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EXOTIC MINERALOGY:

OR,

COLOURED FIGURES

OF

FOREIGN MINERALS,

AS A

SUPPLEMENT

TO

BRITISH MINERALOGY.

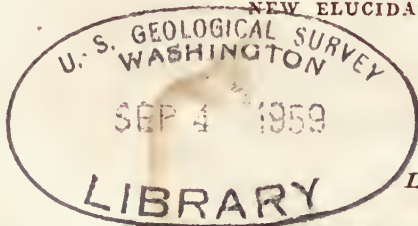
By JAMES SOWERBY, F.L.S. 1757-1822

HONORARY MEMBER OF THE PHYSICAL SOCIETY OF GÖTTINGEN,

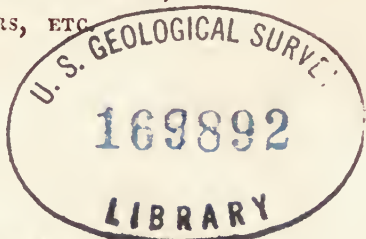
DESIGNER OF ENGLISH BOTANY AND EXOTIC BOTANY, AUTHOR

OF ENGLISH FUNGI, THE BRITISH MISCELLANY,

NEW ELUCIDATION OF COLOURS, ETC.



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MDCCCXI.

D1826

Joseph A. W. Patel

1844

TO

ROBERT FERGUSON, F. R. S.

a Gentleman known as possessing a Cabinet of rare Foreign Minerals, and who generously volunteered his aid in this undertaking, I do myself the honor to dedicate this Volume. That it may be as equal to his expectations in my part as the subjects are important, is the great desire of

His humble Servant,

JAMES SOWERBY.

No. 2, Mead Place, Lambeth,
March 1st. 1811.



P R E F A C E.

IT was under rather peculiar disadvantages that my work upon British Minerals with figures was begun, as Mineralogy was considered merely as an appendage to Chemistry, and it was thought that figures would not elucidate it; but Mineralogy has now gained more importance, and figures have been found much to facilitate the study of that, as well as of the other branches of science. It is almost enough that a Mineralogist should know how far this empire is blessed with native Minerals, which since my work has been in its progress, are so much augmented, that but few are to be added, even from the whole remaining parts of the globe. Indeed most former English Authors, depending chiefly upon foreign information, did not know what was to be found at home; thus, while the British Minerals require five or six volumes, the Exotic ones may be figured sufficiently complete in only one more, perhaps. The little Catalogue which I have just published will serve to show this, and as I do not profess to enter largely into a collection of Exotic Minerals, I am happy to say that the generosity of those who possess the most perfect Cabinets fully supersede the necessity of so doing. The first subject begun for this work, viz. the superb Chromate of Lead, was drawn at my much to be lamented friend's, the Hon.

Charles Greville, and I depended greatly on his matchless collection, and by application to the Trustees of the British Museum, who have so honorably interested themselves in securing this treasure to their Country; I have to thank them for the free access to it which I now enjoy.

British Mineralogy has met with the most flattering approbation with regard to the general plan, and I shall in a great measure adopt it as a pattern, and shall find either convenient to the other as a reference. In the vast extent of the remaining part of the globe, we may expect great chance for superb specimens, and, of course, more expensive plates must be given; it, however, will not be of much consequence upon the whole, and the two works will not want uniformity.

I am happy to have done thus much to advance the essential study, and to see its consequence increase, which encourages me to offer this fresh tribute, which, depending more on its own utility than on myself, cannot want encouragement from a discerning public.

As Exotic Minerals will include the precious stones, I shall feel highly gratified to find the noble wearers in general better acquainted with them, which will rather stamp a double value on them, and, I am sure, will not less augment the satisfaction of the wearer.

Shines not a pebble where the rivulet strays
But claims our wonder, and excites our praise.



TAB. I.

CALX carbonata quartzifera.

Quartziferous Carbonate of Lime. Crystallized Sandstone.

SYN. Chaux carbonatée quartzifere. *Haiiy* 2.184.
Grès calcareo-quartzueux. *De Lisle* 1.501.

THIS specimen shows that the strong tendency of some substances to crystallize often overcomes what might reasonably be thought great obstructions. It is a mixture of Carbonate of Lime with Silicious sand in the form of the inverse rhomb*, and is not known in any perfection but at Fontainebleau, where it is tolerably abundant, either in single crystals, or variously grouped. It is certainly extraordinary, as it sometimes does not contain in an hundred parts above $37\frac{1}{2}$ of Carbonate of Lime, the crystallization of which governs the form, the remaining $62\frac{1}{2}$ being sand. We do not know of any specimens of Carbonate of Lime in a nearly pure state crystallized so finely in the form of the inverse rhomb; although we understand there are some crystals found at Fontainebleau, that are half of them pure Carbonate of Lime, and half mixed with Sand. The crystals seldom vary from the true measure of their angles $102^{\circ} 30'$ and $77^{\circ} 30'$, and are generally very neat. The large rhomb on the present specimen is rather out of shape, and there is a

* B. M. Tab. 4.

curious embossment on one of the relieved crystals, and one of those on the left hand of the print has a sign of truncated angles, possibly rare, as I have not seen it on any other specimen. The whole is so extraordinary, that I despair of seeing such in Great Britain, and therefore consider this figure the more necessary.



Fig. 1. 1. 47. *Stem of Liliaceae*

TAB. II.

ORBICULAR Sienite.

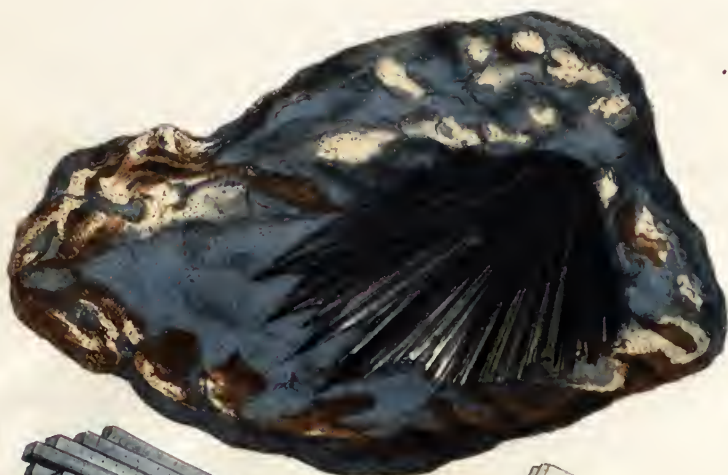
SYN. Roche Quartzzeuse avec Actinote, Granit globeux de Corse. *Hall's* 4.431. *Mathieu, Annales du Museum d'Histoire Naturelle.* 14.82. *English Extract of Do. Phil. Mag.* 35.222.

THE small plain of Talavo, near Stranzona, in the island of Corsica, afforded a solitary block of this curious and singular variety of Sienite. It was first described by Sionville and Barral in the year 1785, since which time several blocks have been found by Mr. Mathieu of the French artillery, on the estate of Sarteni. It is chiefly semitransparent Quartz, some of which, by diverging from a centre, is formed into roundish nodules, including a granular dark green substance, much resembling Chlorite, sometimes rather confused, and in greatest abundance towards the centre, yet often forming thicker or thinner alternate coatings with the Quartz in a very neat manner. These nodules are imbedded in or surrounded by an aggregate of Quartz, the granular green substance, and almost black crystals of Hornblende. The Quartz in some parts is more or less transparent, and sometimes grayish, greenish, or stained with ochre. The annexed figure has the usual appearance, and the cutting and polishing gives the sections of the globes, and makes them distinct, admirably pretty, and better understood. "In Mathieu's memoir the blocks are described as loose, lying on

the side of a very steep mountain, extended over a space of about 400 square metres, with the appearance of having been detached and rounded by the action of the weather. Their being found on an elevated and inclined situation, indicates that they could not be far removed from their original situation, but it is to be regretted that the discovery was not prosecuted a little farther, and the nearest solid rock examined. By this memoir it seems evident that this curious stone occurs in Granite, but what connection it has with the real Granite of the country, we have yet to learn. Possibly it may occur in a vein; it may form part of a bed; it may be a part of an included mass.—But we can yet only conjecture as to its particular relations.”

“ It may be here remarked, that Granite, according to the Wernerian doctrine, cannot contain one particle of Amphibole (*Hornblende*,) consequently this stone, in which it abounds, cannot be considered as a Granite; besides, from my specimens, it does not appear that the enumeration of the component parts is correct, either in Mathieu’s memoir, or in any other publication. Haüy says, it is composed of whitish Quartz and dark green actinolite (actinolite and Hornblende, according to him, are synonymous). Brochant says, Feldspar (in the text Quartz, which is corrected in the errata) and Hornblende. This appears clearly composed of Quartz, Hornblende, Foliated Chlorite, and a few minute crystals of Feldspar, constituting what may be considered Sienite.”

T. A.



from a published by J. S. Lovell, London

TAB. III.

FERRUM phosphatum.

Phosphate of Iron.

SYN. Phosphate of Iron. *Thompson*. 4. 481. *Cadet*,
Journ. de Physique. 58. 259. *Fourcroy*, *Ann.*
de Chimie. 50. 200.

Blue Iron Earth. Native Prussian Blue.
Thompson 4. 482.

Fer Azuré. *Hallé* 4. 119.

Blue Martial Earth. *Kirw.* 2. 185.

Blau Eisenerde. *Emmerl.* 2. 359.

“PHOSPHATE of Iron is found in considerable quantities near the Black Sea, accompanied by animal remains; Pallas discovered a specimen exhibiting a radiated crystallization of the pure phosphate, which he believed to be blue selenite, it has also been supposed to be hornblende of this unique appearance. The Rev. J. Holme, of Cambridge, ascertained the combination of the Phosphoric acid with iron in this mineral.” Dr. Clarke.

It has been found native in the Brazils and the Isle of France, and is said to have been first detected by Vauquelin. Specimens brought by Mr. Roch from the Isle of France were subjected to chemical analysis by Cadet and Laugier*.

* *Thompson* v. 4. p. 481.

The powdery blue phosphate is extremely common in two varieties, as I have shown in Tab. II, British Mineralogy.

The radiated and crystallized form is certainly rare at present among Mineralogists; I know of no other specimen in England than this, which is lent me by Dr. Clarke of Cambridge, well known for his foreign researches, and attention to Mineralogy.

The radii are longitudinally laminated, the laminae parallel to four-sided prisms of about 122° and 58° . The cross fracture splintery and shining. Sometimes we find a truncation at one or more edges of the prism. On the specimen the radii look opaque shining black, but when separated, if viewed through the broader face of the prisms, they appear nearly colourless, if through the narrower one, light brown, and in the direction of the diagonal, of a deep blue. Spec. Grav. according to Cadet 2.539, according to Laugier 2.6.

	Analysis by Cadet.		By Laugier.
Oxide of Iron	41.25		42.1
Phosphoric Acid	19.25		26.9
Silica	1.25		3.0
Alumina	5.00		5.8
Water	31.25		9.1
Loss	2.00		13.1
	<hr/>		<hr/>
	100.00		100.0
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Handwritten text, likely a description or identification of the specimen.

TAB. IV.

PLUMBUM chromatum.

Chromate of Lead.

SYN. Plomb Chromaté. *Haiiy.* 3. 467.
 Red Lead Spar. *Kirw.* 2. 214.
 Roth Bleierz. *Emmerl.* 2. 399.

THIS beautiful specimen is from the mine of Berezof, near Catherinbourg, in Siberia. The remarkable richness of colour that it possesses is nearly peculiar to itself, and is very characteristic of the truly orange and scarlet. Specimens so fine as the present are very valuable; this is the best part of a superb one in the Collection of my late friend the Hon. Charles Greville, whose liberality invited me to partake of his matchless cabinet, with the pleasantest freedom, and I am happy to show this as a proof of his generosity, which may be seen also in British Mineralogy, and as our Government has secured them in the British Museum, I may still hope to find a continuance of such favours.

Although the primitive right angled prism with the short four-sided pyramid is a pretty, somewhat simple and neat figure, easily comprehended, yet the imperfect manner of its being formed, wanting sometimes nearly half, as if the angle were cut off obliquely, makes it so very puzzling, that it has been but little understood.

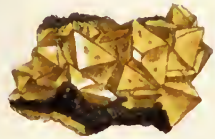
The upper outline shows the prism and pyramid with a crystal, as found in some of my specimens, and measured from them. The lower outline contains all the modifications I have observed united upon one crystal; and each show the longitudinal striæ on the primitive side or sides of the prism.

There is a yellow pulverulent variety sometimes accompanying these specimens; it does not appear to differ in its composition.

Analysis by Vauquelin.		By Thenard.	
Lead . . .	65·12	. . . . .	64
Chromic Acid	34·88	. . . . .	36
	<hr/>		<hr/>
	100·00		100
	<hr/>		<hr/>

This substance has been found in sufficient abundance to be prepared for the use of the Russian artists; I have two varieties of artificial Chromate of Lead, manufactured from Chromate of Iron, from France, which are very rich; but I do not know that it is less liable to change colour than other preparations of Lead; report, however, speaks favourably of it.





TAB. V.

ARGILLA mellitata.

Mellite. Mellitate of Argilla.

 SYN. Mellilite. *Kirw.* 2. 68.

 Honigstein. *Emmerl.* 2. 86.

 La Pierre de Miel, ou le Mellite. *Hauy.* 3. 335.

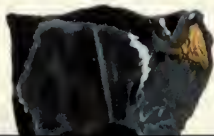
MELLITE at first sight resembles Amber and has been confounded with it, but Amber is not found crystallized, and this substance is mostly found crystallized in octaëdrons, sometimes truncated as in our specimen, and is said to be found in cubes and in rhomboidal dodecaëdrons. The facets are mostly smooth. It is softer than Amber, with a more waxy appearance. It refracts double, has a trifling electricity by rubbing. In burning it emits no odour, whereas Amber generally gives a rather powerful and agreeable odour, although there are some instances of the contrary. It varies in colour from light to dark yellow. It is found on vegetable remains more or less approaching to wood coal. It was first noticed in Thuringia, and since with mineral pitch in Switzerland, &c. With the blowpipe it whitens and does not emit any flame (according to some authors it emits a weak flame) and is reduced to ashes. The primi-

tive crystal is an obtuse octaëdron, composed of two four-sided pyramids, forming at their junction an angle of $93^{\circ}22'$ the incidence of the planes of these pyramids upon each other is $118^{\circ}4'$ —*Haüy*.

Spec. Grav. 1.666 to 1.5858.

Analysis by Klaproth.		By Vauquelin.	
Acid . . .	46	Acid	66.6
Alumina . .	16	Silica, Lime and Alumine	33.3
Water . . .	38		<hr/>
	<hr/>		99.9
	100		<hr/>





TAB. VI.

FERRUM columbiatum.

Columbate of Iron, or Columbite.

 SYN. Phil. Trans. 1802. 49.

COLUMBIUM is well known to have been discovered by Mr. Hatchett, in the analysis of an ore said to be from America, in 1801, which that great chemist found in the British Museum, and till the accurate Dr. Wollaston found the Tantalum of Ekeberg to be the same substance it was altogether unique. It was part of Sir Hans Sloane's Collection, and in his Catalogue is described as "a very heavy black stone with golden streaks," and appeared to have been sent with various specimens of iron ores by Mr. Winthrop of Massachusetts. The Tantalum of Ekeberg was from Kmito in Finland, and had been long known, but was said to be mistaken for an ore of Tin.

Our figure, by the kind leave of the Trustees of the British Museum, is taken from the valuable and original specimen, and while it evinces in some measure the knowledge of the subject in Sir Hans Sloane's time, it is a monument of the penetration of one of the ablest chemists of the present day.

Mr. Hatchett, in his analysis, obtained from 200 grains of this mineral about 42 Brown Oxide of Iron and 155 Columbic Acid.

According to Dr. Wollaston, to use his own words, "the

Columbite is so like Tantalite that it is extremely difficult to discern a difference that can be relied upon. The external surface as well as the colour and lustre of the fracture are precisely the same; but Columbite breaks rather more easily with a blow, and the fracture of it is less uniform, appearing in some parts irregularly shattered; nevertheless, when the two are rubbed against each other the hardness appears to be the same, and the colour of the scratch has the same tint of very dark brown. By analysis also the bodies are found to consist of the same three ingredients; a white oxide combined with Iron and Manganese. The products obtained from five grains of Columbite after each had been heated to redness were nearly

White Oxide of Columbium	grs.	4
Oxide of Iron		$0\frac{3}{4}$
Oxide of Manganese		$0\frac{1}{4}$

but it cannot be supposed that proportions deduced from experiments made on so small a scale can be entirely depended upon, although the properties of bodies may be so discerned, nearly as well as when larger quantities are employed."—See Phil. Trans. 1809, part 2.

Spec. Grav. according to Mr. Hatchett, 5·918.

Dr. Wollaston had not a sufficient quantity to ascertain the degree of oxygenizement of the Columbium, and we regret that he has not explained the cause of the different results he has obtained in some of his experiments from those Mr. Hatchett has described.

We are the more happy in presenting this figure, as there is no chance of another specimen, and as it will be an help to the discovery of the substance by comparison.

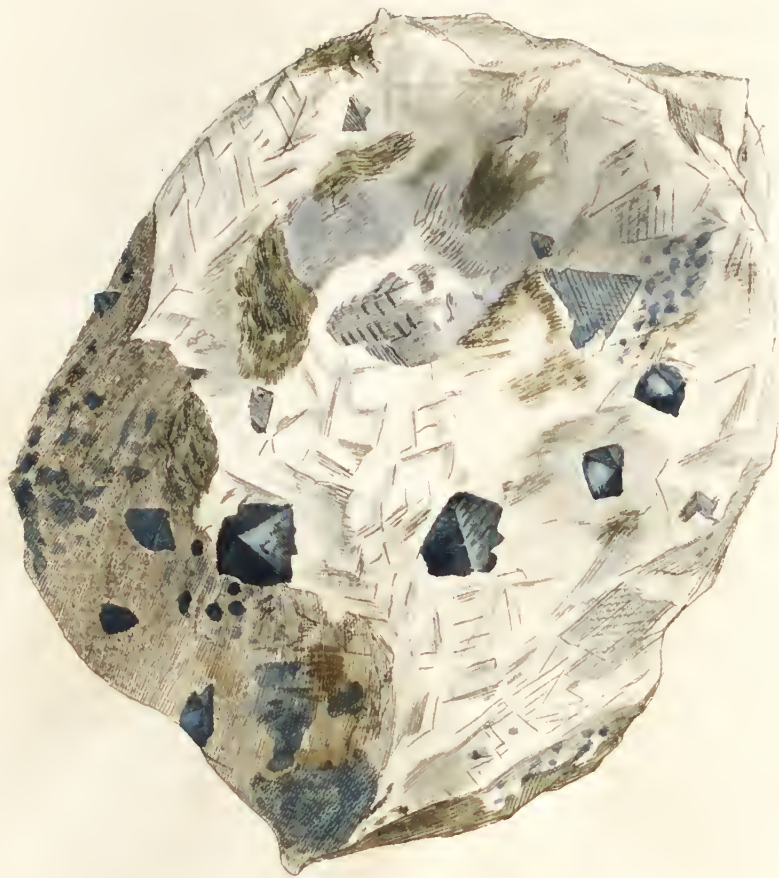


Figure 1. 1841. The same as in the preceding figure.

TAB. VII.

ARGILLA spinella.

Blue Spinell.

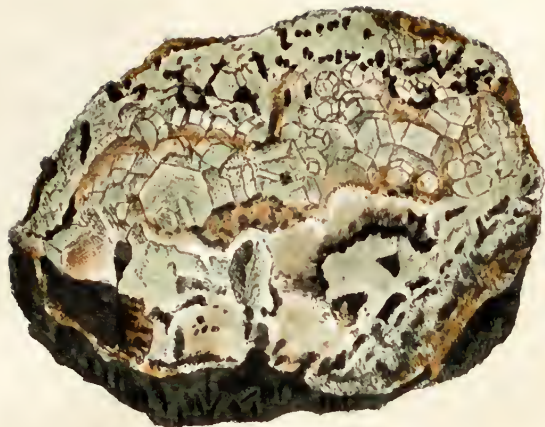
SPINELL has been usually found of small size and in red varieties, long since, at Pegu in the Island of Ceylon, but lately it has been found at Aker in Sweden. Specimens from thence are remarkable for being light blue, and larger than those usually brought from Ceylon. The present specimen was reckoned magnificent by my friend Dr. Clarke, who favoured me with the use of it to figure here. I have one purchased at the sale of Fiott's Minerals, where they are in very confused groups, consequently less distinct, and less fit for a figure. It is found as this specimen, imbedded in carbonate of lime, which shows the rhomboidal fracture, and frequently the diagonals, which are not very common. The green appearance is sometimes sahlite.

The Count de Bournon, so well known as an excellent crystallographer, has discovered colourless transparent spinell on a specimen of his from Vesuvius.

Spinell, which is called by some Balass Ruby, is somewhat commoner than the true or oriental ruby (one of the varieties of corundum), which it often much resembles, but the former has often twenty or more per centum less alumina. The crystal is a regular octaëdron, in general, as the

present specimen; but others, chiefly from Ceylon, have many modifications besides the mackle or hemitrope; but of these hereafter. The surface is usually very smooth, lustre considerable; vitreous. It is partly foliated, partly conchoidal. Fragments sharp-edged. Scratches quartz easily; may be scratched by all the varieties of corundum, and consequently may be cut into shape by the lapidary with emery, which is found to consist of corundum, or what has been called adamantine spar, from its being next in hardness to the diamond. Spinell, although inferior to the ruby in hardness, may sometimes vie with it in brightness. All its varieties have been valued in such instances, as among the most precious stones for jewellery.





Specimens prepared by J. S. Hensley, London

TAB. VIII.

ARGILLA nebulosa.

Sommite, Nepheline.

and cloudy, but does not dissolve. It melts, with the help of the blowpipe, difficultly into a compact glass. Spec. Gray. 3.2741.

Analysis by Vauquelin.

Silica . . .	46
Alumine . .	49
Lime . . .	2
Oxide of Iron	1
Loss . . .	2
	<hr/>
	100
	<hr/>



Specimens described by J. H. Burdett

TAB. IX.

ARGILLA cruciformis.
Staurotide, or Granatite.

-
- SYN. Granatite. *Sowerby's Catalogue of Minerals*,
 pt. I. p. 24. *Haiiy.* 3. 95.
 Staurotide. *Haiiy.* 3. 93.
 Schorle cruciforme ou pierre de croix. *De*
Liste. 2. 434.
 Staurolith. *Karsten Mineral Tabellen.* 22.
-

WHEN some substances come even into the most incurious hands, they become sufficiently attractive to excite admiration. This, which is found in France, Spain, and Switzerland, is mostly crystallized in hexaëdral prisms, crossing each other in pairs, either at right angles or at an angle of 60° . Sometimes these are again crossed by a third. The primitive, according to Haiiy, is an upright rhomboidal prism of $129\frac{1}{2}^\circ$. and $52\frac{1}{2}^\circ$. and its height to the greater diagonal of the rhomb, as 1 to 6; the acute vertical edges of which are usually truncated, making a six-sided prism; these meeting by pairs, and crossing, intersect each other on six-sided plains, placed either in right angles to each other, as in the left hand geometrical figure, or obliquely, at an angle of 60° . as in the right hand geometrical figure, elongating one of the six-sided diagonal plains.

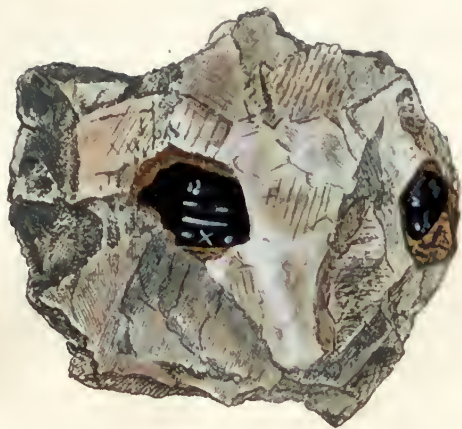
The upper figure, with the crystals in the matrix, is by favour of my very ingenious friend, Wilson Lowrie, Esq. from Brittany, and shows a great variety, which, however irregularly they seem disposed, depend on the above-mentioned regularity, although they might give some idea of the accidental heaping of some other substances. The lower figures, which I have sometimes made as geometrical ones, are by favour of Dr. M'Culloch.

The specimens are generally of a dark red brown colour; some are smooth and glossy, others very rough. Lustre feeble; fracture small grained and conchoidal; scarcely scratches quartz; rather brittle and frangible; not to be fused by the blowpipe. Spec. Grav. 3.2861.

Analysis by Vauquelin.

Alumine . . .	47·0
Silica . . .	30·6
Oxide of Iron	15·3
Lime . . .	3·0
Loss . . .	4·1
	<hr/>
	100·0
	<hr/>

I have a notion we shall find this substance in Great Britain, but not so fine, perhaps. Indeed I have, I presume, scraps from the north of Scotland, which will, if I get good specimens, be identified in British Mineralogy, and, if sufficiently distinct varieties, be figured there.



TAB. X.

YTTRIA ferrifera.

Gadolinite.

SYN. Gadolinite. *Haiiy.* 3.141. *Tabl. Comp.* 47.
Thomps. 4. 372. *Sowerby's Catalogue*, pt.
 I. p. 72.

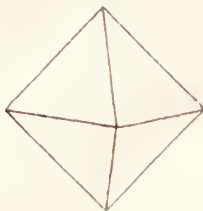
GADOLINITE was discovered by Captain Arhenius, in light feldspar, at Ytterby in Sweden. Gadolin's name was given to it, because he first ascertained its composition, and found it to contain a new earth, which is called Yttria, after the place whence the specimens were obtained. This seems to give it a peculiar character, and is chiefly combined with a dark oxide of iron and silex. It is rarely found crystallized, but rather in small shapeless masses. The greatest part is very black, surrounded by an ochrey crust. It has a sharpish glossy fracture, a vitreous lustre, is too hard to be scratched by quartz, is brittle, opaque, and attracts the magnetized needle.

Whether this is likely to be found in Great Britain, is sufficiently doubtful to place it here; yet, as the substances in which it is found occur, it is not impossible. May not some new combination take place, even in the

decomposition of magnetic iron-stone, and thus this substance succeed, as its outside seems to betray something varying. Spec. Grav. 4.0497.

	Analysis by		
	Ekeberg.	Vauquelin.	Klaproth.
Yttria	47.5	35.0	59.75
Silica	25.0	25.5	21.25
Oxide of Iron . .	18.0	25.0	18.0
Alumine	4.5	—	0.50
Oxide of Manganese	—	2.0	—
Lime	—	2.0	—
Water	—	10.5	—
Loss	5.0	—	0.50
	<u>100.0</u>	<u>100.0</u>	<u>100.00</u>

The nearest approach to crystallization I have met with, is shown on the right hand of the figure, and approaches a rhomboidal prism. I have taken the liberty in the figure, to attach this fragment to the specimen which was lent me by Dr. E. D. Clarke.



Handwritten text, possibly a signature or date, located below the diagrams.

TAB. XI.

ARGILLA zincifera.

Automolite.

SYN. Automolite. *Ekeberg. Thompson, 4.274.*
Sowerby's Catalogue, pt. I. p. 24.
 Spinelle zincifère *Haiiy Tabl. Comp. 67.*

THIS substance was analyzed by Ekeberg. It is always in regular octaëdrons, either single or mackled, or transposed, as Haiiy calls them; the fracture is foliated with the faces of the octaëdron, vitreous, and rather splintery contrarywise; fractures but little shining, and the whole nearly opaque, dark greenish; not fusible by the blowpipe; melts with borax into a greenish glass, which when cold is transparent.

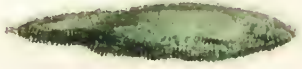
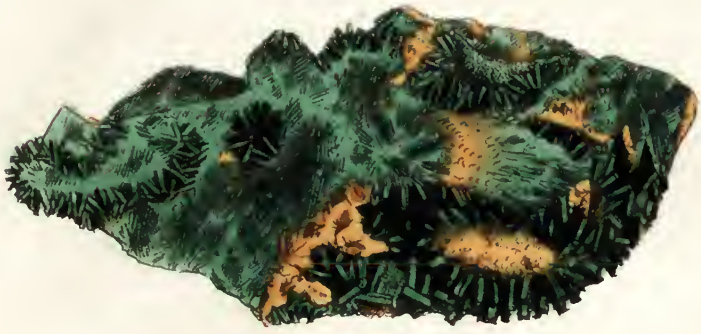
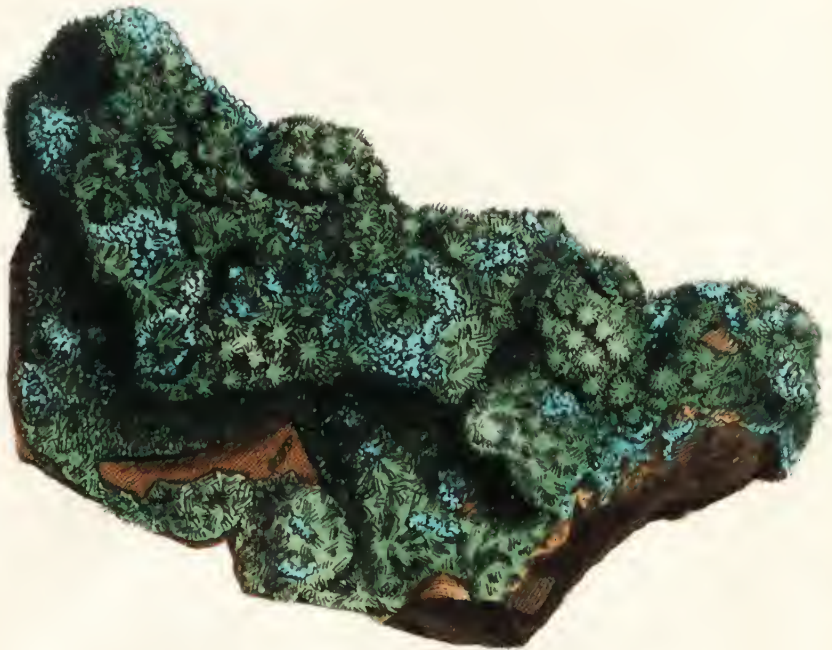
The various points of sight this substance may be placed in, when many crystals are in one matrix, made me give the two views in the geometrical outlines. I do not know of any other variety in the crystals. They at first sight much resemble the octaëdral iron, fer oxidulé of Haiiy.* They have also been found partly covered with the greenish talc, in which they are found like the fer oxidulé, which is often of the same size. Whether these substances have undergone any change in their constituent parts, while

* Found in Scotland also, but generally not larger than a pin's head.

inclosed in this talcose substance, so that alumine and zinc should take place of iron, and therefore make the distinguishing chemical difference, may be a question. As there no doubt exist secondary crystals, so may they not sometimes be detected more or less confirmed as such, while undergoing new infiltrations? Spec. Grav. 4.261.

Analysis.

Alumine	60· 0
Silica	4·75
Oxide of Zinc	24·25
Oxide of Iron	9·25
Lime, Manganese, and Loss	1·75
	<hr/>
	100·00
	<hr/>



From a collection by J. S. ...

TAB. XII.

CUPRUM muriatum.

Muriate of Copper.

SYN. Cuivre muriaté. *Haüy*, 3.560.

Copper mineralized by muriatic acid. *Kirw.*
2.149.

Kupfer sand. *Karsten Mineral Tabellen.* 46.

THIS was noticed in the sand of Peru in the form of a green powder, and is said to have been first brought from thence by Dombey. The specimens I have had given me from time to time have been in small grains, the largest of which I have been able to discover to be rectangular octaëdral crystals, and some, as it were, placed by the sides of each other. Some of the elongated ones seem to be more or less truncated at their apex and opposite, thus making a flattish hexaëdral column, with diedral summits. I found one truncated upon one of the pyramidal edges. Two of the planes of the octaëdron meet at the summit, at an angle of $75^{\circ}. 45'$, and the other two at an angle of $67^{\circ}. 15'$.

The upper figures are taken from specimens presented by Professor Davy to the late Hon. Mr. Greville, and are now in the collection of the British Museum, where I have the pleasure, through the favour of the Trustees, to renovate the remembrance of my lost friend. They are from Peru. It is rare to find such fine specimens, and an high satisfaction to see the crystals on the matrix, which is chiefly silicious. They appear to belong to the same formation as the granular variety below, and show the prismatic form more easily, by their adhering to one

end, a little analogous to the arseniates of copper. See Brit. Min. tab. 168, 169, 170. Their surface is smooth, bright or brilliant; fracture foliated parallel to the obtuse end of the prism; colour of the crystals a fair green, being neither blue nor yellow; when broken they appear lighter and more opaque, as if diluted with white; easily powdered by pressure with the finger nail, which discovers the lighter colour to proceed from powdered particles.

The crystals on the uppermost figure are diverging in stellæ of partly-formed hexaëdral prisms, terminated by diedral pyramids, and are accompanied by silical oxide of copper, or chrysocolle. Thrown on flaming coals the flame becomes green and blue. Nitric acid dissolves it without effervescence, forming a green solution. Spec. Grav. 3.570.

Analysis by Klaproth.

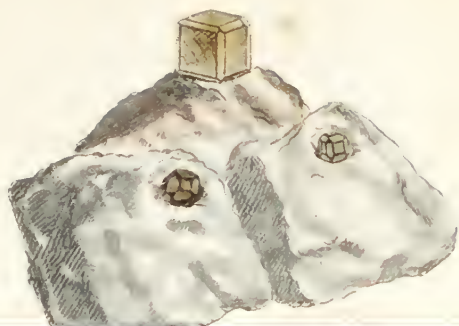
Oxide of Copper	73.0
Muriatic Acid . . .	10.1
Water.	16.9
	<hr/>
	100.0
	<hr/>

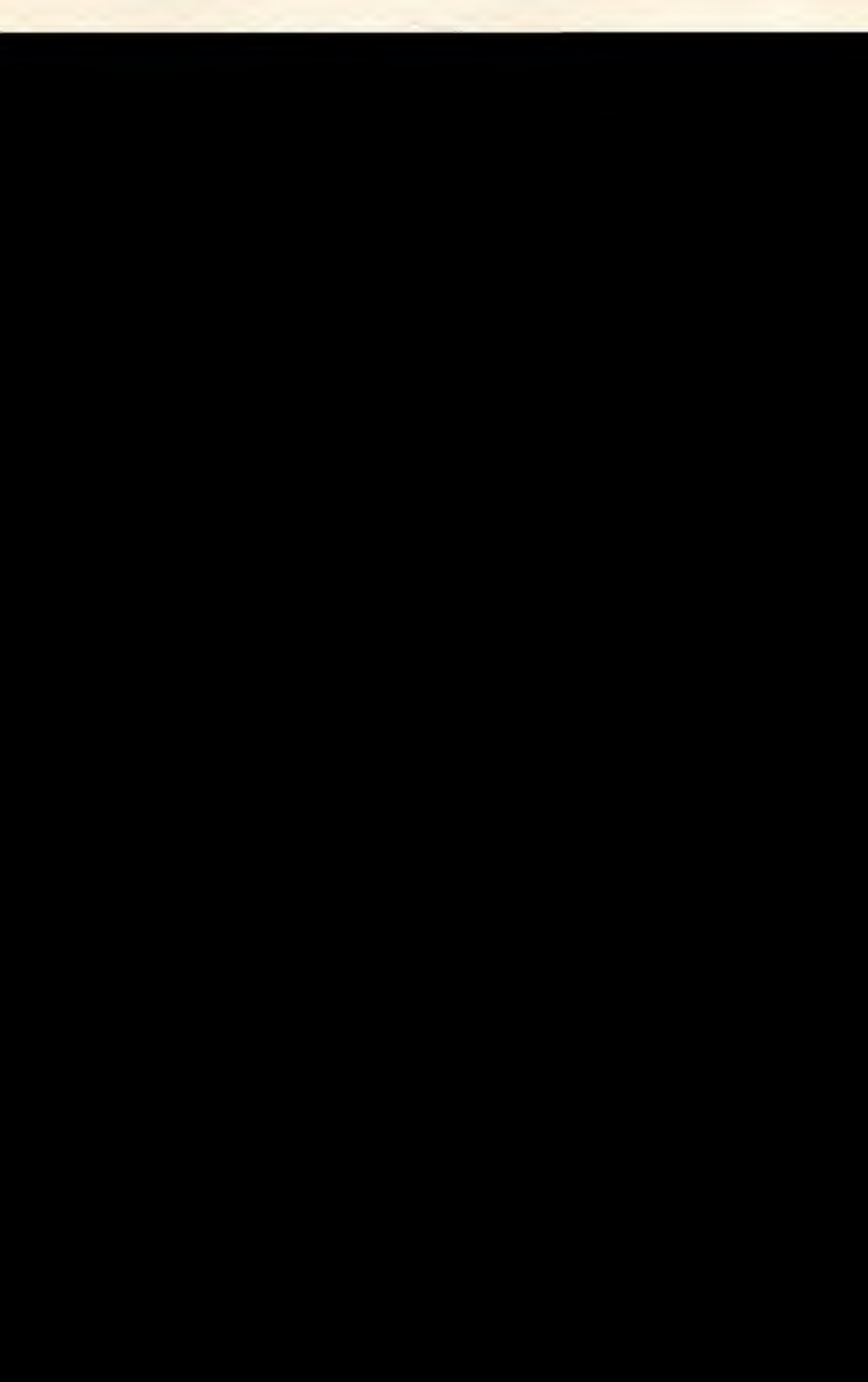
Since writing the above, we have been favoured, by the accurate Mr. John Davy, with the result of his analysis of this muriate of copper. It agrees with the artificial submuriate.

Analysis.

Brown Oxide of Copper	73.2
Real Muriatic Acid . . .	16.4
Water	10.4
	<hr/>
	100.0
	<hr/>

It is in consequence of the development of the true nature of the muriatic acid by Professor Davy, that the proportions of muriatic acid and water are found to be so different from what Klaproth states them.





dodecaëdron, but neither the octaëdron or dodecaëdron form perfectly; the truncations upon the angles are often alternately large and small, &c. I herewith figure those I have of the natural size, geometrically arranged as above, for a memorandum, and as an instructive lesson on crystallization. They are seldom much larger: colour greyish; lustre dull vitreous. It will scratch Fluat of Lime; it is brittle, mostly full of flaws. Spec. Grav. according to Westrumb 2·556.

Analysis by Westrumb.

Boracic Acid	68·00
Magnesia	13·50
Lime	11·00
Silica	2·00
Alumina	1·00
Oxide of Iron	0·75
	<hr/>
	96·25
	<hr/>

The Lime has been shown by Vauquelin and Schmit to be combined with Carbonic acid, and variable in quantity, so it may be considered as accidental, as the crystals examined were not transparent.

When heated it becomes electric, froths before the blow-pipe, gives a greenish light, and becomes a yellowish enamel, illiniting in small points, which by a continued heat

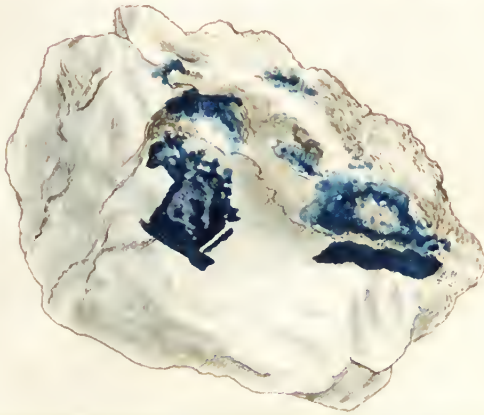
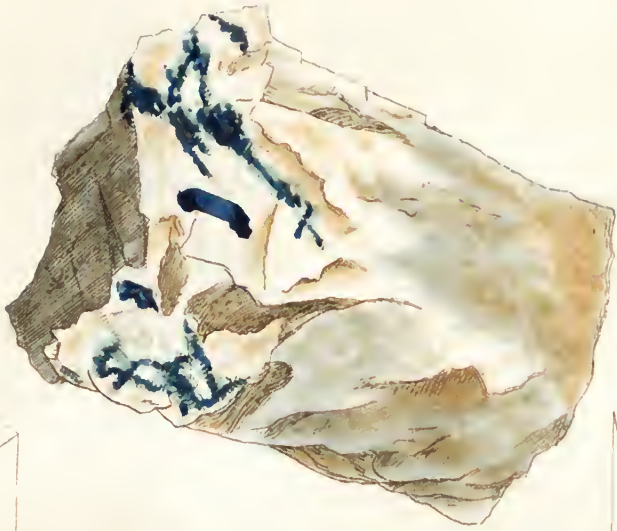
face, we shall have an upright tetraëdral prism, with an oblique-angled base of $130^{\circ} 9'$.* for the nucleus, as seen in the geometrical figure, and not simply a rectangular prism with an imaginary base, as Haiiy states.

In the geometrical figures, I have added Haiiy's letters of reference to such faces as from rough measurements they seem to correspond with; his measures are as follow; the incidence of f upon f $106^{\circ} 18'$, r upon r $156^{\circ} 10'$, the edge k upon M $130^{\circ} 9'$, the edge z upon M $141^{\circ} 40'$, s upon s $114^{\circ} 18'$, the acute angle of the prism $65^{\circ} 42'$, s upon T $122^{\circ} 51'$. The other faces of the prism do not occur in Haiiy's figure; their measures are difficult to obtain, from their edges being ill defined. The mean of various trials upon those close to M gives their incidence upon it $159^{\circ} 40'$, or upon s $168^{\circ} 8'$; but these measures do not exactly correspond with each other. The other face measures about 164° upon s .

This substance is so brittle in the direction of the kaminæ as to be useless in Jewellery, although it will scratch Quartz. Spec. Grav. 3.0625.

Analysis by Vauquelin.

Silix . . . 35 to 36



TAB. XIV.

ARGILLA cœrulea.

Azurite.

SYN. Lazulite. *Haüy, Tableau 62.*

Azurite. *Sowerby's Catalogue, 58. Jameson, 2.542.*

Lazulith. *Werner.*

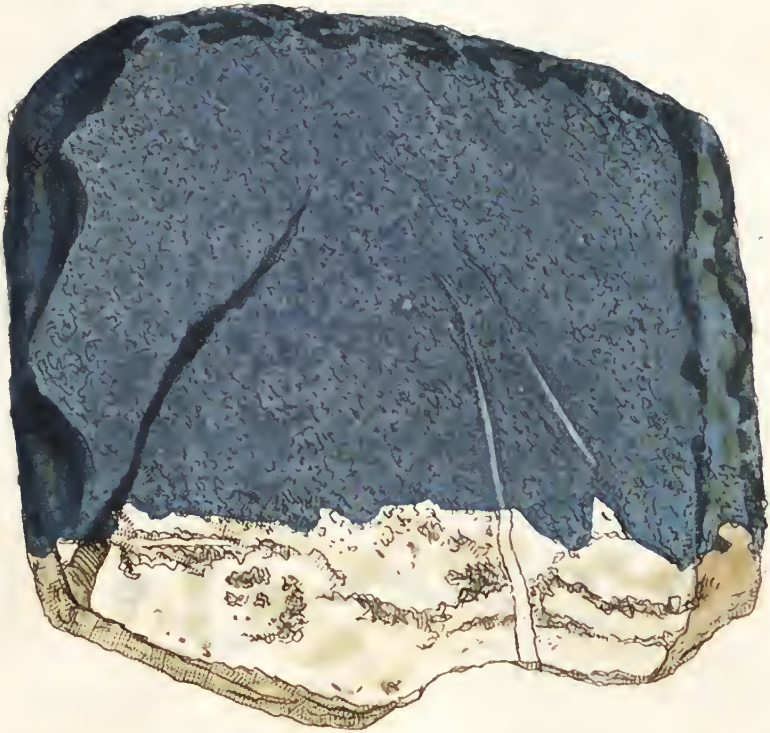
THIS uncommon substance is found at Vorau in Styria, and at Salzburg. The present specimens from Vorau, were lent me by the Count de Bournon, and the upper specimen is the more valuable, as part of a nearly right-angled prism, is seen enclosed in the Quartz very distinctly, while the rest is more or less scattered, although, upon nice examination, it appears to be mostly parts of prisms placed irregularly together. The lower figure shows some signs of the same form, and the more scattered parts are lighter in colour. There are some silvery parts of Mica about the Quartz, also some sparks of Specular Iron. See *Tab. 64, B. M.* Jameson remarks, that no Pyrites is found near this mineral. The longitudinal fracture seems foliated, cross-fracture in the direction of the diagonals of the base, between glassy and earthy; it is also translucent in the more glassy-looking parts, and more opaque in the

earthy parts: the former is mostly darker blue, the latter resembling lightish smalt blue. It scratches glass. The upper specimen is greenish in some parts, and has some ochraceous Iron in the flaws of the Quartz. It is said by some to be imbedded in Mica slate.

Analysis of that from Salzburg, by Tromsdorff.

Alumina	66·0
Magnesia	18·0
Silex	10·0
Lime	2·0
Iron	2·5
Loss	1·5

100·0



TAB. XV.

SILEX Lazulum.

Lapis Lazuli.

-
- SYN. Lazulite. *Haiiy* 3. 145. *Tabl. comp.* 47.
 Zeolithe bleue ou Lapis Lazuli, pierre d'azur.
De Born 1. 201.
 Lazur-stein. *Emmerl.* 1. 212.
 Lapis Lazuli. *Kirwan* 1. 283.
 Azurite. *Sowerby's Catalogue*, p. 1. 58.
-

THIS substance has been long conspicuous for the astonishing brilliancy and permanency of the colour which it produces, and when prepared for use is commonly called Ultramarine, of which there are such numerous examples in the illuminated missals, often of such exquisite labour, and so highly preserved by the choice and lasting colours used in them, as to stamp them almost invaluable.

It is found chiefly in Persia, also in Great Tartary, Siberia, China, and America, and has been much employed by the Chinese and others in painting China; when reduced to powder for the above use, it is sold, according to the pains taken to select the most pure and brilliant, from five to fifteen guineas, or more, per ounce.

The stone is more or less pure in moderate masses, but is seldom without some Sulphuret of Iron (Pyrites) in

specks or veins, and often particles of Mica : the separating it from the former requires some dexterity. This substance scratches glass; has but little transparency, is coarse grained, splintery, and rather brittle. It is said to have been found crystallized in garnet dodecaëdrons. Before the blow-pipe it melts into a white enamel : calcined and reduced to powder, it becomes like a jelly, by the action of acids. Spec. Grav. according to different Authors 2·771 to 2·896.

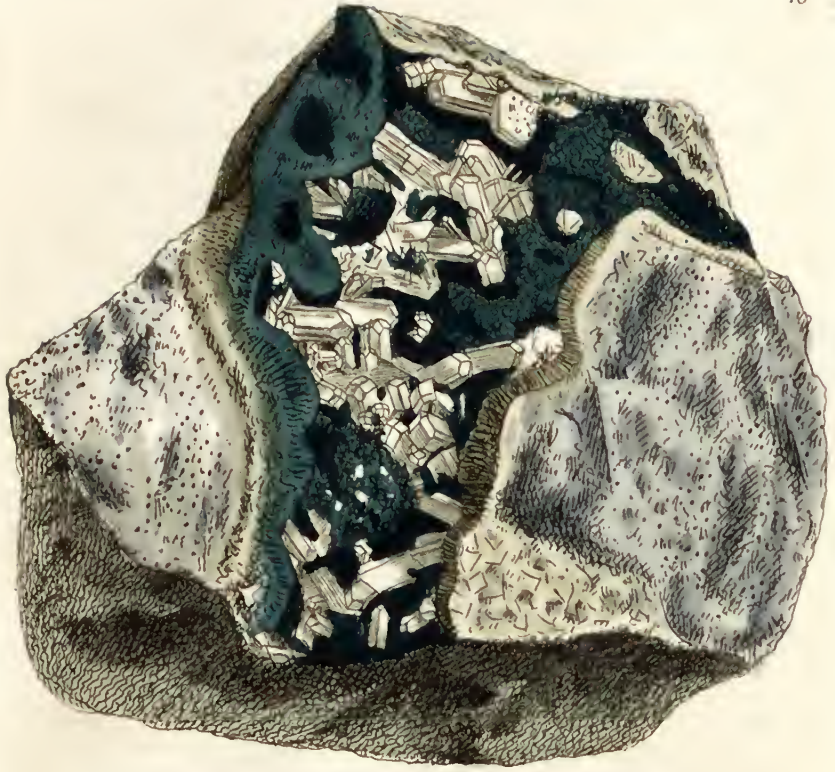
Analysis by Klaproth.

Silica	46·
Alumina	14·50
Carbonate of Lime	28·
Sulphate of Lime	6·50
Oxide of Iron	3·
Water	2·
	<hr/>
	100·0
	<hr/>

The Lapis Lazuli was formerly cut and polished for rich inlaying and Mosaic work ; it has been used for etuic-cases, and is now used for snuff-boxes and ornamental jewellery.

The mixed nature of the specimens render analysis uncertain, wherefore this substance has by some been considered the same as the Azurite, and the similarity of names causes confusion.





by 1850, published by J. W. Smith, London.

TAB. XVI.

SILEX? depressus.

Meionite.

SYN. Hyacinthe blanche de la Somma. *De Lisle*
2. 290.

Meionite. *Hall* 2. 586. *Tabl.* 34.

MOUNT SOMMA, by Vesuvius in Italy, that produces the Sommite, Tab. VIII. produces also this substance. I am favoured with the use of the specimen now figured by the Count de Bournon, whose scientific collection it enriches. The crystals are prettily relieved by the green chlorite, or talc, in an hollow or crack of a mixed grey limestone.* The specimen had apparently been among stones on the sea shore, and had small marine plants on it. The Meionite is crystallized in several varieties, as figured in the outlines at the bottom of the plate. The right-hand figure is a simple rectangular prism, two of whose sides are much enlarged, terminated by four lateral planes or faces, forming a pyramid placed upon its angles. The next figure shows one of the faces enlarged at the expense of the other; the vertical edges of the diminished prism are also truncated,

* By mixed Limestone, I mean, that some parts are in larger flakes or fragments, showing the fracture, and others are smaller, more earthy, &c. and they are of a darker and lighter grey or whitish.

giving two of the faces six angles. The left-hand figure shows small faces between the pyramid and the prism; the faces of the pyramid meet each other at an angle of $136^{\circ}. 20'$. hence the pyramid is more obtuse, and consequently the nucleus is shorter than in crystals of such substances as have been confounded with it. From this circumstance it is named by Haüy.

It fractures, according to Haüy, into a rectangular prism with a rectangular base, which is of course the primitive.

The crystals are seldom larger than in the specimen, and are rather confusedly grouped; the cross fracture somewhat conchoidal; it scratches glass, and yields a spongy white glass by means of the blow-pipe.





Fig. 110. published by J. S. Ferry, London.

TAB. XVII.

HYDRARGYRUM muriatum.

Muriate of Mercury, Corneous Mercury.

SYN. Mercure muriaté. *Haiiy* 3. 447. *Tabl.* 78.

Quick-silber Hornerz. *Emmerl.* 2. 136.

Mercure mineralisé par l'acide muriatique.

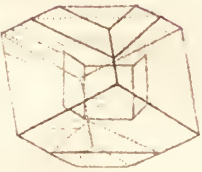
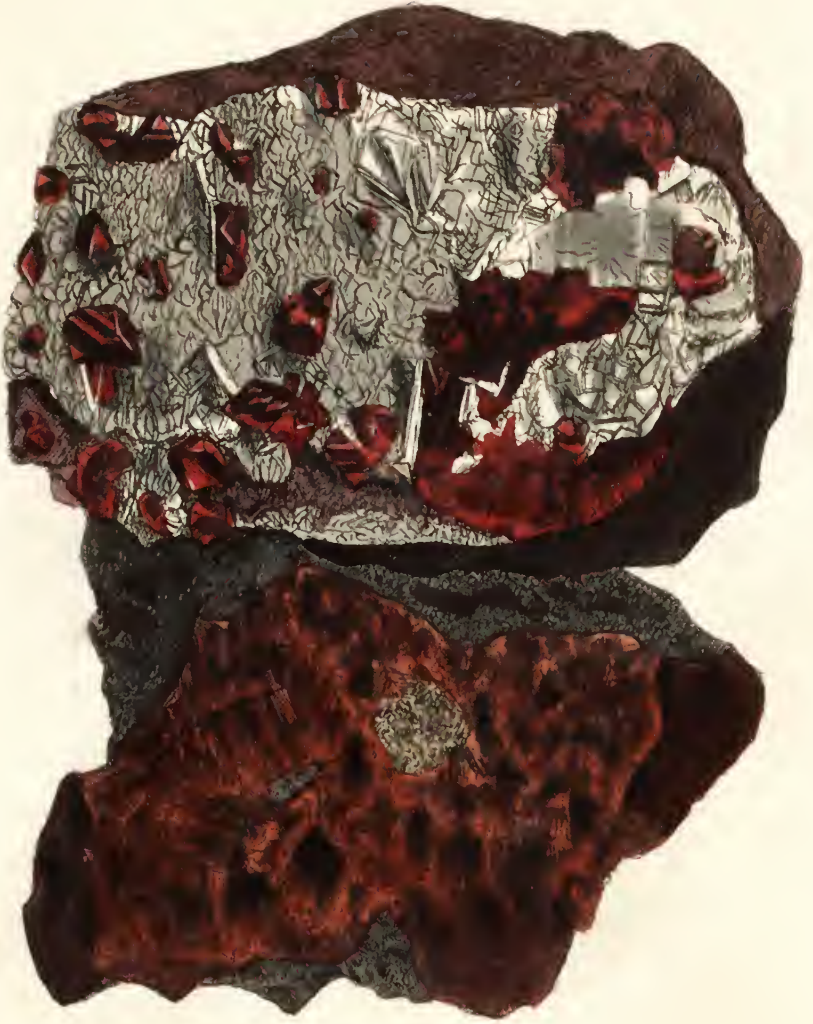
Mine de Mercure corne. *Daub. tabl.* 42.

Analysis by Kirwan.

Mercury	70
Sulphuric and Muriatic Acids	30
	<hr/>
	100
	<hr/>

This specimen is from an old mine which was abandoned, no cinnabar having been found there; it is called Val de Azogue, *i. e.* Valley of Quicksilver, and lies one league distant to the east of Almadenejos.

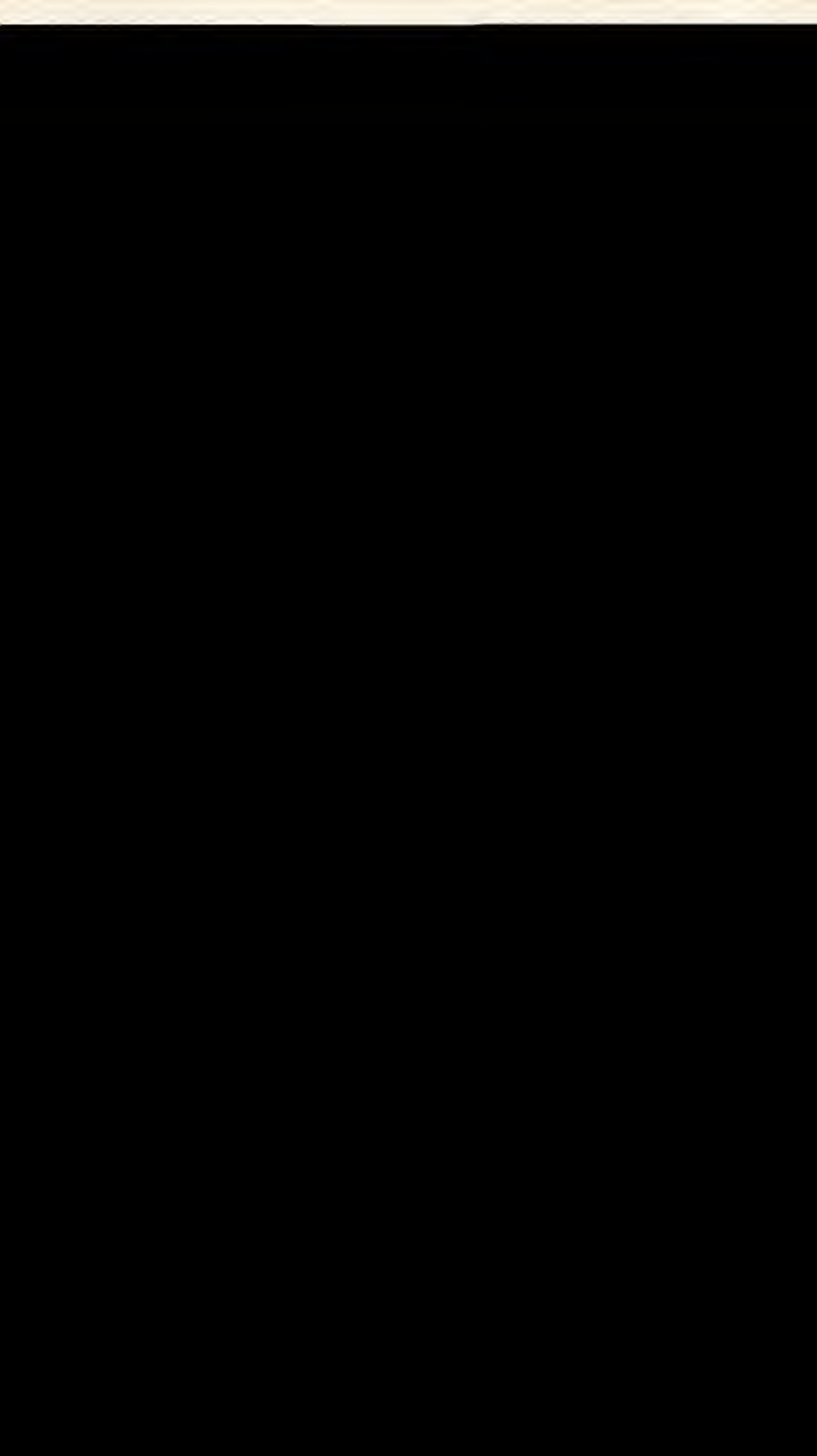
The geometrical figure on the right-hand is copied from Haüy's, and is, I believe, the simplest form known. The small faces upon the other figures, as far as I can judge by mere inspection, correspond with the faces of this.



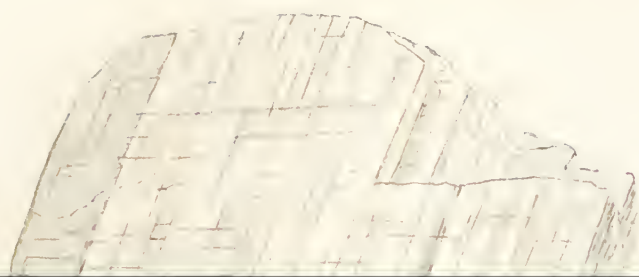
TAB. XVIII.

HYDRARGYRUM sulphureum.

Sulphuret of Mercury. Cinnabar.



it is seldom seen in that state, but always fluid, in which it differs from every other native metallic substance. Its silvery lustre, and the particular freedom of motion when in the fluid state, make it universally known. The drops divide into infinitely small particles, which are perfectly round, the larger are flat with obtuse edges, and a large quantity resembles melted lead in the obtuse or rounding edge. It easily divides, and as easily coalesces. It does not stick to the fingers, but is cold to the touch. It volatilizes after boiling at a heat of 656° . It is heavy, Spec. Grav. 13.581. It is often found occurring with Cinnabar, and is commonly wrought from it. It is of much use and consequence in Chemistry, the Arts, Mechanics, &c. Amalgamating with gold or silver, it is used to separate them from other ores, where fuel is scarce. With tin foil it forms our Mirrors, and is well known in Barometers and Thermometers. It is considered of much power in various combinations as a medicine.



TAB. XIX.

SODA fluata, aluminifera.

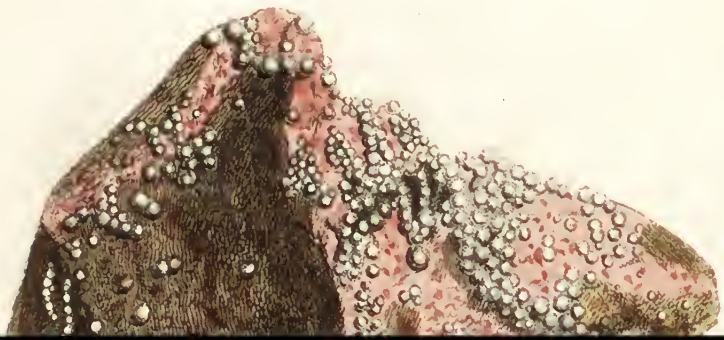
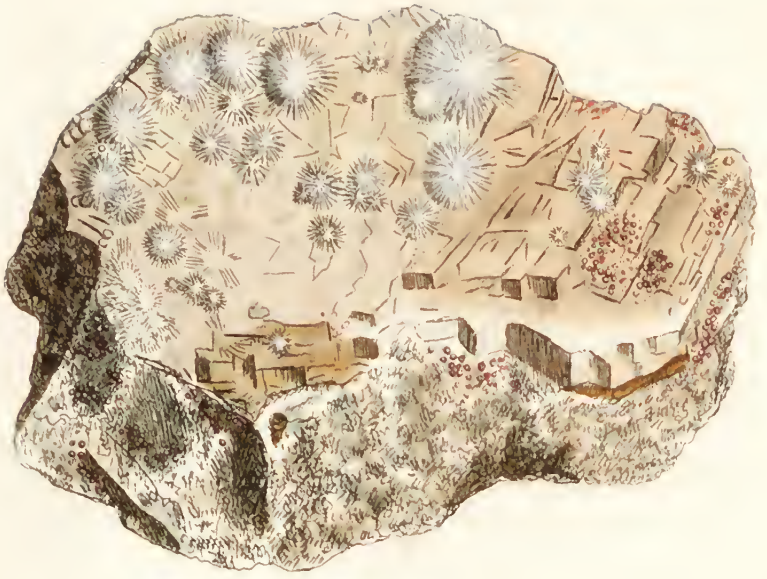
Cryolite.

SYN. Cryolite. *Jameson*, 2. 558.

Alumine fluatée alkaline. *Haüy* 2. 398. *Tabl.*

Dr. Lettsom brought a fine and large specimen to shew to the Geological Society a few weeks since, which he possesses, and is perhaps the largest yet known. It is as yet reckoned very rare. Our specimen is from the collection of the British Museum.

The brown parts of the lower figure are Spathose Iron ore in brown rhomboidal crystals, which are imbedded in the Cryolite; it is accompanied also by Galæna and Sulphuret of Copper.



TAB. XX.

CALX arseniata.

Arseniate of Lime, or Pharmacolite.

SYN. Chaux arseniaté. *Haiiy, Tabl. 12. Traité,*
2.293.

Pharmacolith. *Karst. Min. Tab. 36.*

Arsenik blüth. *Werner.*

Pharmacolite *Thompson, 4.526.*

THE rarity of this substance gives value to a figure, as few can have good specimens, being only found at Witterhen in Swabia; and the peculiar beauty of it, either in the very white delicately radiating clusters of crystals shining with a silky gloss, more or less relieved by the Arseniate of Cobalt, or in the more solid spherules slightly coloured, as in the lower specimen, where the deeper or redder coloured ones passing to minute make it a pleasing object.

It is more or less transparent, very soft; Spec. Grav. 2.64 to 2.536.

Analysis by Klaproth.

Arsenic acid . . . 50.54

Lime . . . 25.00

Water . . . 24.46

100.00

It is found in veins in granitic rocks. The matrix of the present upper specimen is plated, rather massive Sulphate of Barytes, a little coloured, upon Granite in a state of decomposition, and which contains Talc and a sort of Semi-opal; see the brown shining parts. In the lower figure, pure Arseniate of Cobalt conceals the greater part of the matrix, the character of which is otherwise much disguised; it consists principally of Grey Cobalt Ore. Both these specimens enrich the cabinet of the British Museum.



TAB. XXI.

SILEX boratum, calciferum.

Datholite, or Borate of Silex and Lime.

 SYN. Chaux boratée siliceuse. *Haiiy, Tabl. 17.*
Datholite. Journ. des Mine, No. 113, 362.
Datholite. Thompson, 4.399.

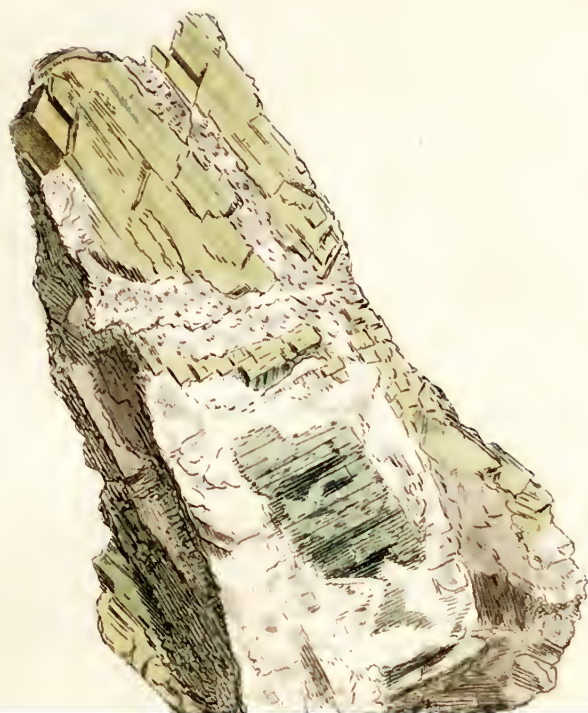
AT Arendal in Norway, so famous for a variety of new substances, was this discovered by Esmark. Our specimens are from the British Museum, and were formerly part of the collection of the Hon. Charles Greville. The crystals are finer and larger than usual; they are short rectangular prisms, with from six to ten lateral planes, the acute solid angles of which are replaced by one or two faces, and sometimes a narrow face upon the upper edge. See the geometrical figure. The matrix is generally obscurely foliated Carbonate of Lime, which runs in veins through greenish lamellated Serpentine, but in the lower figure the Datholite is attached immediately to the Serpentine, and has a few crystals of Carbonate of Lime coloured by Iron scattered over it. The upper figure has smaller crystals standing in many directions, with remarkable modifications shown in the right-hand geometrical outline.

It has not much lustre; internally it is nearly vitreous; fracture small, partly conchoidal; hardness superior to that of fluor. The primitive crystal, according to Haiiy,

is an upright prism, with a rhomboidal base of $109^{\circ}. 28'$.
and $70^{\circ}. 32'$. Spec. Grav. 2.980.

Analysis by Klaproth.

Silica	36.5
Lime	35.5
Boracic acid . .	24.0
Water	4.0
A trace of Iron .	0.0
	<hr/>
	100.0
	<hr/>



TAB. XXII.

SILEX spodumenum.

Triphane, Spodumene.

 SYN. Triphane. *Haiiy, Tabl. 37. Traité, 4.407.*
Spodumen. *Werner.*Spodumène. *Dandrada, Journ. de Phys. Fructidor, an 8, p. 240.*

THIS mineral, described by Dandrada, was found at Uton in Sweden, and also in Norway, disposed in Granite (Quartz with a little Feldspar and Mica), in various directions, in oblique four-sided more or less shattery prisms, composed of plates, and which are generally narrowest on the most readily divisible sides. The surface of the plates is of a light green colour, but the prism terminating irregularly in the matrix, no apex, or even external surface, is to be discovered, and the cross-fracture shows dull small roughish fragments, and appear of a darker green colour. See the middle of the specimen. The middle geometrical figure shows the twofold direction of the lamina, and the diagonal fracture included in a square, and the manner in which the narrow sides are lost in the matrix, which in this specimen is mostly Quartz with a tinge approaching to purplish. The right-hand geometrical figure shows what Haiiy considers as nearly the form of the nucleus, the angles of which are about 80° . and 100° . with the irregular oblique

fractures on the sides. The other uncoloured one shows the nucleus distinctly, with the approximation at the diagonals of the two right-angled planes, to form the oblong parallelogram.

It is so hard as to scintillate with steel, scratch glass, &c. Heated in a crucible, it splits into numerous plates, some yellow, some dark grey; all lose their lustre in a few days, and are of the latter appearance. Before the blow-pipe it melts into a greyish globule. Spec. Grav. 3.1923 to 3.218.

Analysis by Vauquelin.			More recent by the same.
Silica	. 56.5	—	64.4
Alumina	. 24.0	—	24.4
Lime	. 5.0	—	3.0
Oxide of iron	5.0	—	2.2
Loss	. . 9.5	Potash	5.0
		Loss	1.0
	<hr/> 100.0 <hr/>		<hr/> 100.0 <hr/>

23.



Ch. s. var. "la pi"

TAB. XXIII.

MANGANESIUM phosphatum.

Phosphate of Manganese.

SYN. Manganèse phosphaté (ferrifère). *Haiiy, Tabl.*

III.

Phosphate of Iron and Manganese, Pitchy Iron ore. *Thompson, IV. 482.*

THIS mineral is brought from Limoges, where it occurs in a Quartz vein in Granite. It is found massive, and breaks into large flattish fragments, the surfaces of which are covered with a dull ferruginous stain, resembling that in the fissures of various flinty and other substances. In the purer parts it has a shining resinous fracture, with some transparency, and a deep brown colour; it is imperfectly laminated in two directions perpendicular to each other. Haiiy has observed also, that it is divisible with difficulty parallel to the base of a rectangular prism. It is brittle, and yields easily to steel; its powder is nearly white; by the help of the blow-pipe it melts into a black enamel. Spec. Grav. 3.956.

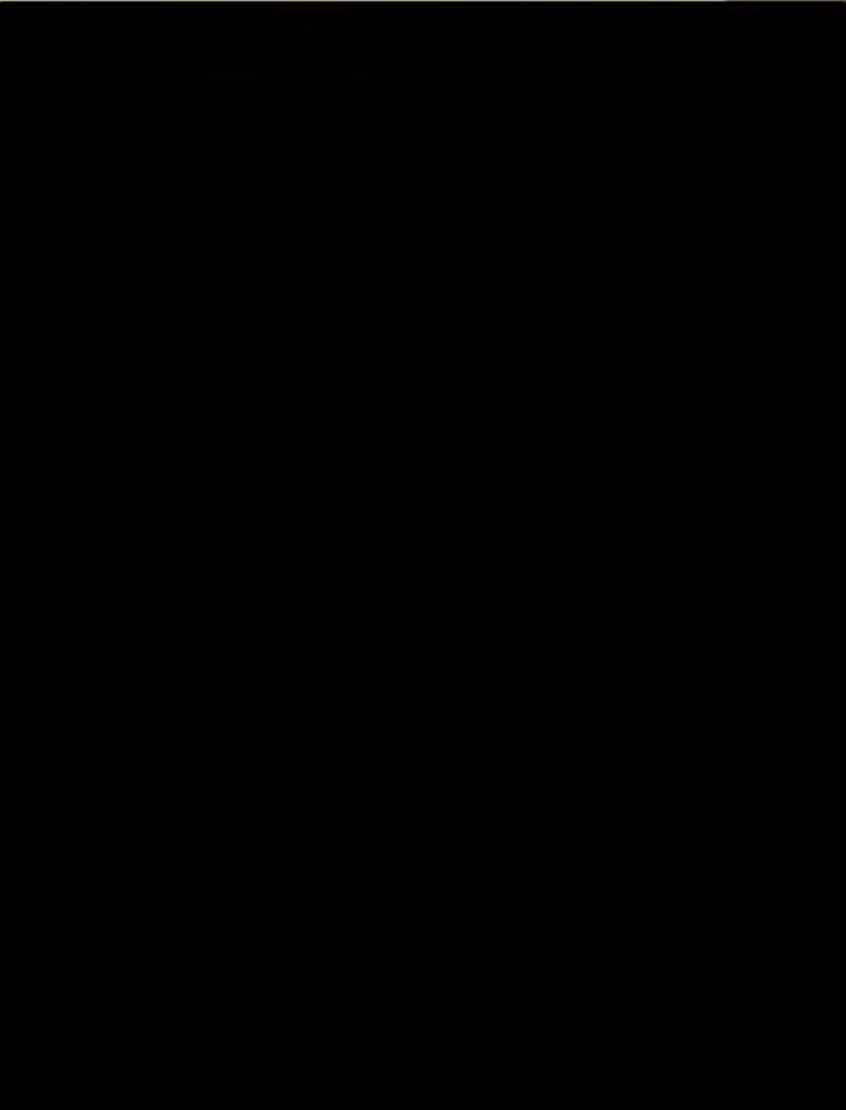
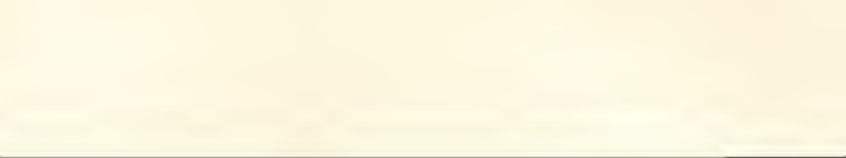
According to Vauquelin's analysis it contains

Oxide of manganese	42
Oxide of iron . . .	31*
Phosphoric acid . . .	27
	<hr/>
	100
	<hr/>

* Mr. Darcet, jun. has shown that some specimens which are redder than others, contain a much less portion of iron, hence the iron may be considered as accidental.

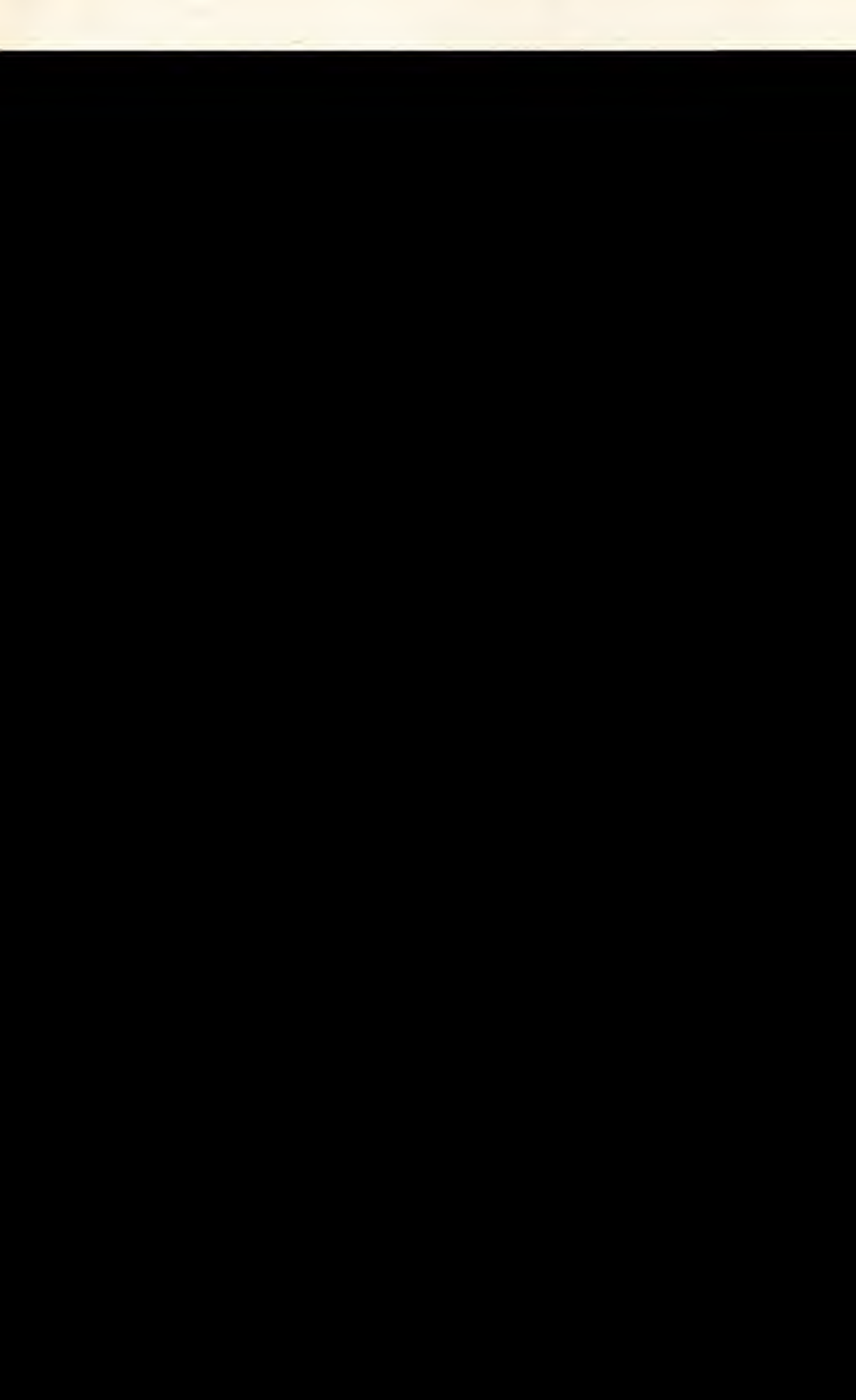
I am indebted to the liberality of Sir Joseph Banks for the specimen figured, who gave it me several years ago: it is accompanied by decomposing Feldspar and green Mica.

I suspect that this substance, which is at present rare, may be found more commonly, but there is nothing sufficiently attractive in its appearance to tempt analysis, but science does not always look to showy appearances.





Urt. exempl. by J. S. Swinley, London.



Analysis by Vauquelin, made with about $3\frac{1}{2}$ grains.

Carbonate of lime	42·85
Silica	28·57
Oxide of copper .	28·57
	<hr/>
	99·99
	<hr/>

Said also, to be found in the land of the Kerguise, some distance from the Russian frontier. Pallas says it is found in the mountain called Altin de Karassu; the matrix is white Carbonate of Lime and Copper ore.



Dr. W. Smith, London

TAB. XXV.

CERIUM siliciferum.

Cerite.

came from Cerate. It has apparently small grains of Specular Iron, which may be distinguished by the usual metallic lustre, like particles of Steel. The Cerite has a crimsonish red colour, more or less, as if mixed with opaque or blackish granulae; and the lighter splintery sides of the fracture are of a paler, dull, rather garnet-like red. According to analysis, the Allanite of Dr. Thompson from Greenland, is also an ore of Cerium. Spec. Grav. 4.660.

TAB. XXVI

rarely have their edges defined; they seem to be part of a vein enclosed betwixt some decomposed Hornblend. The left hand crystal below is from a valuable specimen in the extraordinary fine collection of crystals of the Count de Bournon, by whose friendship it is here figured. It exhibits modifications upon the vertical edges, which are very rare. The right hand figure exposes some neat crystals with truncations upon the angles; it is in the possession of Mr. Lowry.

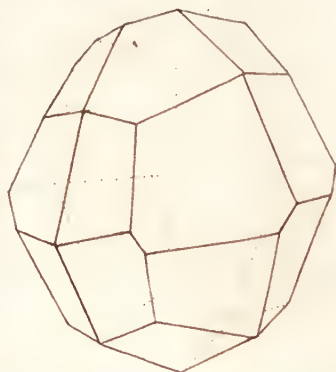
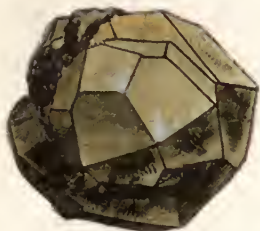
Blend and Galena sometimes accompany this mineral.

The Count de Bournon considers the so called variety of Stilbite from Strontian (B. M. tab. 258) as a variety of Ichthyophthalmite; this point requires elucidation.

Analysis of Ichthyophthalmite.

	By Fourcroy and Vauquelin.		By Rose.
Silex	51	—	55
Lime	28	—	25
Potash	4	—	2.25
Water	17	—	15
Loss	0	—	2.75





TAB. XXVII.

SILEX Vesuvianus.

Amphigene.

SYN. Amphigène. *Haiiy*, 2.362, *Tabl.* 33.

Leuzit. *Werner*.

Leucit. *Emmerl.* 1.53.

Grenats blancs. *Sciagr.* 2.276.

Vesuvian, or white garnet of Vesuvius. *Kirw.*
1.285.

THE crystallized form of this substance has formerly been a cause of much confusion, from its resemblance to Analcime, B. M. tab. 69, and must not be confounded with the white garnet, B. M. tab. 120. Amphigène has with some propriety been called Vesuvian, to distinguish it from Analcime, which outwardly resembles it, in figure, especially, and is found in rocks that are not understood to be volcanic. It is so abundant in the neighbourhood of the crater of Vesuvius, that many of the lava cinders are full of crystals of it. This lava has apparently undergone a strong heat, but the constituent parts of the Amphigene were such as to endure it without much alteration; sometimes, however, they are full of flaws, as if caused by sudden cooling. This might at first sight give an idea of the Analcime in its matrix being changed by heat, but Analcime will not endure so much heat without obliterating its crystallized form. The crystals, as represented, have

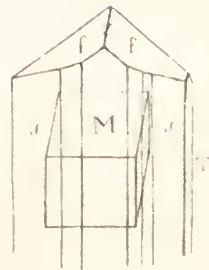
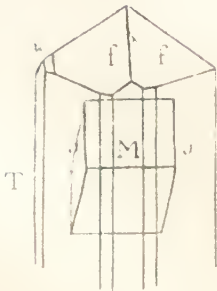
twenty-four trapezoidal faces, somewhat irregular; they are often smaller than a mustard seed, and the largest I know of is the size of the outline at the bottom, of which I have a model, (by favor of the friendly Dr. Fetton) or rather a most accurate cast. It is in the Thompsonian collection, now in the museum at Edinburgh College. The integrant molecule, according to Haiiy, is a tetraëdron, the primitive a cube, its fracture flattish in the direction of the cube, and mostly conchoidal (otherwise generally rather full of flaws of both sorts), mostly semitransparent, nearly as hard as Quartz, scratches glass. Spec. Grav. according to different authors, from 2.455 to 2.490. It is often found in a decomposing state, when it is opaque, and nearly pulverulent.

Analysis by Klaproth.

By Vauquelin.

Silica	.	54	—	56
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Alumina	.	21		20
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TAB. XXVIII.

SILEX Euclasius.

Euclase.

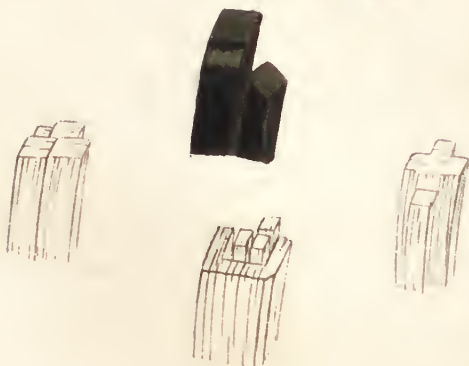
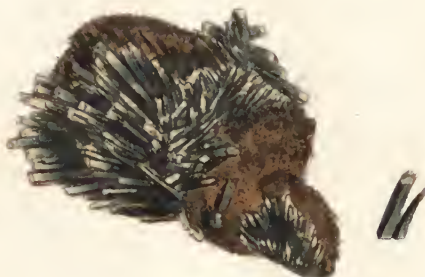
SYN. Euclasius. *Gmel. Syst. Nat. ed. 13. 3. 442.*

Euclase. *Journal des Mines, 28. 258. Haiiy, 2. 531. Tabl. 32.*

THIS substance was first brought from Peru by Dombey, by whom alone the few European cabinets that have possessed it long, have been supplied; lately it has, however, been brought from near Casson* in the Minas Gerais, in South America, as Mr. Mawe informs me, who will in his *Journal*, about to be published, give some particulars concerning it. The upper specimen, from this place, was borrowed from the cabinet of Edmund Rundell, Esq. and is the deepest coloured specimen I have seen. The next specimen, one of Dombey's, is in the British Museum, and was in the Greville collection. The lowest is in the collection of Mrs. Mawe; it is from Casson.

The crystals are rhomboidal prisms of about 65° . terminated by obtuse pyramids, on one side of which are generally two faces, and on the other generally from two to six, or even more; on the obtuse edges of the prisms are generally three planes, of which the centre one is a primitive, another primitive face is found upon the acute edge, and parallel to which the crystals are easily divided into lamina. In the direction of the edge that divides the larger terminal faces of the lower figure, are observable many small flaws; if we consider these to be parallel to a third primitive

* Where it is found among topazes.



Dec 1 1814 published by J. S. Swanby London

TAB. XXIX.

YENITE.

SYN. La Yènite. *Le Lièvre, Journal des Mines*,
121. 65.

Yènite. *Haiiy, Tabl. pp. 42, 182.*

THE first public account of this mineral was given to the French Institution by Monsieur Le Lièvre in 1806, who found it five years before in the Isle of Elba; from his memoir it appears that it had lain in several cabinets (as other minerals sometimes have) among others in that of Romé de Lisle, waiting for some one who had leisure and opportunity to investigate it. Le Lièvre found it in two different spots on the Isle of Elba, Rio la marine, and Cape Calamite, in masses mixed with a green substance resembling Actinolite, and containing Epidote, Quartz, Arsenical Iron, and Magnetic Iron, upon a primitive Limestone containing Talc: at Cape Calamite it was also accompanied by Garnets. It seems from his figures that he found better crystals than any that I know of in England. Our figures are taken from two instructive specimens in the collection of our scientific friend the Count de Bournou; they present rectangular prisms, in some of which, one of the vertical edges is truncated; in the smaller specimen the crystals are divided at their ends into flexible fibres resembling Asbestos, and in other parts are decomposing into a kind of Ochre. The larger figure shows much variety in the fasciculi of prisms, which, diverging from a solid base of the same substance, are crowded in various fanciful ways; see the lower figures.

The Count possesses also a small specimen in which the crystals are somewhat transparent, and of a dull green colour, hence he observes that the black colour described by Le Lièvre proceeds from the intensity of the green. There

have been already two primitive forms ascribed to this substance, the one by Mr. Cordier, in *Le Lièvre's* memoir, he states it to be an upright tetraëdral prism, with a rhomboidal base of $112^{\circ}. 37'. 9''$. and $67^{\circ}. 22'. 51''$ (parallel to the base of which it is not laminated) this prism is divisible in the direction of the shorter diagonal of the base. Häüy considers a rectangular octaëdron to be the primitive form, two of whose faces measured over the summit of each pyramid include $112^{\circ}. 36'$. the other two $66^{\circ}. 58'$. he also mentions a division of this octaëdron by a plane passing through its summits, and corresponding to the diagonal one above, but the Count de Bournon observes that nature indicates very clearly that a rectangular prism is the primitive form, one of the faces of which is the same as Häüy has observed to divide his primitive into two parts. The specific gravity, according to *Le Lièvre*, is from 3.825 to 4.061. the hardness sufficient to scratch glass, but not Adularia. It is easily fusible by the blow-pipe, and becomes attractible by the magnet. *Le Lièvre* gave the name of Yenite to this substance, in commemoration of the Battle of Jena.

Analysis by Descotils.		By Vauquelin.	
Silex	28 ———	29 ———	30
Lime	12 ———	12 ———	12.5
Oxide of Iron	55 ———	} 57 ———	57.5
Oxide of Manganese	3 ———		
Alumine	0.6 ———	0 ———	0
Loss	1.4 ———	2 ———	0

Analysis by Vauquelin of a specimen brought by Mr. Fleuriau de Bellevue from Cape Calamite, several years before it was found by *Le Lièvre*.

Silex	20
Lime	14.8
Oxide of Iron	49
Oxide of Manganese	2
Alumine	1
	<hr/>
	96.8
	<hr/>





TAB. XXX.

PLUMBUM molybdatum.

Molybdate of Lead.

-
- SYN. Mine de plomb jaune. *De Lisle* 3. 387.
 Gelbes bleierz. *Emmerl.* 2. 403.
 Plomb en oxide mineralisé par l'acide molybdique. *Daub. Tabl.* 44.
 Yellow molybdenated lead ore. *Kirw.* 2. 213.
 Plomb molybdaté. *Haiiy* 3. 498. *Tabl.* 83.
-

THIS is usually brought from Bleyberg in Carinthia. It is also said to be found at Sarka in the Bannat, near Freyberg in Silicia, and in France. The specimen here figured is from Bleyberg, and is in the British Museum. The crystals are somewhat opaque, waxy, or like manufactured brimstone, in the dullish yellow colour they generally pos-

form of the crystal, according to Haiiy, is a rectangular octaëdron, one pyramid measuring upon the other $76^{\circ} 70'$, but the Count de Bournon considers it to be a rectangular prism. See three varieties in the lower figures. Klaproth first made us acquainted with the constituents of this ore, and found it to contain

Oxide of Lead . . .	64.42
Oxide of Molybdenum . . .	34.25

Our countryman and good friend Charles Hatchet, Esq. completed a most accurate analysis; see Phil. Trans. vol. 86, page 323. The quantity he employed was 250 Grains, which yielded

	Grains.
Oxide of Lead . . .	146
Molybdic Acid . . .	95
Oxide of Iron . . .	5.2
Siliceous Earth . . .	0.7
Loss	3.1
	<hr/>
	250.0
	<hr/>

The yellow phosphate of Lead from Scotland, has been confounded with the Molybdate of Lead, but may be detected by the blow-pipe.



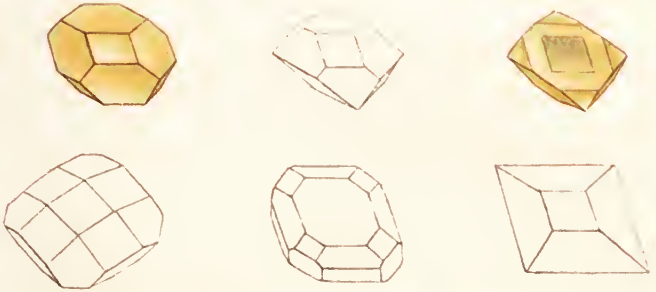


Fig. 1022, published by J. S. Sawley, London.

TAB. XXXI.

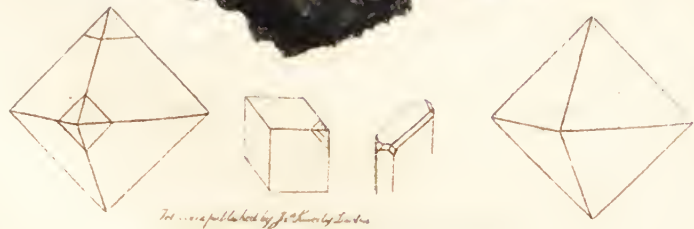
Molybdate of Lead.

THIS tabular variety is probably from Carinthia. It is remarkable for the thinness of the crystals, and the variety of the modifications, and is likely to be confounded with the yellow Phosphates from Wanlock-head-mine, near Glasgow. See tab. 158. Most of the Molybdates of Lead are of the present dullish opaque yellow colour. The principal faces upon these crystals tend to form one of the most obtuse octaëdrons that occurs; the modifications are as in order ranged in the geometrical figures.

This specimen enriches the Cabinet of Dr. Babington;







For ... published by ...

TAB. XXXII.

ARGENTUM sulphureum.

Sulphuret of Silver, or Vitreous Silver ore.

SYN. Argent sulfuré. *Haiiy, Tabl. 74.*

Glas-erz. *Emmert. 2. 165.*

Mine d' argent vitreuse. *De Lisle, 3. 440.*

Sulphurated Silver ore. *Kirwan, 2. 115.*

I AM indebted to the kindness of W. E. Rundell, Esq. for the larger specimen of this substance. It is composed of uncommonly large octaëdral crystals. The smaller one is from the collection of Wilson Lowry, Esq.; its crystals are elegantly supported by equiaxed crystals of Carbonate of Lime.

This mineral occurs in veins in various Silver Mines, as those of Hungary, Germany, Peru, Mexico, &c.

The colour appears very dark lead grey, when fresh broken; by exposure, the surface becomes tarnished. It is very opaque, with a metallic lustre, very soft, ductile, and pliable; the Spec. Grav. is from 6.909 to 7.215. A red heat dissipates the Sulphur, and leaves the Silver: if this experiment be tried with care, the Silver is protruded in filaments from the mass. A heat a little above redness melts it, and requires to be continued a considerable time, to separate the whole of the Sulphur.

The usual crystals of this ore are the cube and the octaëdron, often variously truncated or bevelled. Spec. Grav. 6.909 to 7.215. *Gellert*

Analysis by Klaproth.

Silver	85
Sulphur	15





Substantiated by J. H. L. L.

TAB. XXXIII.

ARGENTUM sulphureum, antimoniatum.
Antimonial Sulphuret of Silver, or Red Silver.

SYN. Argent antimonie sulfuré. *Häuy, Tabl. 75.*
Traité 3. 402.

Mine d' argent rouge. *De Lisle, 3. 447.*

Roth Gultigerz. *Emmerl. 2. 185.*

Red Silver ore. *Kirwan, 2. 122.*

THIS species of Silver Ore has been long known by the name of Red Silver Ore ; it is found in the mines of Germany, Hungary, &c. The fine specimen, from which this figure is taken, enriches the Cabinet of my obliging friend W. E. Rundell, Esq. and is one of the best known, some of the crystals being very large, and others nicely defined ; they rest upon irregularly crystallized Galena, mixed with a little Carbonate of Lime.

The primitive crystal of this substance is, according to Häuy, an obtuse rhomb, the angles of whose faces are $104^{\circ} 28'$ and $75^{\circ} 32'$, and their inclination upon each other $109^{\circ} 28'$ and $70^{\circ} 32'$. The colour is various shades of dull red, so intense in the present specimen, as to appear nearly black. This substance is semi-transparent, soft, rather brittle, easily powdered ; powder red. The Spec. Grav. is from 3.563 to 3.608. Under the action of the blow-pipe it melts before it is red-hot, and when red, it gives out foetid vapours without flame*, and shortly becomes reduced to a white metallic globule of Silver.

The crystals are commonly hexaëdral prisms, or double hexaëdral pyramids, terminated by three or six-sided summits.—*See the outlines.*

* Werner makes two sub-species of Red Silver ore, the light and the dark ; the specimen here figured, I presume, belongs to the latter, as it does not inflame before the blow-pipe ; I also conceive it to contain Antimony, not Arsenic.

Klaproth and Vauquelin have considered the metal, of which it is composed, as in combination both with Oxygen and Sulphur; and Proust, on the other hand, *denies* the presence of Oxygen in Red Silver; this latter opinion appears to be confirmed by synthesis. I have ascertained, that if a mixture of Silver, Antimony, and Sulphur be heated to redness in a glass retort, they immediately combine*, forming a vitreous, very fusible, dark red, and semi-transparent mass, very much resembling the darker varieties; if Silver, *Arsenic* and Sulphur be used, a similar combination is obtained, differing, however, in being more brittle, more transparent, of a lighter colour, and possessing more lustre: this compound burns with a blue flame, when heated red-hot, which the other does not, unless it contains some uncombined Sulphur. Proust's analysis, and what has just been observed, seem sufficient to support Werner in making two species, although, according to Haiüy, there is but one; and the Arsenic mentioned by some Authors is considered by him as probably derived from the matrix.

Analysis by Proust of the Antimonial Sulphuret of Silver.

Sulphuret of Silver	. . .	58
————— Antimony	. . .	33
Oxide of Iron	. . .	3
Sand	. . .	3
Loss	. . .	3
		<hr/>
		100

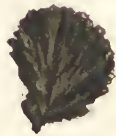
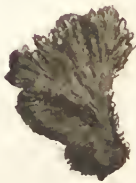
Analysis by the same of the Arsenical Sulphuret of Silver †.

Sulphuret of Silver	. . .	74.35
————— Arsenic	. . .	25.00
Oxide of Iron	. . .	0.65
		<hr/>
		100.00

* If a deficiency of Sulphur is used, the excess of metals forms a separate button; if an excess of Sulphur be used, it is distilled over.

† Should I be so fortunate as to meet with an handsome specimen of this species, I shall be glad to exhibit a figure of it.





... .. J.

TAB. XXXIV.

PALLADIUM nativum.

Native Palladium.

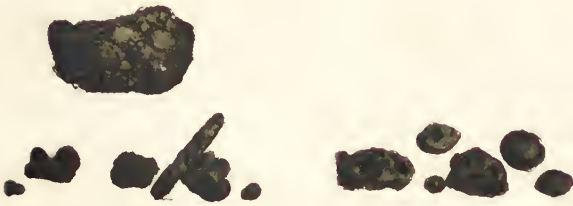
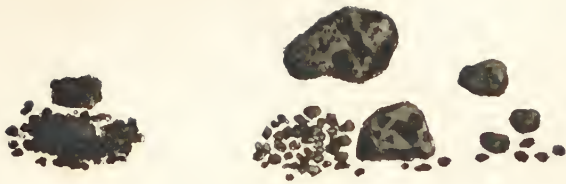
SYN. Palladium. *Wollaston, Phil. Trans. 1804.*

NATIVE Palladium, nearly pure, is found interspersed among the Brazilian Platinum, from which it is distinguishable by the rugged appearance of its grains, which, on more minute examination, are found to have a shrubby, or ramified form. In colour they are scarcely different. It is somewhat harder than Iron, very malleable, and, in common with the other new metals found among Platinum, is nearly infusible. It was discovered by Dr. Wollaston, who has kindly permitted me to figure his specimens, which are perhaps the only ones that ever have been preserved.

The history of this new metal is too well known to tell at length here; suffice it to say, that it was not at first divulged by whom and in what manner it was discovered, till the art of some reputable Chemists was put to the foil. See *Phil. Trans.*

The three lower figures are magnified.





TAB. XXXV.

PLATINUM nativum.

Native Platinum.

SYN. Platine natif ferrifère. *Haiiy, Tabl. 72. Traité*
3. 368.

Platine ou Or blanc. *De Lisle, 3. 487.*

Gidiegen Platin. *Emmerl. 2. 106.*

Platina. *Kirwan, 2. 203.*

THIS curious and valuable Metal, of modern discovery,* has many remarkable properties, but nothing in its ores to give attractive beauty to its figure; they are, however, sufficiently marked to be identified. There have been found hitherto only two, both of which are in the form of small grains. The most common is that brought from the neighbourhood of Peru, and is the kind used in commerce. It consists of grains usually very small, rarely as large as peas; it is mixed with crystals of Magnetic Iron, grains of Ferriferous Titanium or Menachanite, minute Zircons, grains of gold, and of the ore of Iridium, and rarely crystals of Muriate of Copper. The Gold is usually separated by Mercury. The grains of Platinum are generally of a flattish form, with a worn surface; the larger ones show numerous

* Comparatively to the more usual metals; it is supposed not to have been known before the year 1749.

angular hollows, and sometimes enclose crystals of Iron, and flakes of the ore of Iridium. Their colour is between that of Lead and Silver, their hardness and ductility considerable, and they are nearly infusible. Spec. Grav. 17.7. They contain, besides Platinum, about fifteen per cent. of Iron, and small portions of six other metals, viz. Copper, Lead, Iridium, Osmium, Palladium, and Rhodium.

The other kind of Platinum has lately been brought from the Brazils; the grains are about the same size as those from Peru, but they differ in form, as Dr. Wollaston has observed, having numerous convexities, or protuberances, in place of hollows upon their surfaces. They appear to be formed of several coats, one over the other; many of the smaller grains are merely hollow spheres, others are tubular; the larger ones are mamillated on their surface, dull, and but little worn: in colour they approach more to silver than the other Platinum does. They are composed of nearly pure Platinum, and are accompanied by native Palladium.

To our countryman, the ingenious and acute Dr. Wollaston, we are indebted for the fine specimens and analysis of these substances: that from the Brazils is extremely rare in this country.

The upper right-hand figure represents the pure Platinum from the Brazils, of the natural size; beneath are several of the same grains magnified. The left-hand figures show the ferriferous, or Peruvian Platinum, the lower ones being several of the small grains magnified; larger grains than the upper ones have never perhaps been found.

We attempted to use Platinum itself to colour the figures, but found it by far too black when in powder; to imitate the lights tolerably well we have therefore been obliged to use Silver, although we are aware that it will tarnish.





F. ...

TAB. XXXVI.

TITANIUM anatasium.

Anatase. Octaëdrite.

SYN. Titane anatase. *Haiiy, Tabl. 116.*

Anatase. *Haiiy, Traité 3. 129.*

Schorl bleu. *De Lisle, 2. 406.*

Octaëdrite. *Sauss. Voyage dans les Alpes, No. 1901.*

Oisanite. *Lametherie Theor. de la Terre, Ed. 2. 2. 269.*

THIS ore of Titanium is very scarce, and has hitherto been found only in Dauphiny. The specimens here figured are by favour of my friend, W. Lowry, Esq. whom I have before mentioned. It is found crystallized in more or less perfect modified or elongated octaëdrons, whence one of its names. The inclination of the two pyramids from the mutual square base is 137° . It will scratch glass, but is brittle and easily broken. The lustre is somewhat glassy; fracture foliated; colour from warmish brown, to dullish, or Indigo blue, with various degrees of transparency, and a shining or polished surface; faces transversely striated. Spec. Grav. 3.857. It is usually accompanied by Quartz and Adularia, or transparent Feldspar.

Analysis. See Jameson, 2. 503.

Oxide of Titanium	59·1
————— Iron	30·1
————— Uranium	10·2
Loss	0·6
	<hr/>
	100·0
	<hr/>

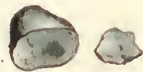
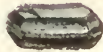
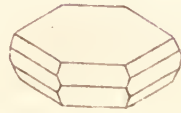
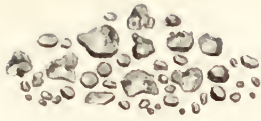


Fig. 1. is published by J. S. Kewley & Co.

TAB. XXXVII.

IRIDIUM Osmiferum.

Native Ore of Iridium.

SYN. *Wollaston, Phil. Trans. 1805.*

THE ore of Iridium is found in brighter and flatted grains among the Peruvian Platinum, having an appearance of their having received some flattening blows from an hammer on a polished anvil, giving them a specular brightness. They are in general more or less irregularly angular, with their edges slightly worn; in colour almost as dark as Lead, by which, though very small, they are easily distinguished from the Platinum. Their hardness is so great, that they will scratch glass readily; they are brittle, dividing into flakes under the hammer; some of them retain the form of crystals but slightly rounded, which are hexaëdral tables, with their edges variously truncated or bevilled, the larger planes of which are smooth, and the lateral ones striated horizontally. They consist of Iridium alloyed by Osmium. These two metals were first discovered in the black powder that remains after dissolving crude Platinum





Microcrystalline U₂Si₂

TAB. XXXVIII.

SILEX fluatum, aluminiferum.

Pycnite, Schorlite.

SYN. Silice fluaté alumineuse. *Haiiy, Tabl. 17, note 24.*

Schorl blanc prismatique. *De Lisle, 2. 420. note 137.*

Schorlatiger Berill. *Emmerl. 1. 192. Werner Catal. 1. 231.*

Schorlite. *Kirw. 2. 286.*

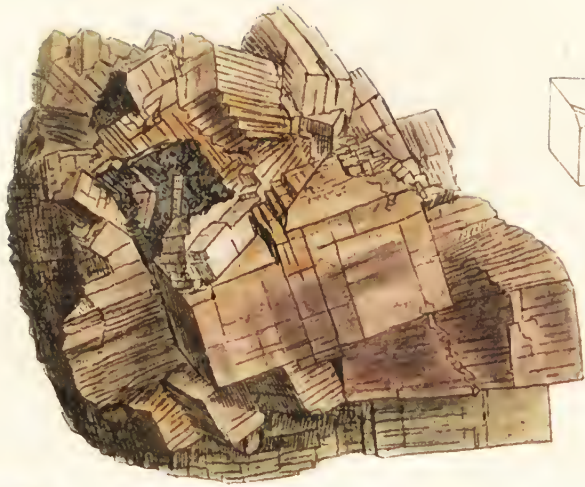
Pycnite. *Haiiy, 3. 236.*

THIS substance is from Altenberg in Germany, whence the present specimen, by favour of Dr. Nöchden, in my possession, said to be from the bottom of a Tin-mine eighty-five fathoms in depth. It is also found in other places. It is in long partly radiating angular confused bundles of prisms, which are often six-sided, spreading in various directions through the rock, which is an irregularly mixed Granite, with a remarkably large mixture of grey Mica with a lead-like lustre, greyish semitransparent broken Quartz, and a portion of Feldspar; it is supposed to be primitive. Pycnite has frequent oblique transverse fractures with reddish stains; it is either whitish, yellowish, greyish, bluish, or blush red, and pinky or deeper red; prisms longitudinally streaked; transparency variable; cuts glass; very brittle. It becomes electric by heat.

Häuy, in his Tables, has united this with Topaz, with which it agrees in analysis and many of its characters. How far other Mineralogists may adopt this opinion is uncertain. Werner has joined it with Beryl. Spec. Grav. 3.503 to 3.350.

Analysis by Bucholz.

Silex	34
Alumine	48
Oxide of Iron	1
Fluoric Acid	17
	<hr/>
	100
	<hr/>



W. H. published 1. J.

TAB. XXXIX.

CALX anhydro-sulphata.

Anhydrous Sulphate of Lime.

 SYN. Chaux sulfatée anhydre. *Hall* 4. 348.
Anhydrite, Würfelspath. *Werner*.Bardiglione, or Sulphate of Lime. *Bournon in
Trans. of Geological Society, 1. 355.*

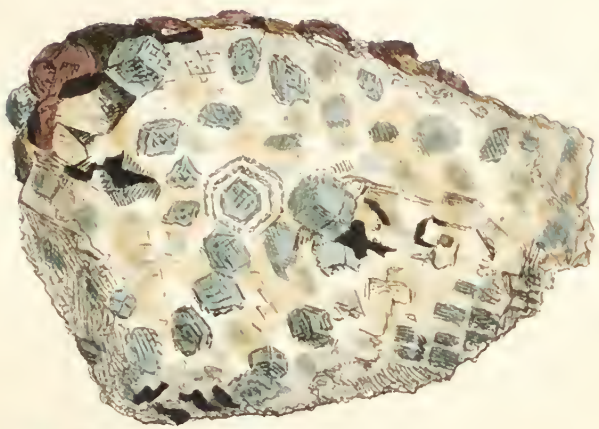
I AM glad to have an opportunity of showing figures of this very interesting substance, which at present is rare, probably because it is not yet universally enough known, although, after the able investigation by the very experienced Count de Bournon, in the Geological Society's Transactions, it may be found to be more generally distributed, as he expects. It appears to the Count, to use his own words, "not to be confined to the secondary strata, but also to occur in some veins in primitive rocks, such as that variety from Pesai, near Mont Blanc, as well as that from Sweden. Hitherto it has been met with much more frequently in the newer rock-formations, particularly those that include large deposits of Sea-salt, as at Bex, Hall, Weiliczka, Arbonne, Carinthia, Upper Austria, Swabia," &c. The upper figure is from a good specimen of the crystallized variety, from a salt-mine in Saxony, favoured by Dr. Babington: it contains, besides imperfect rectangular prisms, many of which are fractured, one crystal, part of which only is exposed to view, whose solid angle is replaced by an isocles triangular plane; the angles, however, from its situation, could not be precisely measured; nevertheless, it proves what the Count had suggested, that the nucleus is not a cube. This is the only specimen, at present known, that exhibits a modification upon the solid angle. Near this crystal is a beautiful minute mackle of common Gypsum, the same as figured Brit. Min. tab. 233. and in various parts are small portions of greyish clay. The

smaller crystals are from the Counts own collection; they exhibit two or three of the 15 varieties of the six modifications upon the vertical edges figured by him. I have exhibited below the variety from Sweden, mixed with Actinolite and Copper Pyrites: it is the specimen mentioned by the Count as formerly in Mr. Greville's collection. I have added a specimen of the blue variety: both these are from the British Museum.

This substance is somewhat harder than Carbonate of Lime; is easily broken into rectangular fragments, with flat polished surfaces; the lustre is very considerable, and sometimes slightly pearly. Some specimens were found by the Count to be phosphorescent; some electric. Its refractive powers are peculiar; a line drawn upon one side of a clear piece, when viewed perpendicularly through the opposite side, appears single, but if viewed obliquely it is doubled; hence probably the reason for the difference between Bournon and Haiiy. The nucleus is divisible in the direction of both the diagonals of its base: Bournon observes, that the lines within the crystals, indicating this division, appear to intersect each other at an angle of nearly 100° ; whereas fractured surfaces, apparently parallel to these striæ, measured upon the primitive faces, give 135° ; so that they would intersect each other at 90° . This circumstance he is inclined to attribute to the refracting power of the substance; and hence concludes, that a triedral prism, with a rectangular isocetes triangle for its base, is the true integrant molecule. The Spec. Grav. when crystallized, according to Haiiy, 2.964, or to Bournon, 2957. It is not acted upon by acids, and is difficultly fusible into a white brittle enamel. It occurs in lamellar, granular, compact, and stalactitiform masses. The lamellar variety is often sufficiently compact to be used by statuary, as is the case at Bergamo and Milan. It differs chemically from common Sulphate of Lime, in not containing any water, of which the common Sulphate contains 22 per cent.

Analysis by Vauquelin.		By Klaproth.	
Lime	40	. . . . .	41.75
Sulphuric Acid	60	. . . . .	55.
	—	Muriate of Soda	1.
	100	Loss	2.25
			<hr/>
			100.00





the crystals belong to the variety of the

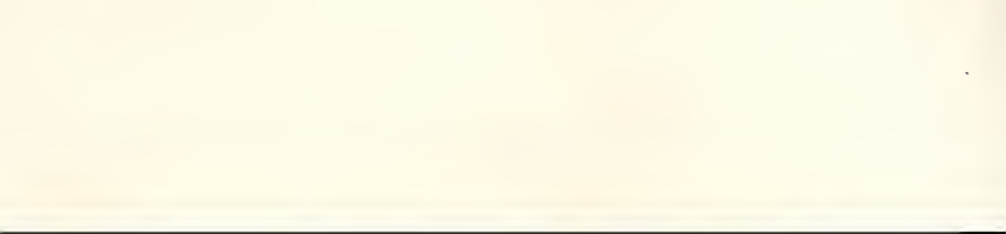
TAB. XL.

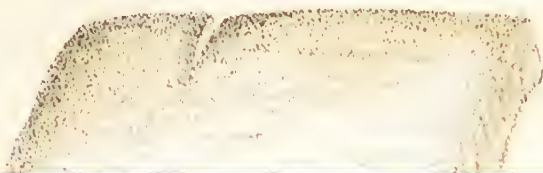
SILEX.

Sodalite.

SYN. Sodalite. *Thompson in Trans. of the Royal*







TAB. XLI.

BORIUM oxygenizatum.
Native Boracic Acid.

SYN. Native Concrete Boracic Acid. *Tennant in Tr. of G. S. 389.*

SOME time since, my late friend, Ibbetson Fenton, Esq. procured me a case with various natural substances, belonging to the famous Volcanic formation of the Lipari Islands, among which are the specimens figured, which accord with the same substance as described by Mr. Tennant. Its peculiar shining scaly appearance indicates it in the mass, but viewed laterally, it appears fibrous, its fibres being from half an inch to an inch in length, giving it thickness. Probably it often forms in very broad masses on the lava dispersed over the Islands. It is procured only of a size convenient for specimens, some of which, when sent to England, are six or eight inches or more square, and from half an inch to an inch thick. Sometimes it is nearly white and pure, at others it has a mixture of Sulphur, on which it often rests. The artificial primitive crystal is said to be an irregular octædron, but it usually occurs so very flat, as to appear only a very thin hexædral plate. It has a peculiar pearly lustre. It is very soft, and separates most readily on the least touch, adhering to the fingers, giving a sparkling talcose whiteness; on pressing, it offers something of a snow-like resistance, almost creaking. On heating, it becomes a transparent globule, resembling glass, acquiring considerable hardness.





Nov. 1812, published by J. Sowerby London

TAB. XLII.

AMMONIA muriata.

Muriate of Ammonia.

SYN. Ammoniaque muriatée. *Haiiy, Tabl. 22.*

THIS, from its colour might appear to be a variety of Sulphur among the usual sulphurous productions of Lipari. Its irregular fibrous or small columnar appearance and less solid texture, however, distinguish it. Sulphur and even the beautifully scarlet Realgar or Sulphuret of Arsenic accompany it, as in the present specimen, It is usually found in the state of powder in the middle of Lava in Persia. When heated it sublimes in the form of whitish smoke with a foetid pungent odour occasioned by its partial decomposition by the sulphur that colours it; it is readily soluble in water, giving it an alkaline taste.

Analysis of a specimen from Tartary by Klaproth.

Muriate of Ammonia	95.5
Sulphate of Ammonia	2.5
	<hr/>
	98.0
	<hr/>





from a collection of J. S. Smith of London.

TAB. XLIII.

ARGILLA durissima.

Corundum, Ruby, and Sapphire.

-
- SYN. Télésie, *Haiiy, Traité* 2. 480.
 Rubis d'Orient, *De Lisle*, 2. 212.
 Saphir, *Emmerl.* 1. 67.
 Oriental Ruby, Oriental Topaz, Oriental
 Sapphire, *Kirw.* 1. 250.
 Corindon, *Haiiy, Tabl.* 29.
-

SINCE the Count de Bournon's elaborate treatise on Corundum in the Philosophical Transactions for 1802, little doubt has prevailed of the identity of it with those coloured Gems, distinguished by the Jewellers as Oriental Topaz, Ruby, Sapphire, Amethyst, &c. and which prove to differ only in being purer, and consequently more transparent. They are at present all included under the specific name, Corundum.

I have exhibited in this plate a number of the crystals of Ruby and Sapphire in their unwrought state; excepting two or three, they are all selected by the Count de Bournon from his matchless collection, as fitted, not only to exhibit their general appearance, but to show their relation to Corundum. No. 1 is the primitive rhomb with the obtuse solid angles truncated; this is a very rare variety, and shows admirably the coincidence of form with common Corundum. No. 2 shows the lateral edges also truncated, leading to the six-sided prism. Nos. 3, 4, 5, and 6, are different varieties of the same modification. Nos. 7 and 8 have in addition two small faces upon the lateral solid angles of the primitive, which lead to a dodecaëdron like No. 11. In Nos. 9 and 10 are the same modifications, but those of the column are much enlarged: the former shows two colours, half of the crystal being Oriental Topaz; the latter is from its extraordinary size and the perfection of its form, extremely valuable*; its form is nearly the same as that of the Corundum in tab. 45. No. 11 is a Sapphire on

* One hundred and twenty guineas have been given for such an one.

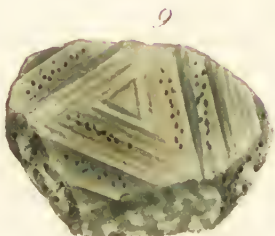
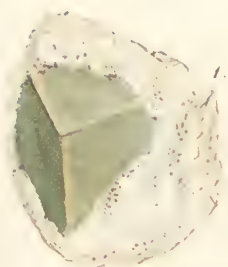
which the faces of the primitive rhomb remain, together with the truncated apex and the pyramidal plains, the prism being broken off. No. 12, from the British Museum, is of the form formerly attributed to the Ruby, a dodecaëdron composed of two hexaëdral pyramids. No. 13 the same more perfect, with small remains of the primitive faces; this is of a purplish colour approaching to the Amethyst. No. 14 a very regularly formed dodecaëdral Sapphire, somewhat worn by attrition; this is in the British Museum, it was discovered there among a large parcel of rubbish remaining from Sir Hans Sloane's Collection, some years since, by the Count de Bourmon. Nos. 15 and 16 the hexaëdral pyramid united with the prism. No. 17 has, in addition to the faces in No. 10, the faces of a more acute pyramid. No. 18 is the primitive rhomb deeply truncated at its apex, and around the truncating plane are placed three striated facets similar to those of fig. 9 of the common Corundum in the next plate. No. 19 is an exceedingly fine acute dodecaëdron of Sapphire, the edges of which are truncated; the faces do not appear to be worn, it was lent me by the justly celebrated Chemist, Smithson Tennant, Esq.

It is observed that the smaller crystals of Corundum are in general the most perfect; thus the smaller rubies are generally transparent, the larger ones are opaque in parts, less compact, and often even foliated in the direction of the primitive rhomb. The common Corundum is generally nearly opaque and always foliated. The hardness of these Corundums, distinguished as gems, is superior to that of any other gems excepting the Diamond; their lustre and the purity of their colours, when transparent, is also very great, for which properties they have been highly valued for ages, and the more so in proportion to their size, and the degree of perfection of these qualities.

The Spec. Grav. of the Ruby varies from 3.939 to 4.087, the mean of twenty specimens being 3.977; and that of Sapphire from 3.907 to 4.161, the mean of 16 specimens was 4.016; see the Count's paper. All the varieties are infusible excepting by the aid of pure Oxygen or a burning glass.

The analysis by Chenevix afforded,

	Of the Ruby.		Of the Sapphire.
Alumina	90	. . . . .	92
Silex	7	. . . . .	5.25
Iron	1.2	. . . . .	1.
Loss	1.8	. . . . .	1.75



TAB. XLIV.

ARGILLA durissima.

Corundum.

SYN. Imperfect Corundum, *Bournon.*
 Adamantine Spar, *Kirw.* 1. 335.
 Demant Spath, *Emmerl.* 1. 9.

THIS plate exhibits several of those varieties of Corundum to which that appellation most correctly belongs, and which have been proved by analysis, as well as by their physical characters, to be the same as the Ruby, Sapphire, &c. only less perfectly crystallized. The external form of the crystals of this variety is generally very imperfect, the surface rugged and dull, but in some specimens the form is better defined, and the surface somewhat smoother. Such specimens approach towards the more opaque and rugged Rubies. The fracture of this variety is always very distinctly foliated, the laminae parallel to an obtuse rhomb of 94° and 86° . It frequently also breaks in the direction of the terminal plane of the prism, as in fig. 2 and the right hand figure at the bottom of tab. 45; both these fractures may sometimes be observed in the Ruby, although the more perfect cohesion of the particles in that commonly prevents their being obtained. The hardness is much the same in all the varieties. The mean Specific Gravity of the present variety taken from 33 specimens by the Count de Bournon was 3.931, the lightest was 3.875, and the heaviest 3.981. The colour is very variable, as may be seen by the figures.

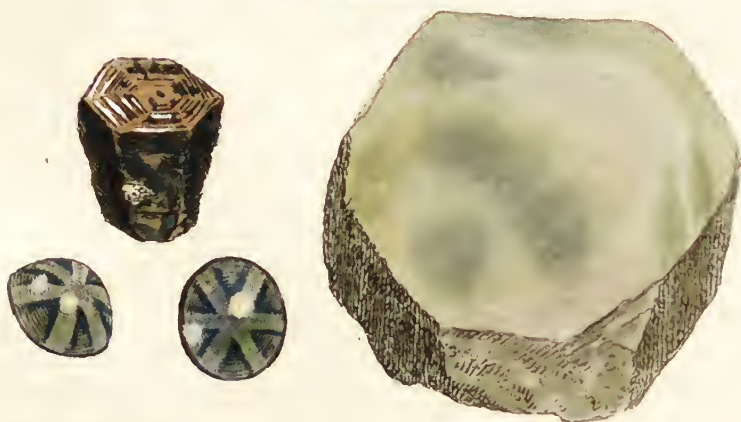
There are two kinds of stone in which the common Corundum is found; one of them consists of a peculiar kind of Feldspar, which contains an extraordinary quantity of Lime, and is accompanied by Hornblende, Epidote, Quartz, Garnets, Fibrolite, Mica, Talc, and Suboxide of Iron. This matrix is sometimes found in a state of decomposition, when the lime, having been previously separated, perhaps by water, forms a kind of cement which surrounds broken pieces of Corundum. The other kind of matrix is shown in the next plate.

No. 1 is the primitive crystal; it is imbedded in Feldspar of a white colour mixed with Lime. No. 2 a fragment showing the fracture upon the solid angle, and corresponding with the modification, No. 1, upon the last plate. No. 3 a remarkably well defined crystal, nearly similar in form to No. 3 of the last plate, and of a colour approaching to that of the Oriental Topaz, a brownish yellow, the terminal plane is deeply striated, as in No. 10 of the last plate. Nos. 4, 5, and 6, are varieties of the hexaëdral prism; and Nos. 7 and 8 show the hexaëdral pyramid. No. 9 is modified in a manner similar to No. 18 of the last plate, the planes corresponding to the obtuse rhomb being striated in a like manner.

Of these Nos. 1, 2, 4, 6, and 9, are from the Carnatic, and Nos. 3, 5, 7, and 10, from Ava. They are all, excepting No 2 and No. 8, in the select cabinet of the Count de Bourmon; No. 8, which is from Malabar, is in the British Museum.

Analysis of Common Corundum, from the Carnatic.

Alumina	91·0
Silex	5·0
Iron	1·5
Loss	2·5
	<hr/>
	100·0
	<hr/>



From 1812 published by J. S. Kebley London

TAB. XLV.

C O R U N D U M.

WE have figured the present Corundum in the matrix as an instructive and interesting specimen in Geology. At the same time it is a fresh proof of the identity of Corundum and Oriental Ruby, although at first sight so different in appearance from a gem. The principal crystal extends through the matrix, and is an irregular prism, whose upper end is tolerably perfect, and contains the commencement of a pyramid and the remains of the primitive faces, as in No. 10 of Tab. 43. On the left hand side is part of another crystal which is terminated, and seems to have been divided by, a plate of Mica, and the form of which is very irregular. The matrix consists of brownish red Feldspar, Mica, Suboxide of Iron, and Fibrolite. This specimen is from China, it was lent me by the Count de Bournon.

The lower figure on the right hand is part of a large crystal from the Carnatic, for the figure of which I am indebted to the Trustees of the British Museum; it shows the horizontal fracture and common colour of that variety of Corundum.

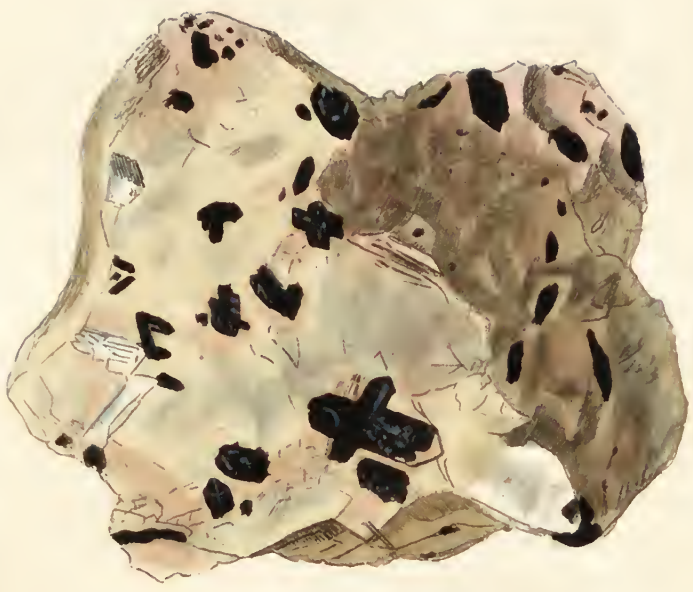
The other figures exhibit the most remarkable varieties of Corundum; the uppermost is part of an hexaëdral pyramid from Ava; it appears to be formed of numerous coats, and so imperfectly aggregated, that its laminae are in parts open enough to admit of the reflection of light between them, giving the crystal a peculiar lustre

when broken horizontally, and also showing numerous concentric hexagons. These crystals when cut in an oval form, exhibit a luminous star with six points, the centre of which coincides with the apex of the nucleus.

The Oriental Rubies frequently exhibit similar appearances upon the terminal faces of their pyramids, and when properly cut also show the star, from whence they are named by Jewellers, Star-stones; I have tried to represent two views of a very fine one belonging to E. W. Rundell, Esq. to whom I am indebted for the loan of it. It shows not only the principal star commonly observed, but also another more faint produced by a second reflection.

Among the small rough Rubies brought from Ceylon, are often fragments of the star stones, rounded sufficiently by attrition to exhibit one or two points, and the colours of these are often of a delicate red or pink, shaded by violet.





TAB. XLVI.

TANTALIUM oxygenizatum Yttriferum.

Yttrio-tantalite.

 SYN. Yttertantal, *Eckeberg.*
Yttertantalite, *Jameson.*Yttrotantal, *Karsten.*Tantal oxydé yttrifère, *Haiiy, Tabl. 120.*

THE present remarkably fine specimen of Yttrio-tantalite, from Ytterby in Sweden, is in the collection at the British Museum. The substance is dispersed through Feldspar, Quartz, and Mica, in a manner very much resembling Feldspar in some Porphyrys, apparently in imperfect crystals, crossing, &c. and were it white or reddish instead of a fine coal black, it might have been passed over as Feldspar in Porphyry. It does not appear that any one has been able to discover the form of the crystal, and it can only be understood in part without spoiling the present specimen. We however venture a hint at its form in the outline below collected from various sections shown on the specimen. It appears to be a rhomboidal prism terminated at each end by two rectangular faces. The hardness is moderate; in general it is opaque, with the blackness and lustre of coal, but sometimes transparent and greenish brown in small fragments. The fracture is rather splintery and

resinous. Spec. Grav. 5.130. According to its discoverer it is composed of Tantalium united to Yttria and Iron; according to Vauquelin it contains Oxide of Tantalium 45, and the remainder Yttria and Iron.



Junonia ...

TAB. XLVII.

ARSENICUM nativum.

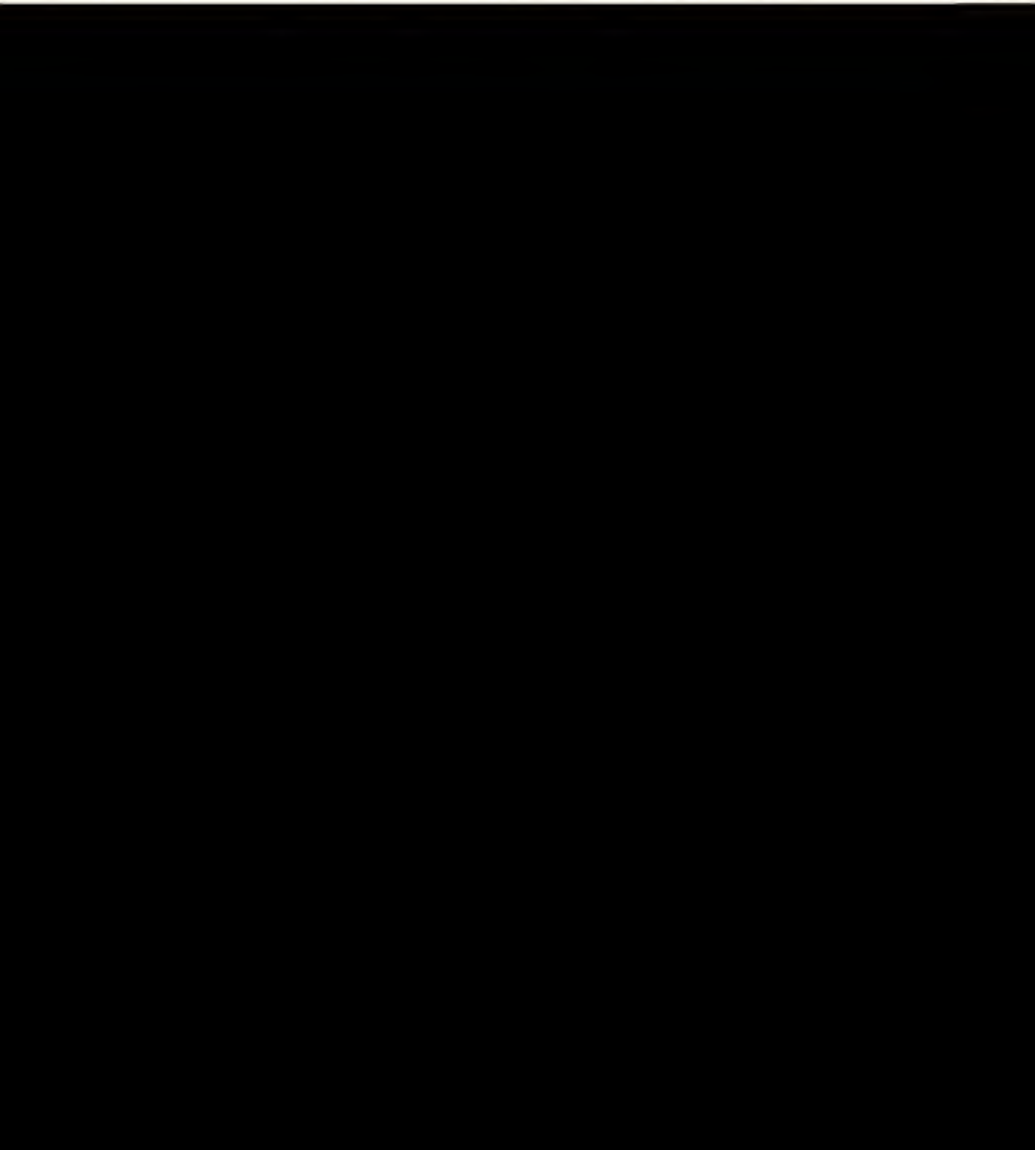
Native Arsenic.

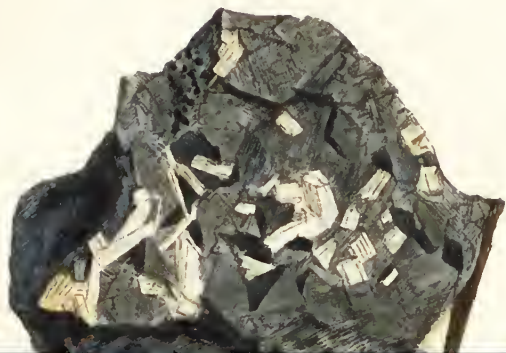
-
- SYN. Arsenic natif, *Haiiy, Tabl. 108. Traité 4. 220.*
 Arsenic testacé, Règule d'arsenic natif, *De Born, 2. 94.*
 Gediegen arsenik, *Emmerl. 2. 548.*
-

THE facility with which some metals oxidize when exposed to damp or the atmosphere, has been urged as a reason for their not having been discovered in an uncombined state. Is it not then a curious fact, that Arsenic, one of the most easily oxidized metals, should be found in the metallic state and nearly pure? It has, however, been long known, and is found in the Hartz, Saxony, Freyberg, France, &c.

The upper figure is taken from a specimen in the British Museum; the globular masses of Arsenic rest upon Quartz, and are prettily relieved by flesh coloured Carbonate of Iron or Pearl-spar. The other is a small specimen of the more common kind, usually called testaceous, from the shell-like form of the concentric coats of which it is composed; its gangue is Carbonate of Lime. Native Arsenic agrees with the artificial in most of its characters, but appears to be less easily acted upon by the atmosphere; the texture is generally fine granular, but in some specimens the grains are sufficiently large to show a laminated

fracture, and are disposed in ramifications through the mass, the colour when fresh broken is grey with a metallic lustre, but the surface soon becomes of a dark and dull brown. Its peculiar odour is rendered perceptible by friction, and it is known from the ores of Arsenic, by being wholly volatile when heated.





TAB. XLVIII.

ANTIMONIUM oxygenizatum.

Oxide of Antimony.

SYN. Antimoine oxydé, *Haiiy, Tabl. 113. Traité*
4. 273.

Weiss-spiess-glanzerz, *Emmerl. 2. 480.*

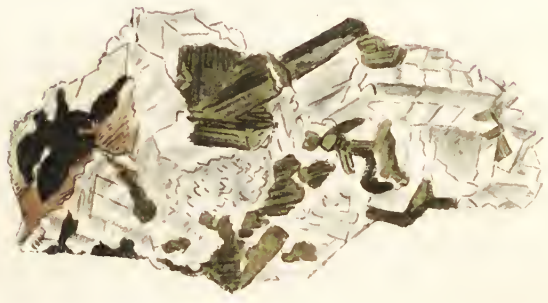
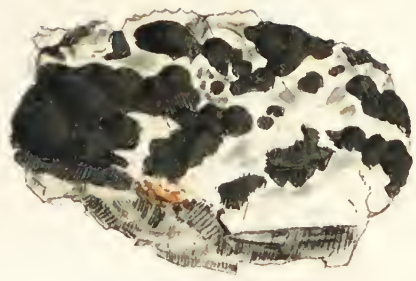
White Antimonial Ore, *Kirw. 2. 251.*

NATIVE oxide of Antimony was first made known by Mr. Mongez the younger, who found it in acicular crystals upon Native Antimony in Dauphiny. It has since been found in several other places, sometimes in tabular crystals upon Galæna, as shown in our figure, which is taken from a specimen in the Count de Bournon's excellent collection.

There appear to be two oxides of Antimony, one of which is usually crystallized and easily fusible, the other pulverulent and almost infusible; this latter has been found in Cornwall; see B. M. 440. They differ, probably in the proportion of Oxygen, the crystallized one containing least. These crystals are soft, brittle, easily divided into laminae, their form that of rectangular tables, the largest planes of which are often striated, seldom possessing any additional faces. The primitive form appears to be a rectangular prism. It melts in the flame of a candle, and when more

heated it evaporates. By Vauquelin's analysis it is found to contain,

Pure Oxide of Antimony	86
Oxide of Antimony, mixed with Oxide of	
Iron	3
Silex	8
Loss	3
	<hr/>
	100
	<hr/>



Specimens collected by J. S. Hensley, London.

TAB. XLIX.

ARGENTUM antimoniferum.

Antimonial Silver.

SYN. Argent antimonial, *Halliy*, *Tabl.* 74. *Traité*
3. 391.

Spies-glas-silber, *Emmerl.* 2. 162.

Antimoniated Native Silver, *Kirw.* 2. 110.

THIS mineral, which nearly resembles Native Silver in general appearance, may be distinguished by its laminated fracture and brittleness. It occurs either in granular masses or prismatic crystals; the crystals are either regularly six-sided, rhomboidal, or rectangular, with their sides deeply striated; sometimes the prism is terminated by a diedral summit with smooth faces. When heated upon Charcoal, the Antimony is volatilized, leaving the Silver. It is of rare occurrence, the matrix is Carbonate of Lime or Sulphate of Barytes, and is generally accompanied by Galæna, Native Silver, and Blend.

Our figures were taken at the British Museum: in the upper one the Antimonial Silver is surrounded by foliated Native Arsenic, it is in rhomboidal crystals with diedral summits, the matrix is Carbonate of Lime. The other specimen is in rectangular deeply furrowed prisms, also penetrating Carbonate of Lime, it is from Wolfack in the

principality of Fürstenberg. This mineral has also been found in the Harz and Spain.

Spec. Grav. according to Haüy is 9·4406, or according to Selb it is 10·000.

Analysis by Klaproth.

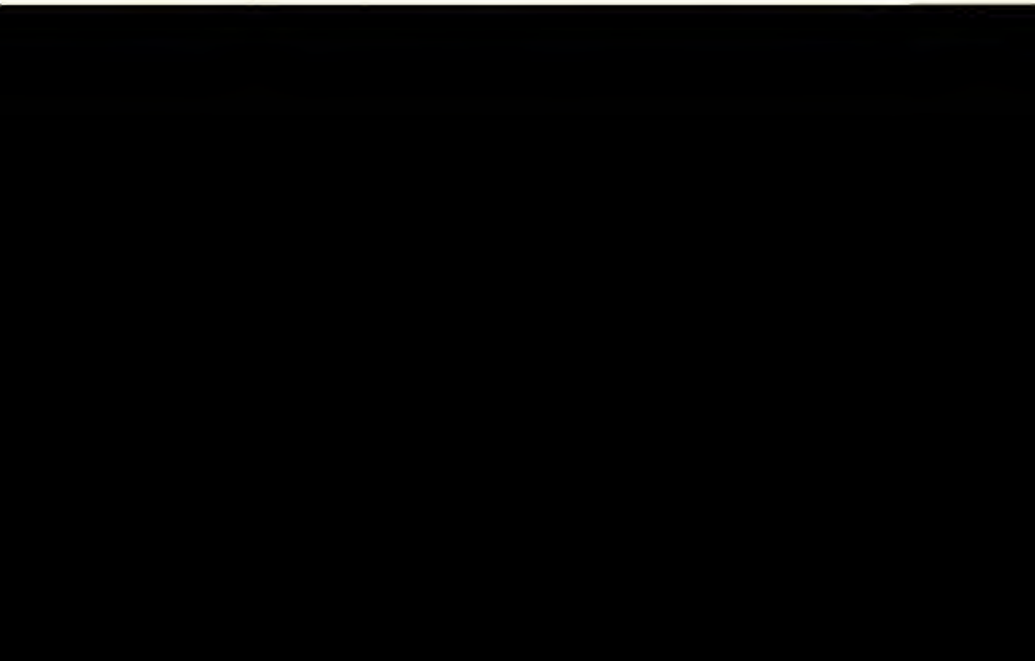
Silver	84
Antimony	16

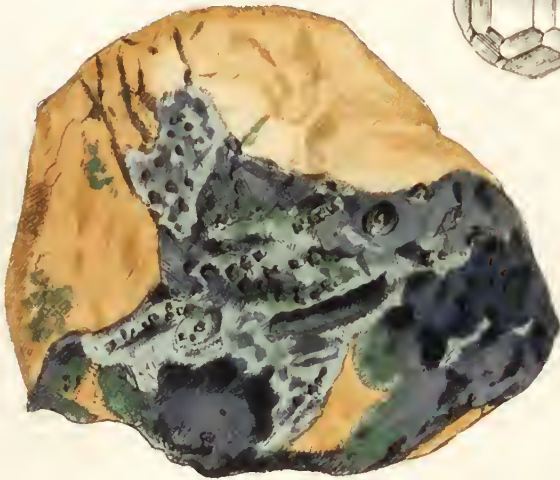
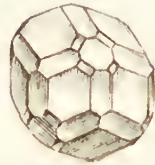
100

Of another variety by Vauquelin.

Silver	78
Antimony	22

100





Aug. 1 1912 published by J. H. L. L. L. L.

TAB. L.

HYDRARGYRUS argentiferus.

Argental Quicksilver.

SYN. Mercure argental, *Haiiy*, *Tabl.* 77. *Traité*
3. 432.

Natürliches amalgam, *Emmerl.* 2. 134.

Natural amalgama, *Kirw.* 2. 223.

AMALGAM of Mercury, as it is generally called, is usually soft and brittle; when gradually heated the Mercury volatilizes, and leaves the Silver in beautifully white ramifying masses; if rubbed upon Copper, it adheres to the surface, giving it the colour of Silver; and occurs upon ores of Quicksilver in two different forms, viz. regular crystals and films, the crystals are often very minute, and connected together by fluid Quicksilver into irregular masses, the films are frequently blended

Analysis by Klaproth.

Silver	36
Mercury	64
	<hr/>
	100
	<hr/>

By Cordier.

Silver	27.5
Mercury	72.5
	<hr/>
	100.0
	<hr/>

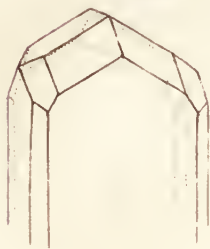
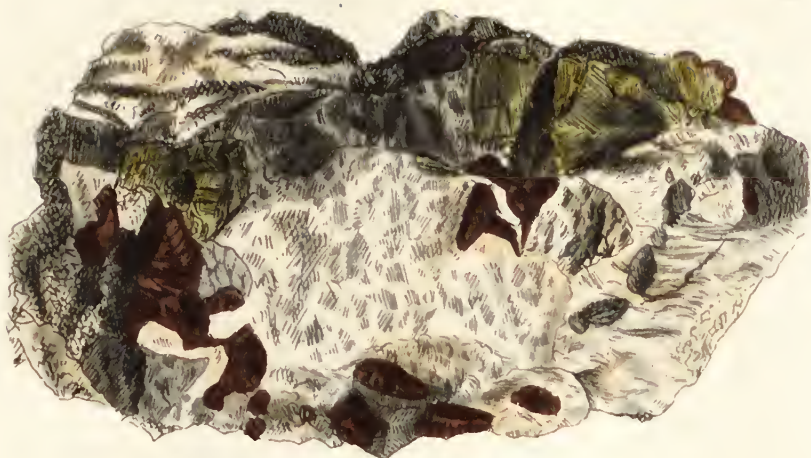


Fig. 110. 2. 111. 112. of the 3d. variety of the same.

TAB. LI.

ALUMINA chrysoberyllus.

Chrysoberill.

SYN. Cymophane, *Haüy, Tabl. 30. Traité 2. 491.*
 Chrysoberill, *Emmerl. 1. 19.*
 Chrysoberil, *Kirw. 1. 261.*

WE are obliged to the President of the Geological Society for the use of this fine specimen; it is from Connecticut. The crystals are drawn from specimens in the possession of the Count de Bournon, to whom we expect the scientific world will soon be obliged for some account of his valuable collection. While we may regret our inability to represent these things in their natural splendour, we may rejoice to have been allowed to give that help which must, more or less, aid instruction. Figures in all cases help language, and give a more perfect idea where the thing itself is seldom seen, and very often elucidate, by geometrical magnified sketches, the specimen that might otherwise escape very acute adepts, who often find such figures necessary to assist each other.

The crystals in the matrix are so placed, that very few natural faces remain; the fracture, however, is more distinct. Their green colour is partly relieved by grey Quartz, in a vein, of which they form a part, mingled with Garnets. The Garnets, with the grey Quartz, and a little of the Chrysoberill, are also dispersed among the white

Feldspar, and the Quartz is in some parts coated with Asbestos.

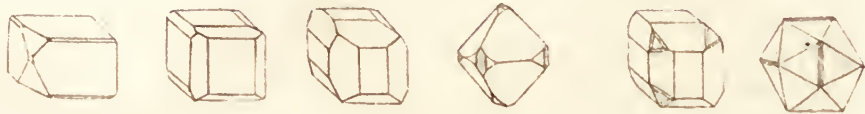
Chrysoberill is generally of a bright yellow, or yellowish green colour, in many crystals a remarkable opalescent blue glare is visible within, either through the narrower faces of the prism, or in the direction of their axis, but if viewed in other directions they are transparent. The primitive crystal is a rectangular prism, parallel to the sides of which, fractures may sometimes be found. It is harder than Spinell, brittle, fragments conchoidal, sharp-edged, transparent. Infusible without addition. Spec. Grav. 3.600 to 3.7961.

Analysis by Klaproth.

Alumina	-	-	71.5
Silica	-	-	18.0
Lime	-	-	6.0
Oxide of Iron	-		1.5
Loss	-	-	3.0
			<hr/>
			100.0
			<hr/>

Known in common as Opalescent or Oriental Chrysolite. Sometimes used in rings: rare among the Jewellers.

Jameson.



These are not necessarily for the only crystals

TAB LII.

COBALTUM arsenicale.

Grey Cobalt Ore.

-
- SYN. Cobalt gris, *Haiiy, Tabl. 107, Traité 4. 204.*
 Mine de Cobalt arsenico-sulfureuse, *De Lisle,*
 3. 129.
 Cobalt blanc, *De Börn, 2. 180.*
 Glanz Kobolt, *Emmerl. 2. 488.*
 Cobalt arsenical, *Daubenton, Tabl. 33.*
 Bright white Cobalt-Ore, *Kirw. 2. 273.*
 White Cobalt-Ore, *Jameson, 2. 432.*
-

FOUND chiefly at Tunaberg in Sweden, especially the finer crystallized specimens; also in Norway, and at Giern in Silicia, in beds which, according to Jameson, lie in Mica slate. The present specimens were both lent me by Dr. Babington; the upper one was from Hesse, the other from Tunaberg. The upper specimen is crystallized in small irregular cubo-octäedrons, chiefly on the surface of part of a dark Schistose rock, their surfaces are smooth, and their lustre much more splendid than imitable.

The lower specimen is a larger crystal than is usual, in a matrix of Copper Pyrites, with Carbonate of Lime and Cocolite; it is a cube modified by the faces of the pentagonal dodecaëdron, shown in the plate of Sulphuret of Iron, Tab. 22, Brit. Min. These substances commonly assuming the same figure, the forms of the crystals of either will designate the other.

Having a number of crystals presented to me by the generous Mr. Swedenstierna when in England, which happen to be such as elucidate the subject in a proper manner, I avail myself of them. They were brought, with other varieties, as to purity, value, &c. among samples for sale, and are detached more or less perfect crystals. They are cubes and octaëdrons, the cubes variously elongated and modified, either with the solid angles truncated, approaching the octaëdron, or with the edges alternately bevilled, in the manner of the large figure, with the faces of the pentagonal dodecaëdron.

The first geometrical figure on the left hand shows a lengthened parallelogram with two corners truncated, and the edges slightly bevilled; the little square facet is one of these bevilled edges. The next outline has the edges more largely bevilled, and the third deeper still; the faces between being those of the cube, they are quite complete in the figure of Sulphuret of Iron above alluded to. The next figure is the regular octaëdron with small remains of the faces of the cube, often six-sided, and the two triangular faces on either side alternating on the points of the octaëdron correspond with the faces of the dodecaëdron above-mentioned. The next differs from the first chiefly in having bevillings at some of the corners around the triangular faces, and is a rare modification. The right hand figure is the Icosaëdron complete, having twenty equilateral triangular faces, those of the octaëdron and pentagonal dodecaëdron meeting regularly; where three lines are drawn there are sometimes the remains of the faces of the cube. Thus this figure has the faces of the octaëdron, dodecaëdron, and signs of those of the cube combined.

Cobalt is so like Iron Pyrites, that it is not easily distinguished; however, an eye accustomed to discriminate Mineral substances, will soon recognize it. It has however some characters which may help the novice by description. It has a whiter splendour, with something of a crimson tarnish, Pyrites is more likely to be rusty, it is softer or more easily frangible than Iron Pyrites. Lustre highly metallic; fracture more or less fine grained, rather foliated in the direction of the faces of the cube. A blow, or heat, will cause a strong garlick-like odour, which, however, is also the case with Arsenical Pyrites. Cobalt has the peculiar property of colouring the glass of Borax of a fine ultramarine blue. Melts before the blow-pipe easily, giving out a thick white smoke.

Analysis of Arsenical Cobalt from Tunaberg.

	By Klaproth.	By Tassaert.
Cobalt	- - 44.0	— 36.66
Arsenic	- - 55.5	— 49.00
Sulphur	- - 0.5	— 6.50
Iron	- - 0.0	— 5.66
Loss	- - 0.0	— 2.18
	<hr/> 100.0	<hr/> 100.00
	<hr/>	<hr/>

TAB. LIII.

FERRUM subsulphatum.

Subsulphate of Iron.

SYN. Eisen pecherz, *Ferber's M.S. label.*

Fer sulfatée avec excès de base, *Gillet Laumont, Journ. des Mines, No. 135, p. 221.*

Fer oxydé résinite, *Haiiy, Tabl. p. 98.*

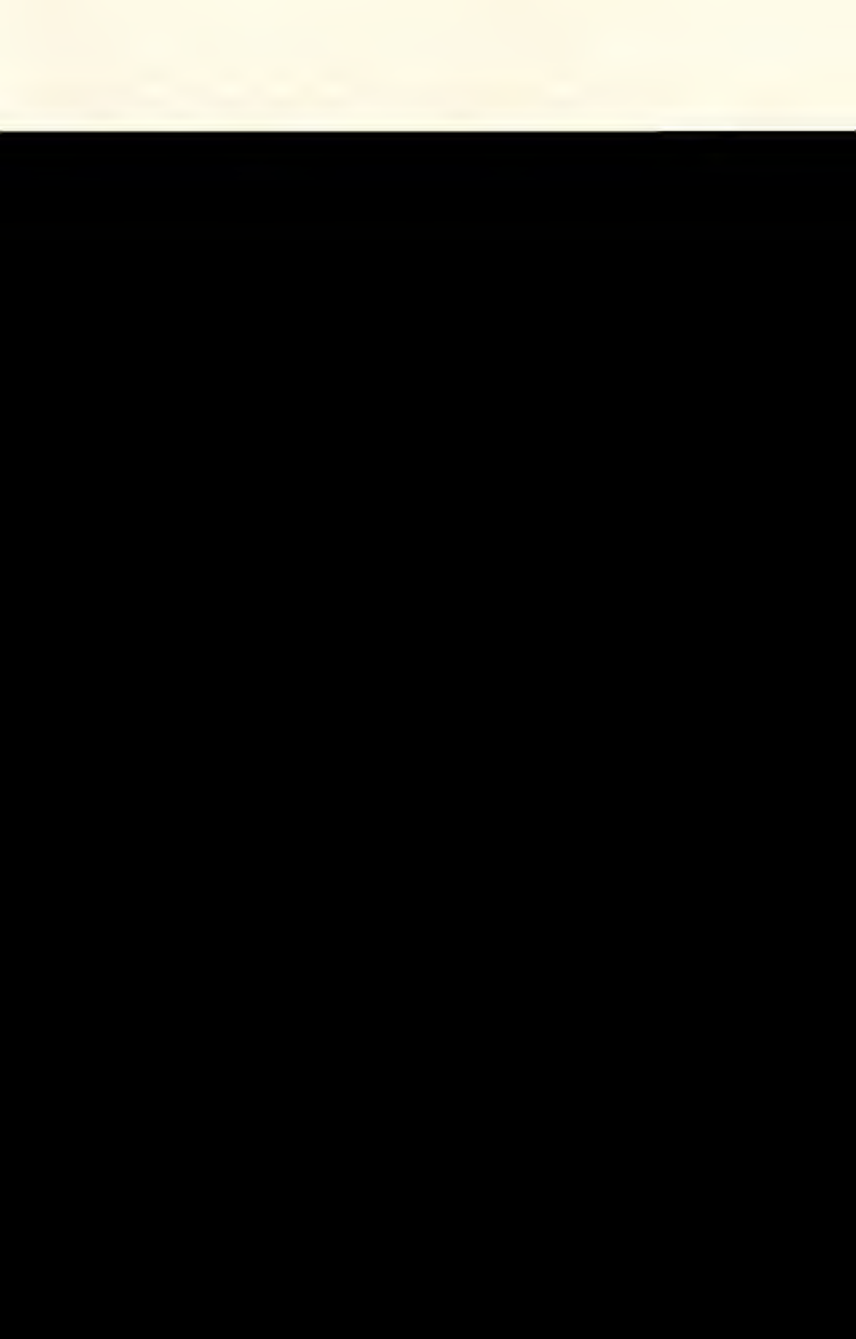
THE upper specimen of this substance is from the East Indies, and is here figured by favour of the Count de Bournon, to whom it belongs, as does also the lower specimen, which was part of the contents of a small box found in Ferber's collection. Ferber himself formerly gave the Count a specimen, but it shared the same unhappy fate as the rest of the Count's collection in France. The first is upon an argillaceous matrix of a grey colour. The upper side is an oblique view, and shows a somewhat irregular incrustation of the substance, which is very brittle and tender, of a resinous fracture, and the colour approaches that of resin in the interior; the upper surface, or crust, which is mostly broken off, is of a warm deep brownish red, or scorched hue, with a very delicate greyish bloom, if I may so call it, in some of the fissures.

The lower specimen inclines to ochraceous in some parts, and is of a rich scorched dark brownish red colour in others; it has a large conchoidal fracture, and is semi-transparent, showing very rich glowing reflections. This is a part of Ferber's specimen from the mine of Kust Bescheerung, near Freyberg. Spec. Grav. 2.144.

Analysis by Klaproth.

Oxide of Iron -	-	67
Dry Sulph. Acid -	-	8
Water -	-	25
		<hr/>
		100
		<hr/>

Hall observes, that upon exposure to the flame of a candle it melts and becomes magnetic.



TAB LIV.

CUPRUM phosphatum.

Phosphate of Copper.

SYN. Cuivre phosphaté, *Hallij, Tabl. 92, Karsten, Journ. de Phys. 53. 350.*

THESE specimens are in the collection of the Count de Bournon; the upper one is from Peru, the under one from Thuringia.

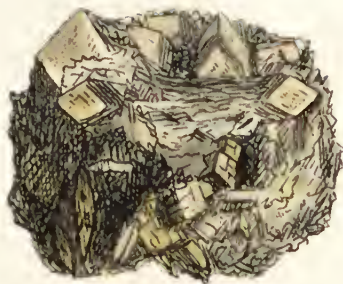
This substance has so much the appearance of a variety of Arseniate of Copper, that it might in general have passed for such. Chemical examination, however, proves it to be a more rare species. Its lining the matrix and its dark green glassy lustre, might help the deception, but on nice examination the crystals seem to present a different form. Although it is difficult to ascertain the shape with certainty, they are so confused, yet we are inclined to think them rectangular prisms, with vertical striæ on their sides, and diagonal ones on their ends. Hereafter we may meet with more distinct specimens, and then discover modifications. There is the more chance in favour of future help, as the substance has been discovered already in two places. It is, however, at present very little known.

Before the blow-pipe it melts into a grey metallic globule. Dissolves in Nitric Acid without effervescence. Its colour is a very deep bright green, the surface of the crystals, and also that of the spiculæ, which compose the mass, some-

times approaches to nearly black, probably from a partial decomposition.

Analysis by Klaproth.

Oxide of Copper	-	68.13
Phosphoric Acid	-	30.95
Loss	- - -	0.92
		<hr/>
		100.00
		<hr/>



1825. 1826. 1827. 1828. 1829. 1830. 1831. 1832. 1833. 1834. 1835. 1836. 1837. 1838. 1839. 1840.

TAB. LV.

SODA Glauberi.

*Anhydrous Sulphate of Soda and Lime.
Glauberite.*

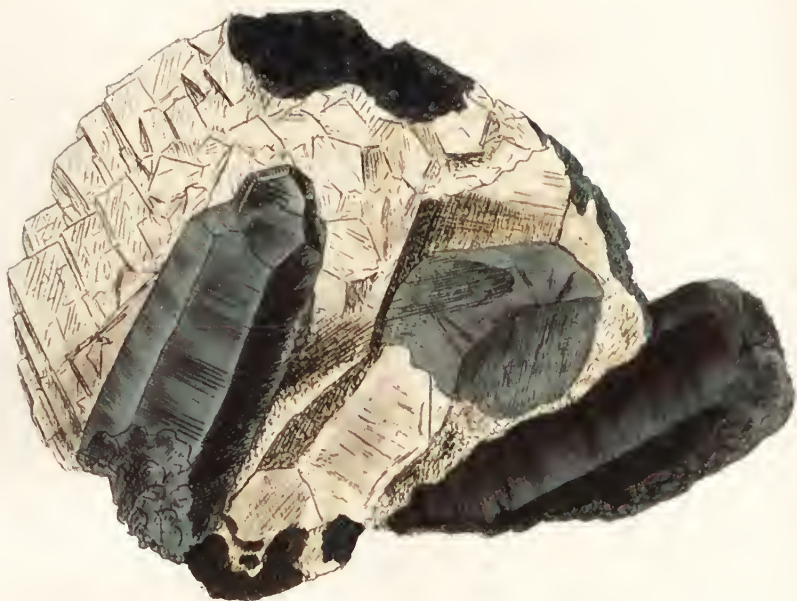
SYN. Glauberite. *Brongn. Journ. des Mines, No. 133. p. 17. Haiiy, Tabl. 23. & 150. Bourn. Catal. 183.*

THIS substance was discovered about the year 1807, in the salt mines at Villarubia, near Ocagna in New Castile, by Mons. Dumeril. At first sight, it may, from the general contour of its crystals, which are very flat, be taken for the flatter lenticular crystals of Gypsum; yet a very little attention will be requisite to discover that it differs, not only in the form of its crystals, but also in its lustre and in several other characters. The crystals are very oblique prisms, with rhomboidal bases; the angles of the base of this prism are 104° . and 76° . The angle of the incidence of the base upon the adjacent sides is 142° ., and the sharp angles 138° . The inclination of the edge formed by the two sides at the obtuse angles, upon the base is 154° . The faces of the base are generally neat, and even brilliant; the side faces, on the contrary, are full of striæ parallel to the edges of the faces. The fracture is neat and very easily obtained, parallel to the base; in all other directions vitreous. The primitive form is an oblique prism with a rhomboidal base, whose obtuse angles agree with the obtuse angles of the secondary prism.

The colour of these crystals is said to be most commonly Topaz yellow, but sometimes they are nearly limpid, as in our specimens. Its hardness is superior to that of common Gypsum, which it also exceeds in lustre. When exposed suddenly to fire, the crystals decrepitate, fall in pieces, and melt into a white enamel. Exposed to the air, they preserve their solidity and transparency, provided they are not at all wetted, but if put into water, their surface quickly becomes covered with a milky white coat, and upon being again dried, they do not regain their transparency, but the white coat falls off in powder. Spec. Grav. 2.73. According to an analysis by Brongniart, it contains

Anhydrous Sulphate of Lime	49
Anhydrous Sulphate of Soda	51
	<hr style="width: 50%; margin: 0 auto;"/>
	100
	<hr style="width: 50%; margin: 0 auto;"/>

To the kindness of the Count de Bournon I am indebted for the loan of the specimens from which my figures are taken. The upper figure is a mass of Muriate of Soda, replete with well-defined crystals, a few of which shew the yellow colour: the left-hand figure is a perfect secondary prism: the centre figure has striæ indicating another modification, as explained below: the right-hand figure exhibits the same striæ; the two faces at the bottom of this are primitive, they were obtained by breaking: the interior of the left-hand outline is the primitive form.



TAB. LVI.

CALX phosphata.

Phosphate of Lime, Moroxite.

SYN. Chaux phosphatée. *Haiiy, Tabl. 7.* Cristaux de Norwége, bleu-verdatres ou gris bleuâtres.

Phosphate of Lime. *British Mineralogy, &c.*

Variété de l'apatit. *Karsten.*

Moroxite. *R.*

THIS variety of Phosphate of Lime is so different in general appearance from the British, that I trust it merits a figure in this work. The name Moroxite was given to it by Reuss, who obtained it from Arendal in Norway, from whence also our specimens come.

The upper figure is from one presented by Sir Joseph Banks to the British Museum. The lower figure is also taken from one in the collection of that Museum, and is of a remarkably fine colour.



July 1813 published by J. G. Leavelle, London

TAB. LVII.

ZIRCONIA Crichtoni.

Crichtonite.

SYN. Craitonite, Crichtonite. *Bournon Catalogue*,
430 & 468.

THE Count first observed this substance in 1788, but it remained undescribed until he published his Catalogue, where he has named it after Dr. Crichton, first physician to the Emperor of Russia, and an excellent mineralogist. From his description the following characters are extracted. The primitive form is an acute rhomb of about 18° . and 162° .; this rhomb is divisible parallel to a plane perpendicular to its axis, but in no other direction does it show signs of laminae; hence it is, from the general character of the modifications it undergoes, that it is taken for the primitive form.

Colour a deep opaque black, surface shining, with much lustre; cross fracture conchoidal. It is softer than Anatase; it scratches Fluor but not Glass. Infusible and unchanged by the blowpipe. Dr. Wollaston found it to contain Zirconia in the greatest quantity, with Silix, Iron, and Manganese.

The figures are taken from two specimens particularly mentioned in his valuable Catalogue, which the Count, with his accustomed zeal for science, has permitted me to

engrave. The upper one is the variety in acute rhombs, with their apices truncated, resting upon crystals of Quartz coloured by Chlorite; the other is the laminated variety upon Quartz mixed with crystals of whitish Feldspar, or Adularia; these laminæ have striæ upon the surface indicating their origin from the rhomb; among these is one twelve-sided, as figured below.

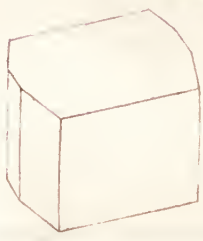
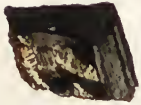
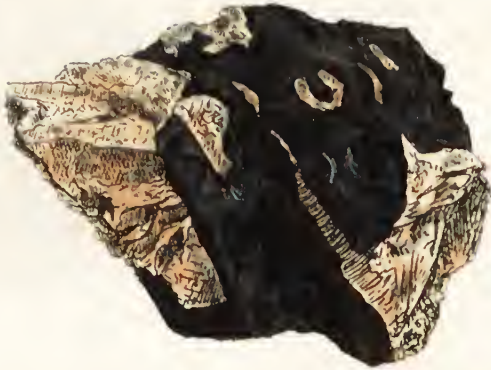


Fig. 10. matches of St. Lawrence Island.

TAB. LVIII.

CERIUM oxyferriferum.

*Ferriferous Oxide of Cerium.**Allanite.*

SYN. Allanite. Thomson, in *Trans. of Royal Society of Edinburgh*, vol. VI. p. 371. Bournon *Catalogue*, 455.

THE fortune of war having placed a collection made in Greenland by a persevering German mineralogist, M. Gieseké, in the hands of a British privateer, it was sold in Edinburgh to Mr. Allan, who, upon examining it, found it to contain many rare specimens, particularly of Cryolite and of the substance now before us, which proved to be non-descript. It was placed in the hands of Dr. Thomson, who, having analyzed and described it, gave it a name after its proprietor, not knowing at the time the person to whom it would have been more handsome and more correct to have done that honour.

The primitive form of Allanite, according to Bournon, is a rectangular prism, the height of which is not at present known, and the edges of the base of which are to each other as 12 to 5·6. This prism is generally modified upon its edges; the modifications upon the vertical ones only have been determined.

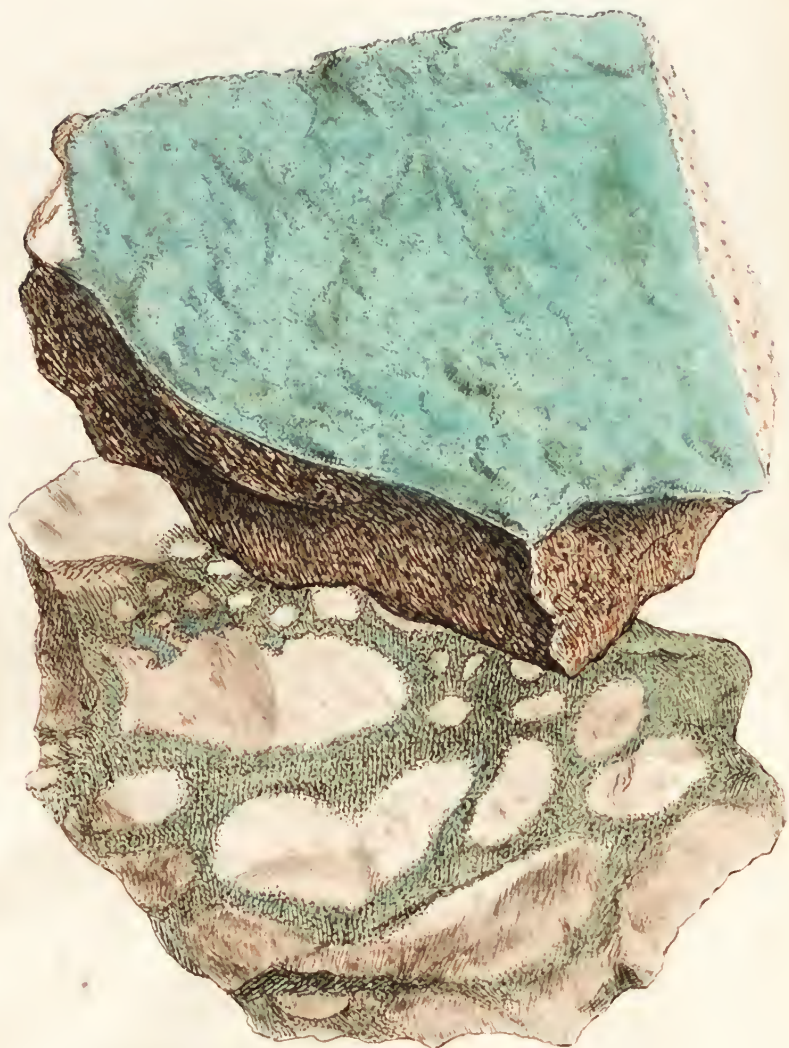
The following characters are such as Dr. Thomson gives in his paper. The hardness is not sufficient to

scratch Feldspar or Quartz, but it scratches Hornblende and Glass. It is brittle, with a conchoidal brilliant fracture; its powder is of a greenish grey colour; in the mass it is black, and, even in thin pieces, opaque. Spec. Grav. from 3.119. to 4.001. Before the blowpipe it froths and melts imperfectly into a brown scoria; it gelatinizes in Nitric Acid. It appears very liable to decay when exposed to the weather, as the external parts of the specimens are much rounded, and the surface of the crystals covered by a thin ochrey crust, the result of its decomposition.

My figures are from the two crystals the Count mentions in the Catalogue of his very scientific collection. The free access I am indulged with to this collection, imposes upon me the pleasing duty of frequently expressing my gratitude to him, for the many favours I hope the public, as well as myself, will be benefited by.

I have given Dr. Thomson's analysis before, under Cerite, but will repeat it.

Cerium Oxide	33.9
Iron Oxide	25.4
Silica	35.4
Lime	9.2
Alumine	4.1
Volatile Matter	4.0
	<hr/>
	112.0
	<hr/>



TAB. LIX.

CHROMIUM oxygenizatum.

Oxide of Chrome.

SYN. Chrome oxidé. *Bournon Catalogue*, 459.

DISCOVERED in the mountains called *Écouchets*, near a village of the same name, on the road from *Creuzot* to *Couches*, in the department of the *Saone and Loire*, by *M. Leschevins*, about the year 1809 or 1810.

The upper figure is taken from a specimen of the variety which is found in layers, from half a line to three lines in thickness, in a fine-grained grey grit, composed of grey Quartz with a little Mica. The Oxide of Chrome is never found but in combination with Silix. Its colour, after being exposed to the air, is a pale opaque verdigrease green.*

According to *Leschevins* it is easy to scratch with a knife, when it is newly taken out of the rock, but it acquires hardness by exposure. It is rough to the touch; its fracture is unequal, earthy; its powder is of a pale dull green. It is insoluble in Nitric Acid; it communicates

* *Leschevins* says it is of a fine apple green, a term which I very much object to, as it conveys no definite idea, and I certainly never saw an apple at all resembling this substance in colour.

to glass of Borax a superb emerald green. Being analyzed by M. Drapiez of Lisle, it is found to contain

Silex	64·0
Alumine	23·0
Oxide of Chrome	10·5
Lime and Magnesia	2·5
Iron and Manganese, a trace	
	100·0

Vauquelin found but seven per cent. of Oxide of Chrome, but it appears to vary much in quantity, and that the specimen analyzed by Drapiez was from a different layer. Spec. Grav. 2·5714.

The lower specimen is a mass of rather opaque reddish Quartz, traversed by veins of a silicious substance, coloured by Oxide of Chrome in a small proportion. The middle of the veins, where they are broadest, have a reddish tinge, and the green is much more intense at the edges. The whole veins have the waxy appearance of Hornstone. It is from the same place as the upper figure; both were lent me by the Count de Bournon.



Illegible handwritten text, likely a specimen label or description.

TAB. LX.

FERRUM chromiferum.

Chromate of Iron, or Chromiferous Oxide of Iron.

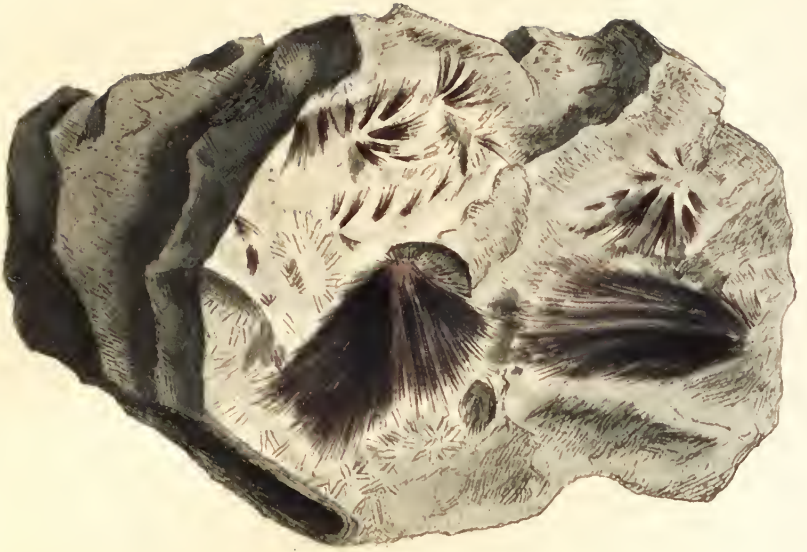
SYN. Chromate de Fér. *Bulletin des Sciences, &c.*
 Fer chromaté. *Heüy, IV. 129.*
 Eisen-chrom. *Karsten.*

ABOUT fifteen years ago Chromate of Iron was discovered by M. Pontier near Gassin, in the department of the Var, in France. It has since been found in Siberia and America. Not long after its discovery, the Chromic Acid was prepared from it, and combined with Lead to form a fine yellow or reddish yellow pigment, which was sold in Paris, and has proved to be a very valuable addition to the pallet of the artist.

The Chromate of Iron is usually disseminated through masses of Chlorite or Talc; in the American the Talc is often coloured of a delicate pink, probably from a slight admixture of Chrome Oxide with it. Fracture conchoidal, slightly laminated, with rather a dull surface; colour brownish black, with less metallic lustre than Magnetic Oxide of Iron; it is soft and rather brittle. The smaller specimen is a remarkably rich piece, it was lent me by Thomas Meade, Esq., a zealous and scientific collector of the fossils of the West of England; he received it from

near Baltimore in America. The other is also an American specimen. The worthy President of the Royal Academy, having been assisted by American friends, has had preparations of it made by Mr. Edmund Davy, late of the Royal Institution, which he has found well adapted to his art, and used successfully. I herein beg to thank him for his kind answer to my enquiries upon the subject.

Analysis of the French variety, by Vauquelin.	Of the Siberian, by Laugier.
Chromic Acid . . . 43·0	Chrome Oxide . . . 53
Iron Oxide . . . 34·7	Iron Oxide . . . 34
Alumine . . . 20·3	Alumine . . . 11
Silex . . . 2·0	Silex . . . 1
<hr/> 100·0 <hr/>	<hr/> 99 <hr/>



See accompanying label on page 60

TAB. LXI.

ANTIMONIUM oxysulphureum.

Oxysulphuret of Antimony. Red Antimony.

-
- SYN. Antimoine oxidé sulphuré. Antimoine Rouge,
Bourn. Cat. 404. Haiiy, Tabl. 113.
 Antimoine hydrosulfuré. *Haiiy, Traité, 4. 276.*
 Roth-spiessglaserz. *Werner.*
 Red Antimonial ore. *Kirw. 2. 250.*
 Roth-spiessglanzerz. *Emmerl. 2. 477.*
-

RED Antimony has long been esteemed as one of the most elegant ores of that metal; it is found in Saxony, Hungary, &c., but is by no means a common Mineral; its matrix is generally Sulphuret of Antimony, or Quartz. In its most perfect form it occurs in scopiform bundles of acicular crystals of a rich deep red colour, with much lustre; these crystals are transparent and pliable, two characters which have been overlooked by every author except the Count de Bournon. Red Antimony also occurs in dull red films, or even pulverulent, coating decomposing crystals of the grey Sulphuret, in which case it is often accompanied by small crystals of Sulphur, and pulverulent Oxide of Antimony.

It is the opinion of Haiiy that it is produced in general by the decomposition of the grey Sulphuret, and Bournon even supposes that it is always so, and that its acicular form arises from the splitting of the crystals of the grey Sulphuret during the progress of decomposition, for he has observed that the fibres of each have the same form,

and that the grey may frequently be divided into spiculæ, approaching in fineness those of the red. The Count has specimens of the grey which have lost all the Sulphur from the surfaces of the crystals, and are covered in part with Oxide, which seems ready to peel off, and within which the Sulphuret appears to be dividing into spiculæ; of one of these crystals I have given a magnified figure, to illustrate the formation of the red. It appears to me tolerably certain that the filmy or pulverulent forms are produced simply by the decomposition of the grey, but I feel some hesitation in pronouncing that the constituent parts of a substance can be changed without destroying its texture completely, and I am the more inclined to think that the transparent spiculæ which occur in diverging groups, are formed, independently of the grey Sulphuret, by the direct aggregation of their constituent parts according to the regular laws of crystallization.

Chemists formerly considered the red Sulphuret of Antimony, whether native or artificial, (when it was called *Kermes Mineral*) as a combination of Antimony, Sulphur, and Hydrogen; but lately, upon the authority of Klaproth, and considering the process by which the glass of Antimony is formed, it is supposed to be a compound of the protoxide of Antimony with Sulphur.

The following is Klaproth's Analysis.

Antimony	67·5
Oxygen	10·8
Sulphur	19·7
Loss	2·0
	<hr/>
	100·0
	<hr/>

Is it not probable that, instead of its being an oxygenized Sulphuret, it is a simple Sulphuret containing a greater portion of Sulphur than the grey?

The larger specimen is in the cabinet of the British Museum; the others in that of the Count.

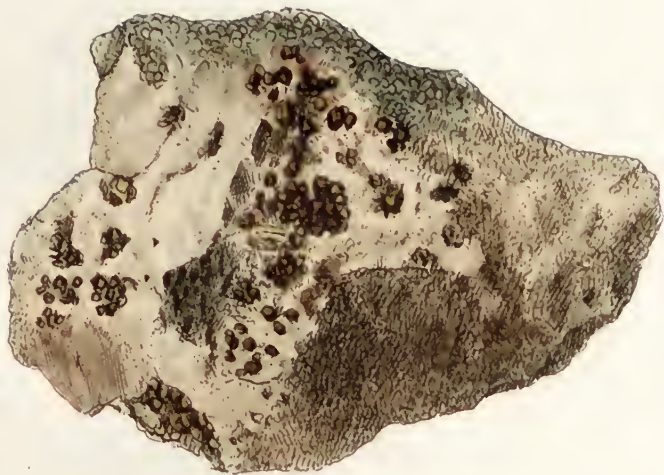


Fig. 1. - 1851. published by J. A. Kirby, London.

TAB. LXII.

SILEX Humei.

Humite.

SYN. Humite. *Bournon Catalogue*, 52.

THE penetration of the Count de Bournon, which is equalled only by the persevering generosity and scientific ardour with which he has strove for many years to promote the useful study of minerals, and for which, although his endeavours have not been crowned with the success they have merited, Britain is much indebted to him; an habitual penetration which, improved by experience, has added many important discoveries to the science, could not fail to distinguish the present mineral from Idocrase, for which, it is very probable, most mineralogists have taken it, and despising crystals too small to attract their notice, rejected the specimens in which it formed a predominant feature.

Humite is found among the light brownish grey granular Topaz of Mount Somma, which is accompanied by a beautiful variety of green Mica, that appears of an orange red colour when viewed through the faces of the prism or edges of the plates. It is distinguished from Idocrase, by the great lustre of its surface, by the form of its crystals,

which are short hexaëdral prisms with many-sided pyramids, that have often eight-sided terminal planes; by its inferior hardness, which is very little greater than that of Quartz; and lastly by its colour, which is a brighter and rather purplish brown, without the green cast which characterizes Idocrase.

The name of this mineral, dictated by the Count de Bournon's friendship, will hand down to posterity that of Sir Abraham Hume, Bart., as a patron of mineralogy, to whom such an honour is most justly due.



Handwritten text, possibly a signature or label, located below the specimens.

TAB. LXIII.

SILEX quartzum, sericeum.

Cats-eye Quartz.

-
- SYN. Cats-eye. *Kirw.* 1. 301. *Jameson* 1. 200.
 Œil de chat. *Bournon* 24.
 Katzenauge. *Emmerl.* 1. 188.
 Quartz agathe chatoyant. *Haiiy, Traité* 2.
 427, *Tabl.* 27.
-

WHETHER this stone be a variety of Quartz, or a distinct species, is a question not easily solved, and will probably long remain a matter of opinion among Mineralogists. In its component parts it differs so little from Quartz, that in a system regulated by chemical characters they would be arranged together. In its external characters it bears the same relation to Quartz, as Satin-spar does to Calcareous spar*, except that it is more compact. There is a variety of Feldspar with a similar lustre, that is sometimes confounded with it; indications however, of a laminated fracture will readily distinguish them. The Spec. Grav. varies, according to Klaproth, from 2.600 to 2.625.

* Therefore I give the same trivial name. The Satin-spar, the striated Gypsum, compact Asbestos, &c. if cut in the same form, show the same line of light that in this stone has been compared to the glare of a Cat's eye: this comparison is here much favoured by the colour of the stone: in the mass the lustre is often obscured by the dulness of the surface, but in fresh broken specimens it is very considerable.

Klaproth's analysis gives,

Silex	95	. .	94.50
Alumina	1.75	. .	2.00
Lime	1.50	. .	1.50
Oxide of Iron . .	0.25	. .	0.25

The largest specimen figured is from the Island of Ceylon, and is the same kind as the larger cut specimen. The other two are from the Peninsula of India. They are to be found in the Count de Bournon's extensive collection. Rough specimens are extremely rare in England, particularly of the variety from India.

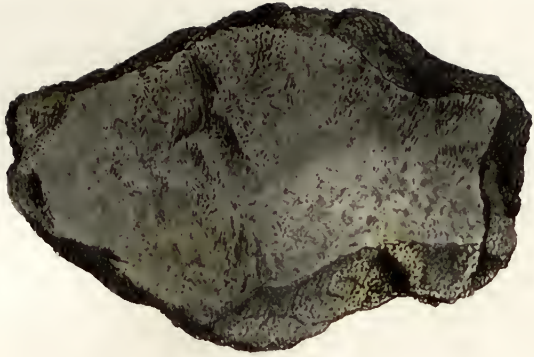


Fig. 1. 2. 3. published by J. S. Newby London

TAB. LXIV.

TELLURIUM nativum.

Native Tellurium.

SYN. Tellure natif ferrifère et aurifère. *Haiiy, Traité 4. 325.*

Tellure natif auro-ferrifère. *Haiiy, Tabl. 119.*

Gediegen Silvan. *Werner.*

Gediegen Tellure. *Karsten.*

Tellure métallique natif. *Bourn. Catal 446.*

Native Silvan. *Jameson 2. 513.*

Sylvanite. *Kirw. 2. 324.*

TELLURIUM, in a state approaching nearly to purity, is found in masses composed of minute crystals intersecting each other in all directions, of a tin-white colour and brilliant metallic lustre, accompanied by Blende, Galæna, &c. It has Quartz and Lithomarga for its matrix, and has been discovered only in one place, namely, Facebay, in Transylvania, where it is said veins of it traverse Greywacke and Transition Limestone.

It is soft enough to be cut easily with a knife, under which it feels rather waxy, but it is reduced to powder: when strongly heated it burns with a bluish flame, and evaporates in a white vapour, with a pungent odour: it is as easily melted as Lead. Spec. Grav. according to Kir-

wan, 5·730, or according to Klaproth, 6·115. Its old names, Aurum problematicum and Aurum paradoxum, were given in consequence of the small quantity of Gold it contains in comparison with the other ores of Tellurium to which it bears a great resemblance, and which, in the eye of a Mineralogist, are little else than varieties of it.

Klaproth's analysis gives in an hundred parts.

Tellurium	92·55
Iron	7·20
Gold	0·25

The primitive crystal has been discovered by Bournon to be a rectangular prism with a square base, the height of which to its breadth is as seven to ten. The prism is modified upon all its edges and angles, producing a series of crystals, some of which are peculiar to one, and some to another alloy of Tellurium. I have taken two belonging to the present from the Count de Bournon's figures attached to his Catalogue*.

The specimen figured is in the Cabinet of Wilson Lowry, Esq. whose kindness I have before had the pleasure to acknowledge.

* Some of the modifications resemble such as are usually produced by a cube, but the angles are different; the octaëdron, for instance, is more acute than the regular one resulting from the cube, as will be shown when I figure the variety in which it occurs. The incorrect descriptions of the crystals given by Haüy and most Authors, has probably arisen from their minuteness and the imperfection of the specimens examined.

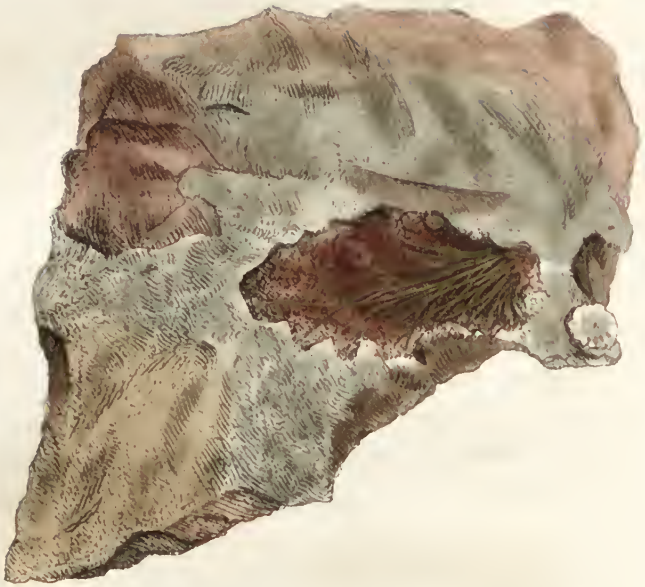


Fig. 1. Skull of J. ...

TAB. LXV.

WISMUTUM sulphureum cupreo-plumbiferum.

Compound Sulphuret of Bismuth, or Cupreoplumbiferous Sulphuret of Bismuth.

SYN. Bismuth sulphuré plumbo-cuprifère. *Haiiy, Tabl. 105.*

Nadelerz. *Werner. Bournon 379. Lucas, Tabl. 2. 435.*

Needle-ore. *Jameson 2. 522. Thompson 4. 537.*

MR. PATRIN, in the year 1786, discovered the present Mineral in Catharineburg, in Siberia. It had been considered as Native Chromium by several eminent Mineralogists, until Mr. John published a memoir, proving that it was a Sulphuret of Bismuth, containing Lead and Copper in considerable quantities, as the analysis shows; its external characters, united with its composition, appear to me to mark it as a distinct species from the pure Sulphuret of Bismuth. The surface of the fresh fracture is very brilliant, of a colour generally resembling polished steel, but rather whiter, sometimes it is rather redder, as if it then contained more Copper: it is soon tarnished, becoming at first yellow, then green, and at length blue and purple. The crystals are long prisms, much striated upon their surfaces, they are described by Karsten as six-sided, I have observed

one or two decidedly so, but not regular hexaëdral prisms, the rounding of the faces and the striae prevent any very nice decision, otherwise the supposition of the Count de Bournon, that the hexaëdral prism spoken of by Karsten is derived from an obtuse tetraëdral one, which the Count considers as the form of the needles of which the prisms appear generally to be composed, might happily be confirmed. The crystals that are closely enveloped in the Quartz, are dull grey upon the surface, but those that are exposed to the action of air or moisture, are covered with a dull green crust; when much exposed the crust becomes very thick and yellow externally: it consists of the metals in the state of Oxyde. Before the blow-pipe it is easily melted; a great portion evaporates, and a globule of Lead, encrusted with Oxyde of Copper, remains. The crystals frequently contain grains of Gold; in the specimen I have figured some of the crystals are partially covered by a laminated substance like Galæna. Spec. Grav. 6·125.

Analysis.

Bismuth	43·20
Lead	24·32
Copper	12·10
Nickel	1·58
Tellurium	1·32
Sulphur	11·58
Loss (Oxygenated Sulphur?) .	5·90
	<hr/>
	100·00
	<hr/>



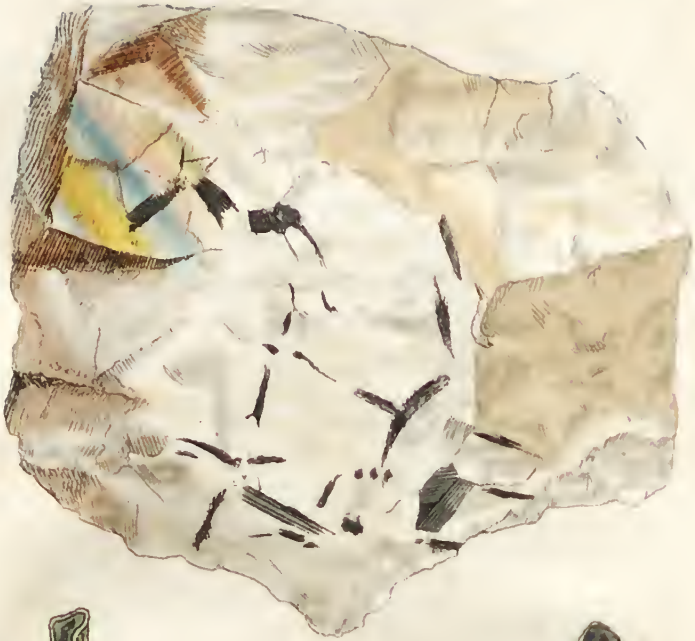


Fig. 1813 - attached by gelatinous matter

TAB. LXVI.

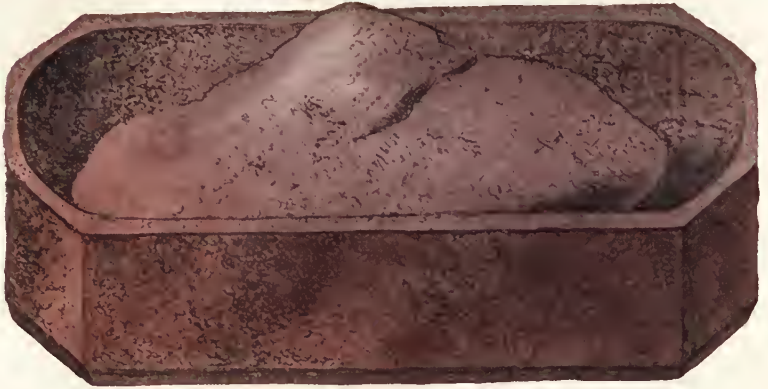
NICCOLUM nativum.

Native Nickel.

SYN. Nickel natif. *Haiiy, Tableau 84. Lucas, Tabl.*
 2. 327. *Bournon, 389.*
 Gediegen Nickel. *Klaproth.*

SEVERAL varieties of capillary Pyrites have been spoken of by Mineralogists, along with which the Mineral now under consideration had been confounded, until Klaproth proved it to be Nickel alloyed with a small portion only of Cobalt and Arsenic; since then it has been considered as Native Nickel; it is in extremely fine capillary crystals laying across hollows in a dark red Jasper, the hollows are lined with crystals of Quartz*. Its colour and pliability distinguish it from Pyrites, which is yellower and brittle. It is infusible by the blow-pipe. It is found at Annaberg, Schneeberg, and Johann-Georgen-stadt in Saxony, in veins in the primitive mountains, and in the Transition mountains of Andreasberg. Our specimen is, I believe, from Johann-Georgen-stadt in Saxony. It is a rare Mineral.

* In our specimen the Nickel is accompanied by Pyrites in dodecaëdrons with pentagonal faces.



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TAB. LXVII.

SILEX lepidolithus.

Lepidolite.

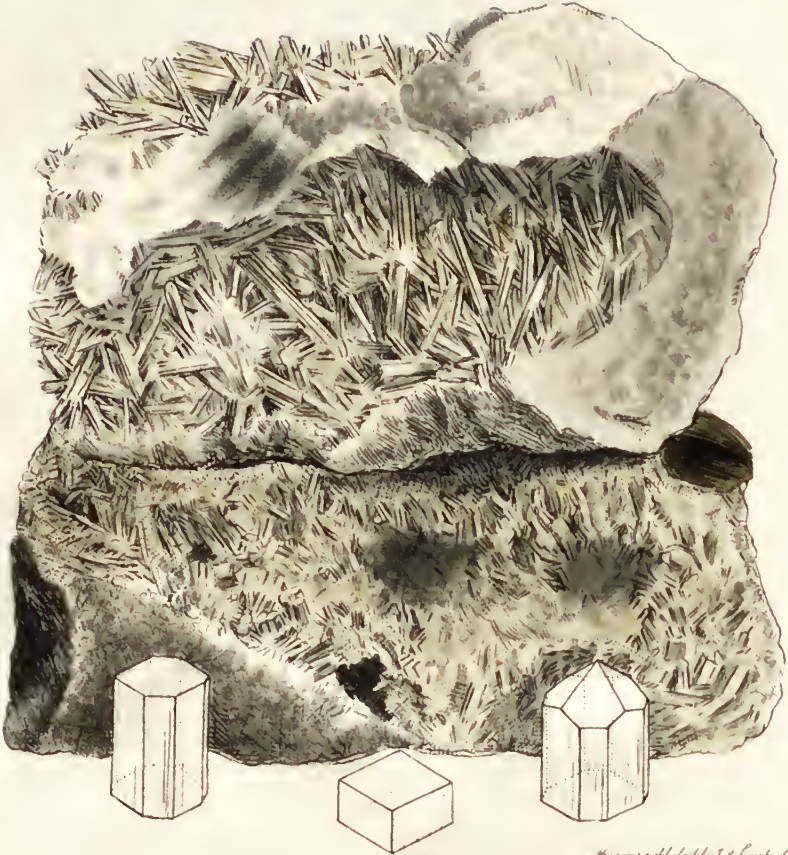
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- SYN. Lepidolithe. *Haiüy, Traité 4. 375. Tabl. 64.*
 Lepidolith. *Emmerl. 3. 324. Werner.*
 Lepidolite. *Kirw. 1. 208.*
 Lepidolide. *Bourn. Catal. III.*
-

THIS substance, the more common variety of which much resembles Avanturin, must not, however, be confounded with it, as it may easily be known by its inferior hardness. The variety in large plates so nearly resembles Mica externally, that it is no wonder if it be mistaken for it, unless its flexibility be tried. It is therefore our business to show it as distinctly as possible. The Mica-like illinations, if I may so call them, are only the shining faces of the laminae of its crystals seen through the transparent sides; their being heaped together in a mass causes them to reflect the light in every direction. The upper figure is a fine variety, displaying the crystals and showing the shining surfaces in large laminae very like Mica, and indicates angles of rhomboidal and hexaëdral plates, nearly approaching to regularity, but none so perfectly defined as to determine the measure (which perhaps may prove an useful character). The Count de Bournon describes the primitive form to be a regular hexaëdral prism, whose terminal planes are perpendicular to the sides. It has no elasticity like Mica, and breaks in less regular plates and more splintery fragments. It is scarcely so hard as common crystallized Carbonate of Lime, being more easily scratched by a knife: its lustre is very considerable, and its trans-

parency rather greater than that usual to Mica. It is more fusible than Mica, as the Count de Bourbon observes with the following illustration. "Mica is, though difficultly, fusible by the blow-pipe, and gives a more or less brown or black glass; but the flame of the blow-pipe will scarcely have touched the Lepidolite before it melts with frothing, and gives a perfectly colourless glass. I have often melted Lepidolite by putting it in the fire, and upon taking it out again it run, producing fine capillary fibres of glass, analogous to that produced in the Isle of Bourbon." The more compact variety showing the small glittering facets is cut into various fanciful forms; I have a snuff-box, the bottom of which is in one piece. Having the means of representing it pretty accurately, I have added it to the plate. The whole is neat, and so thin that it has some appearance of being rather tougher than might have been expected for so soft a substance, which may depend on the sort of entanglement and varied direction of the lamina; it is semitransparent. Snuff-boxes and other trinkets made of this substance, ought to be kept in cases to preserve them from scratches, or being rubbed and getting rough.

The upper specimen showing the large laminae is rare, and is in the very choice collection of Mr. Heuland, who generously allows me to make this public use of it. Within the snuff-box, at the bottom, is a rough fragment of the more compact kind.

	Analysis by Klaproth.		by Vauquelin.
Silex	54.50	. . . . .	54
Alumine	38.25	. . . . .	20
Potash	4.	. . . . .	18
Fluate of Lime . . . . .		. . . . .	4
Oxyde of Iron and Manganese	0.75	. . . . .
Oxyde of Manganese . . . . .		. . . . .	3
Water and Loss	2.50	. . . . .
Oxyde of Iron . . . . .		. . . . .	1



This was published by J. G. Smith, London

TAB. LXVIII.

SILEX Wernerii.

Wernerite, Scapolite.

-
- SYN. Wernérite. *Haiiy, Traité 2. 121. Tabl. 45.*
Bourn. Catal. 98.
 Arktizit. *Werner.*
 Wernerit. *Karsten.*
 Paranthine. *Haiiy, Tabl. 45.*
 Scapolith. *Werner & Karsten.*
 Rapidolith. *Abildgaard.*
 Wernerite or Arctizite. *Jameson 2. 548.*
 Micarelle. *Abildgaard, Traité 4. 483.*
-

THIS substance, named in honour of the celebrated Werner, whose great abilities and practice in the distinction of formations or geological data by the Neptunian System, have rendered him justly esteemed by all Mineralogists, is another new discovery in Mineralogy since my endeavour to elucidate the subject. It was first described and named Wernerite by Dandrada. My figure is taken from a specimen brought from near Arendal in Norway; it has also been found in other arctic countries, wherefore Werner called it Arctizite. I have not seen authentic specimens of Scapolite, but from what I can collect, the opinion of Weimar, which has been followed by several Mineralogists,

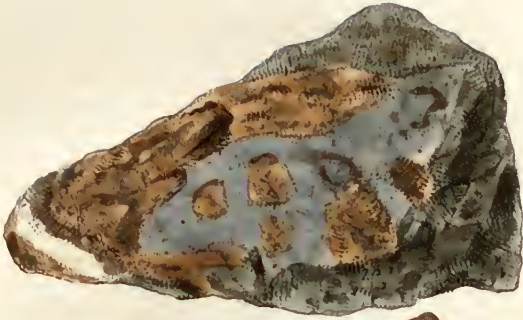
that Wernerite and Scapolite ought to be united as varieties of the same species, will prove correct. The Scapolite, when in crystals, exhibits the same laminated structure more distinctly. Wernerite is fusible with intumescence before the blow-pipe, and phosphorescent when heated in powder; two characters which distinguish it from most other minerals that have a similarly formed crystal. The primitive form is a rectangular prism, whose lateral faces may all be obtained with equal facility, and are equally more shining than the cross fracture, which is rather splintery; the external surface is shining, rather irregular, and rounded at the edges: its common crystal is an eight-sided prism, with an obtuse four-sided pyramid. It is accompanied by Quartz, Hornblende, Carbonate of Lime, Mica, &c

Analysis of the green crystallized Wernerite by John.

Silex	40
Alumine	34
Lime	16
Oxyde of Iron	8
Oxyde of Manganese	1.5
	<hr/>
	99.5
	<hr/>

Of the white amorphous variety.

Silex	51
Alumine	33
Lime	10.45
Oxyde of Iron	3.50
Oxyde of Manganese	1.45
	<hr/>
	99.40
	<hr/>



Num. 1022. Fossilium by J. S. Edwards.

TAB. LXIX.

NICCOLUM arseniferum.

Arsenical Nickel.

-
- SYN. Nickel Arsenical. *Haiiy, Traité 3. 513. Tabl. 84.*
 Copper-Nickel. *Jameson 2. 448.*
 Kupfernichel. *Werner, &c. Emmerl. 2. 513.*
 Sulphurated Nickel. *Kirw. 2. 286.*
-

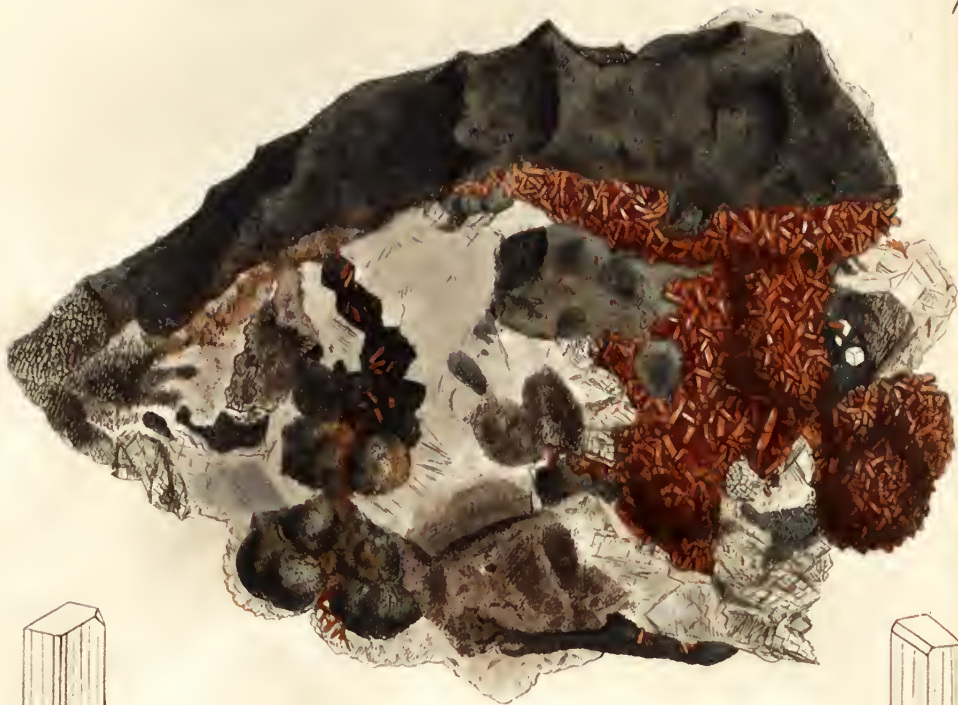
NOT having any where met with a Cornish specimen of Arsenical Nickel, I am induced to doubt whether it be ever found in that country, and therefore exhibit a figure of it here. It is by no means a rare mineral on the Continent, having been found plentifully in several parts of Germany, in France, Spain, Sweden, Siberia, and Norway; it is generally accompanied by Arsenical Cobalt, which it often contains in combination, and thus, as Werner suspects, it may sometimes pass into Grey Cobalt. Haiiy observes that the colour, together with the dull rather rough surface of the fracture, offers a character that hitherto appears to be peculiar to this substance, whence he considers it as one of those minerals that may be most easily recognized when they are met with a second time. I have endeavoured to give this peculiar appearance to the figure, and hope I have not altogether failed. The colour, if I may be allowed the expression, is a pale yellow grey, to which a warm glow

is added by a considerable admixture of red*. Lustre metallic. Fracture between splintery and conchoidal, with a finely granulated surface; it is brittle, but requires a smart blow to break it. Mr. Sage found in 100 parts,

75 Nickel,
22 Arsenic,
2 Sulphur;

from which analysis I suppose his specimen to have been very pure, as Bergman had found Iron and Cobalt besides. It is the ore from which Nickel is obtained for use: specimens of it are often found decorated by the green oxyde produced by its decomposition. Natural crystals have not been found, but artificial crystals are described by the Count de Bournon.

* I cannot call it a mixture of yellow and red, for that would be much too bright, like Chromate of Lead; neither is it so red nor so bright as Copper.



From a 1852 publication by J. A. Smith, London

TAB. LXX.

ARSENICUM sulphureum.

Red Sulphuret of Arsenic. Realgar.

SYN. Arsenic sulphuré rouge. *Hallé, Traité 4. 228.*
Tabl. 109.

Roths-rauschgelb. *Emmerl. 2. 563. Werner, &c.*

Realgar. *Kirw. 2. 261.*

Red Orpiment. *Jameson 2. 477.*

THE two Sulphurets of Arsenic have long been considered as varieties of one species, for Chemists have been at variance about their composition; some considering them to differ in the quantity of Sulphur; others suppose that Oxygen is the agent that distinguishes them; while some think that the difference lies in the state of aggregation, and that this is produced by fusion; that the yellow Sulphuret becomes red when melted is certain, it also loses its lamellar structure, but its *powder*, unless it have been heated long, is still yellow; the same takes place with pure Sulphur. The powder of Realgar, whether native or artificial, is always orange, and in direct combinations of Sulphur and metallic Arsenic, made by heat, the powder is of a deeper and redder orange, in proportion as the quantity of Arsenic is increased, from which I am inclined to adopt the old opinion that the red Sulphuret contains less Sulphur than

the yellow, wherefore I shall call the yellow, Super-Sulphuret, and the red only Sulphuret, of Arsenic.

Realgar, or Sulphuret of Arsenic, is generally massive, but when crystallized it is in rhomboidal prisms, with from one to eight terminating faces. De Lisle, and Haiiy after him, consider four of the terminal planes as primitive, and corresponding with the faces of an octaëdron, exactly similar to that of Sulphur; but the Count de Bournon calls the lateral planes primitive: I will not pretend to decide between such high authorities. The vertical edges of the prism are often bevilled or truncated.

In a heat below redness it is almost entirely volatilized with a blue flame and white smoke; a character, which, joined to its red colour and orange powder, will distinguish it from all other minerals in whatever form it may occur. Its crystals appear to be produced by the action of the vapour of Sulphur upon the surface of Native Arsenic, upon which they very commonly rest. In the neighbourhood of Volcanoes much is produced in amorphous masses sublimed along with the Sulphur, and taking some of the same external forms as if it had run among stones. It often colours the Muriate of Ammonia and other products of sublimation in the same situations.

The specimen I have delineated is from Nagyag. I have borrowed it from Mr. Heuland's extensive private collection. The principal mass is Native Arsenic penetrating a reddish Hornstone, accompanied by minute crystals of Quartz, and a considerable quantity of lenticular Carbonate of Lime.

Bergman's analysis of Native Realgar gave 90 of Arsenic and 10 of Sulphur. Kirwan's, 84 Arsenic and 16 Sulphur. Westrumb's, 80 Arsenic and 20 Sulphur. Thenard found in the Realgar of Commerce, 75 Arsenic and 25 Sulphur.



Var. cristallinella, a Gypsumulca

TAB. LXXI.

ARSENICUM super-sulphureum.

Super-sulphuret of Arsenic; Orpiment.

SYN. Arsenic sulfuré jaune. *Haiiy, Traité 4. 234.*
Tabl. 109.

Gelbes Rauschgelb. *Emmerl. 2. 559. Werner.*
Orpiment. *Kirw. 2. 260.*

Yellow Orpiment. *Jameson 2. 481.*

THIS is one of the most beautiful of Minerals, and at the same time one of the most difficult to imitate; its lustre is very great; its transparency too is great, whence the reflection from between the laminae is transmitted in a way that gives it a semimetallic appearance wholly beyond the feeble powers of the Artist to give an idea of.

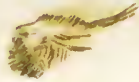
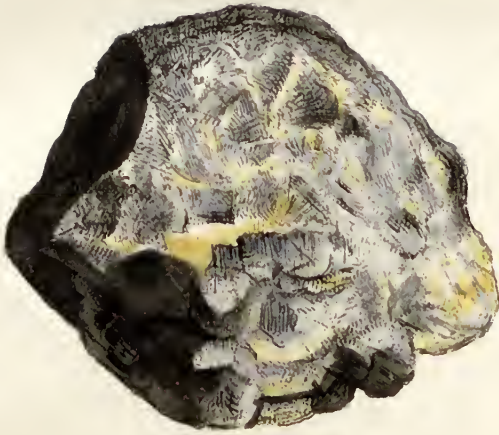
The colour I consider as a perfect yellow when seen in the mass; if it be transparent to a considerable depth, the intensity of the colour gives it a redness approaching to orange, I have observed the same in Gumboge and other bright yellows; indeed the colour is so clear that the least stain is noticed by every observer. The *Realgar* in crystals I consider as a pure red, but its powder is orange; thus the Native Orpiment and Realgar may be quoted as examples of two primitive colours, and the Realgar in powder as an example of orange. The artificial Orpiment has always an orange tinge, and is variable, and King's yellow, which

is sometimes free from the red, is too pale as well as too variable to be considered a standard for yellow. When pure it is the same as the Native Orpiment in powder, which is much paler than when in the mass*.

Native Orpiment is found in Hungary, Transylvania, China, and several other places; it is sometimes accompanied by Realgar, Arsenical Iron, Iron Pyrites, Quartz, &c. In the specimen figured it is accompanied by granular Iron Pyrites. It adorns Mr. Heuland's collection.

Thenard found this substance to contain, Arsenic 57, and Sulphur 43. Perhaps future experiments upon crystallized specimens of Realgar, and pure ones of Orpiment, may prove one to contain twice the quantity of Sulphur that the other does.

* The different appearances of Orpiment and Realgar when in powder, makes them unfit to be used as standard primitives, of course I did not refer to them in my Elucidation of Colours.



... published by J. P. Corby & Co.

TAB. LXXII.

PLUMBUM arsenitum.

Arsenite of Lead.

SYN. Plomb arsenié. *Bourn. Catal.* 349.

Plomb arsenié aciculaire et filamenteux.

Haüy, Traité 3. 465.

AT present this is an extremely rare mineral, and almost unknown in England. The specimen copied is from Mr. Heuland's splendid collection, it came from St. Prix in the department of the Saône et Loire, where it has been recently discovered by the Citizen Champeaux. It is in matted fibres of a pale gold yellow colour, upon decomposing Galæna mixed with purple Fluor; it is soft, flexible, but not elastic, and dull on the surface. Its novelty makes it interesting, and were it not so different in appearance from other minerals, I should have suspected that it had passed unnoticed, and have hoped when once pointed out it would be discovered in various places, perhaps even in England.

