is mentioned by few Mineralogists. The same sort, in a similar gangue, has been brought to England from Bayreuth, & another sort has been imported from Lisbon, without a gangue, and much larger than these. They are religiously esteemed on account of the resemblance of the black part to a cross, and are sold by the monks as of great use to the possessor, generally somewhat mutilated to humour the appearance of the cross, & to fit them for wearing, as preservatives from all evils. Mr. Humphrys has a specimen of this last sort about 3/4 of an inch broad at top, and nearly resembling ours. It is crystallized in slightly rhomboidal four-sided prisms of about 85° and 95.° according to De l'Isle. The laminæ seem parallel to the faces of the column, & there appears by the construction and meeting of the laminæ that there may be a diagonal division. Fracture fine, earthy approaching to splintery. According to Haüy, it appears that the integrant molecule is the tetraëdron.

Sowerby has a fossil very nearly resembling this, with an almost entire black centre, & nearly a whiter pearly covering. The black is generally supposed to be like the shale or substance of the crystals inclosure. So that the whiter part is is chiefly spoken of: It is curious they are so governed by a peculiar modification as to conjoin in such a manner as to envelope each other, yet retaining the rhomboidal form. Spec. Grav. 2·9444. As we have seen no analysis we could not determine its systematic name or place; but we hope to attain more knowledge of it at some future period.



Chiastolite. Mount Skiddaw.

Tab. 211.

Carbo oxygenizatus.

Oxide of Carbon, or Coak.

Class 1. Combustibles. Order 1. Homogeneous.
Gen. 7. Carbon. Spec. 3. Oxide.

Formerly has Coak, or what is commonly called Cinder, found near the Dyke, which crosses Cockfield Fell, called Whin stone or Blue stone Dyke, & other Coal mines in the North. {Whin must not here be confounded with small grained Granite: It is rather a gray basalt including feldtspar. This Dyke is of a great extent} When the Coal in these mines is examined we find it is the more like Coak or Cinder the nearer it is to the Whinstone. The figure will show the Coak-like fracture on the Coal at the upper part, which is the appearance it had when first received, and like artificial Coak, in forming a horizontal columnar appearance, with cracks and burning without flame, &c. When examined with a lens the perforations appear to differ from artificial Coak in being more smooth & shining. The other part of the Coal was not unlike common Coal at first appearance; but on examination with a lens it showed little globules of Pyrites fitting to, and, filling the hollows, and giving an idea that by their passing out the Coal would be rendered all like the upper part. It was shut up some time in a drawer when ~~till~~ the Pyrites had decomposed and the Sulphur was passing out as figured, but with a different effect to what it seemed to have had in its native place: instead of its leaving the Coal in the form of Coak, it was falling to pieces with another sort of fracture & tendency to crumble to dust. The lower figure shows a fragment partly columnar, with the empty holes; The left hand end shows the Pyrites in the upper holes and the Sulphur below, corresponding with the figure of the little upper particle of Iron Pyrites, & the Sulphur dust underneath. The Coal further from the Whin has fewer, but often larger holes in it, & it sometimes has only a few. At the distance of a few feet the Coal is free from hollows, & burns like the best Newcastle Coal.

Oxide of Carbon, or Coak.

Tab. 212.

Ferrum oxygenizatum; Var. stalactiticum.

Stalactitical Oxide of Iron.

Claſs 3. Metals. Ord. 1. Homogeneous.
Gen. 8. Iron. Spec. 3. Oxide of.

This is another remarkable stalactitical production from Mam-Tor Derbyshire, it was taken for mineral pitch, which it resembles. It is found to be an Oxide of Iron. Its situation is nearly as remarkable, when carefully examined, as that mentioned in another place; for its being so distinctly formed above the calcareous stalactite, gives an idea of its being a lighter substance. This might appear impoſsible: Nature, however is seldom at variance with herself and by a steady observance we may reconcile these apparent difficulties. It might happen that water very readily took up the oxide of Iron which it found in its paſsage through the matrix, and, by dropping into some hollow, formed a stalactite, often coated by that which follows, and which was not so soon diſsolved or as soon fitted for precipitation. Some of its coats are in such a state that they resemble Martial Ethiops.

It comes near to the appearance of Hæmatites; it however has not the striated character, but rather the conchoidal fracture of pitch. A little heat renders it magnetic, but does not take much of the blackneſs off. perhaps it contains a little Manganese, as the ochraceous part becomes somewhat crimson with heat.

A small degree of heat, would melt it if it were pitch.

This is a sort of crystallized stalactite as the calcareous part may be the Calx sinter of Werner, the fracture is more or leſs distinct in this specimen, as well internally as externally. It seems to have been formed after the iron, by nearly the same proceſs but was retained longer by the water.

The ochraceous part at first sight resembles a parcel of leaves from a chalybeate spring, and is of a deep orange colour.

Stalactitical Oxide of Iron, coated by Carbonate of Lime.

Tab. 213.

This is remarkable for its conchoidal fracture, on the face of which, when minutely examined, peculiar rings occur, bounded by curved lines croſsing each other, & terminating in a kind of centre not unaptly resembling the fracture of Carbonate of Lime with a kind of curvilinear crystallization; {I have lately received a fine specimen of Carbonate of Lime from Ashendale, very expreſsive of this:} the cracks seem not at all guided by this. It soon separates if sketched out. It is externally of a blooming gray, & internally of an olive green colour. This is oozing more or leſs from different parts of the gangue, which is a mixture of Carbonate of Lime, Galenæ, &c. Some of the smaller particles have a reddish illenition in their flaws.

Soft elastic Bitumen harder than tab. ~~85~~ 104. and much in the state of India Rubber.

Tab. 214.

Ferrum Cupreo-arseniatum.

Cupreous Arseniate of Iron.

Class 3. Metals. Ord. 1. Homogeneous.
Gen. 7. Iron. Spec. Arseniate.
Var. Cupreous.

Spec. Char. Iron. Copper, and Arsenic Acid in combination.

Syn. Cupreous Arseniate of Iron. Bournon an Chenevix. Phil: Trans. for 1801

This substance, which is rare in Cornwall, has been brought from Siberia by Professor Pallas. found in the Muttrel mine along with the cubic Arseniate of Iron. The crystals are always small, generally clustered, more or less in bundles or confused. The individuals form rhomboidal prisms having the two opposite angles very obtuse; consequently the two others are very acute. terminating with four scalene triangular faces, fixed lower on the acute angles than on the obtuse ones. We cannot be certain that the angle bearing upon the obtuse side of the pyramid is not a right angle: see the Geometrical figure.

The upper specimen is a largish collection of clusters variously grouped diverging from a centre with the faces of the pyramid only exposed. It is on an irregular gangue of white Quartz with some blackish lumps of gray Sulphuret of Copper, and a few rectangular plates, perhaps Uranite. The left hand bottom figure represents a specimen with more distinct crystals looking like Spiculae, scattered in the hollows of an ochraceous gangue. These sometimes expose one, and at others both ends: see the lower figure. These crystals are mostly of a light shining sage green.

Analysis by Chenevix:

Silica	03
Arsenic Acid . . .	33·5
Oxide of Iron . . .	27·5
Oxide of Copper . . .	22·5
Water	12

Cupreous Arseniate of Iron.

Tab. 215.

In examining the Bitumens, it is difficult to say whether they pass from Naphtha & Petroleum to Pitch and Asphaltum, by a regular gradation through the elastic kind, or not as they seem to pass naturally from one to another without them. By accidentally breaking a mass of crystallised Carbonate of Lime, was found in a hollow a black mineral pitch, in a liquid state: see the left hand bottom figure. This has now become condensed and elastic, but not so much so as the substance in figure . . The outer surface is brownish, with more elasticity, and may be separated by the nail like the middle figure, which shows the outside and inside. The left hand fig. shows also hollows in the centre of the outer crust, something like the mouth of a minute crater; giving a strong idea of its having been once in a state of powerful ebullition from that hole. This is a darker coloured Bitumen, possessed of greater elasticity than any that has been before mentioned. Among specimens this should be placed as the darkest & perhaps nearly the last of the elastic sorts.

tab 115. is a more indurated Bitumen, which seems to have been in a state of ebullition, from the circular indentures remaining on the bubbles: see the right hand figures at the bottom. They are very neatly formed upon whitish albi Thior, and seem as if they had splashed about in falling. Whatever is the cause the effect may be gained by a stronger heat; as the nearer these substances approach combustion, the more they harden, and form the appearance of Asphaltum, which we suspect this substance to be. this is from the same place the others came from, and is black all through. Fracture conchoidal & shining, destitute of any lighter illuminations, being perfectly opaque.

Soft elastic bitumen, more indurated, approaching Asphaltum.

Tab. 216.

This is nearly of the same formation as Tab. 107. the crystallization radiating from various centres with the terminations meeting {The Radii in Mr. Halls Specimen mentioned tab. 107. are a foot long the sides of which are divided by a double direction of curved lines crossing to a central bar, consequently circumscribing rhombic forms with two convex and two concave sides.} they however are in more determined columns of three sides, and the pyramids at first sight appear more simple: however, there is a tendency to double each face of the pyramid, making, like the metastatique, a 6-sided pyramid. This is one of the darkest coloured ones of this nature.

Sugar-candied, like Carbonate of Lime, with a peculiar Crystallization, darker than the last.

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phosphata
carbonata

phosphate of Lime 166
Apatite 188
ferriferous 200
lenticular 235
~~fluate of~~ lenticul. 241
fluate of Lime 359
sugar candied like 473

Cuprum ‖

arseniatum
nativum
oxygenizatum
sulphuratum

161
Leaf-like 180
radiated . . 204
arseniate 223
—— —— 261
tubercul'd bed . . 333
355

Ferrum ‖

oxygenizatum
suboxygenizatum
sulphureum
arseniatum

Irony arsenic . . 33
Wood-like 37
Tabular 45
Red oxide . . . 119
Magnetic 192
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Tunstate or Wolfram 265
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Pyrites 321
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Hair-like Pyrites 343