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PATERNOSTER-ROW.

1823.

Or,

Sulphate of iron	43·84
Sulphate of alumina	12·88
Water	43·28
	100·00

Article IX.

On the Crystalline Forms of Artificial Salts. By H. J. Brooke, Esq. FRS.

(To the Editor of the *Annals of Philosophy.*)

Dear Sir,

The introductory volume to the Science of Crystallography on which I have been for several months engaged, having passed through the press, I propose now to resume an examination of the crystalline forms of the artificial salts, a subject which has been hitherto much neglected, and of which, during the last two years, we have frequently spoken.

As an evidence of the neglect with which the crystallographical characters of the productions of the laboratory have been treated, I may refer to the recent edition of Dr. Henry's Chemistry; and I do this, not to impeach in the slightest degree the value of that work, but merely to remark, that instances of imperfect and useless descriptions of crystalline forms are admitted into volumes otherwise of great worth.

The crystalline characters of the artificial salts will, if strictly attended to, frequently assist the researches of the chemist.

An examination of the forms, and measurements of the angles of the crystalline deposits from his experimental processes, will immediately inform him whether his experiments have produced such results as he had anticipated, or whether his compounds are new and unexpected. For this purpose, however, the reflective goniometer must be added to his other implements, and he will not fail soon to discover its value in reference to his pursuits.

But to be provided with the means of effectually applying this instrument, he must be acquainted with the forms, and the measurements of the angles of all the known crystals of those salts. During the last summer, I measured a considerable number of these, most of which I have to thank you for procuring for me, and for some others I am indebted to the kindness of Mr. Teschemacher. Several I also prepared myself; and I shall still feel obliged to you, or to any of your friends, for measurable crystals of any of these artificial compounds.

With a view to render the descriptions of these as simple and as practical as possible, it is not my intention to consider them mathematically, and in relation to the theory of decrements. The information the chemist requires to be possessed of concerning the crystals which may be formed during his operations, is the character of their simplest or primary forms;* their cleavages where they can be given; their modified or secondary forms; the angles at which their planes severally incline to each other; with occasional notices on their predominating characters, and on any peculiar habitudes which may be observed to belong to particular crystals.

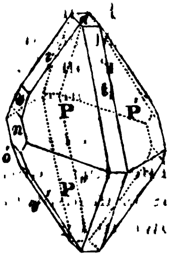
Descriptions of several of the artificial salts, founded on these characters, will form the substance of this and some following communications. These will be accompanied by figures which are not drawn with geometrical truth, and are intended merely as diagrams to which the measurements of the crystals may be more conveniently referred, and which will, at the same time, convey a general idea of the form of the substance described.

Crystals deposited from the Oil of Cubebs.

Of the chemical nature of the substance of these crystals, which I received from Mr. Teschemacher, I know nothing.

The predominating form of the crystals is that of an octahedron with a rhombic base, as shown in fig. 1, measuring as follows:

Fig. 1.



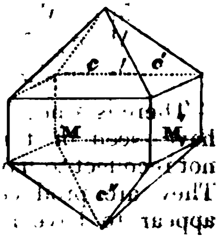
P on P′ about	115°	45′
P over plane *v*	74	56
P on P″	145	40
n on *o*	165	0
n on *v*	151	0
n on *a*	90	0

Arseniate of Potash.

The primary form of this substance may be regarded as a right square prism.

In the crystals I have measured, the terminal edges of the prism are replaced, as seen in fig. 2, measuring as follows:

Fig. 2.



M on *c* / M′ on *c′*	133°	15′
c on *c′*	122	2

The predominating form of most of the

* The nomenclature of forms, and the letters placed on the crystals, are those which are used in the introductory volume already alluded to.

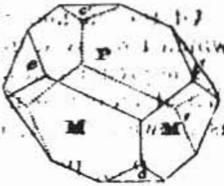
Fig. 3.

crystals I have seen is exhibited in fig. 3, where the plane M′ is so much less than M as to confer on the crystal an appearance of the base being rectangular, but not square; thus affording one of the numerous instances which will be found among crystals, of deviation from regularity and symmetry in their natural forms, by a disproportionate extension of some of their planes, a character which would frequently lead to an inaccurate determination of their forms, if the goniometer were not resorted to. But the goniometer will generally correct the erroneous conclusion derived from the appearance of the crystal; as it has done in this instance, by showing that M on *c*, and M′ on *c*′, measure alike, which it is highly improbable they should do if the base of the prism were not square.

Chlorate of Potash.

The primary form is an oblique rhombic prism, some of the crystals being modified as in fig. 4. The cleavage is easy parallel to the planes M and M′, and the cleavage planes are brilliant, but the only crystals I have are too thin to obtain a cleavage plane parallel to P. The measurements are as follows:

Fig. 4.

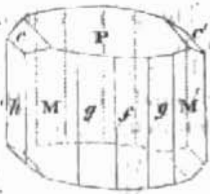


P on M, or M′ . . .	105°	30′
M on M′	104	0
P on *c*′	106	45 dull
P on *c*, or *e*′	129	45

Tartrate of Potash and Soda.—Rochelle Salt.

The form derived from cleavage is a right rhombic prism. This is modified in the crystals measured, as shown in fig. 5.

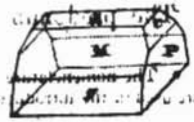
Fig. 5.



P on M, or M′	90°	0′
P on *c**	138	50
M on M′.	100	0
M on *g* / M′ on *g*′	163	0

There is a peculiarity in all the crystals I have seen of this substance which I do not recollect to have observed in any others. They are produced nearly in halves, and appear to have rested or been formed on planes which would have passed through the middle of the entire crystal. One of these natural segments is shown in fig. 6. In

Fig 6.



* *c* is a dull plane, and occurs on only one of the crystals out of several that I have seen.

some of these, the front half of fig. 5 is the portion produced; the plane *f* being then uppermost. In some of the segments, however, there is a slight deviation from this exactness of position of the planes *f* or *h*.

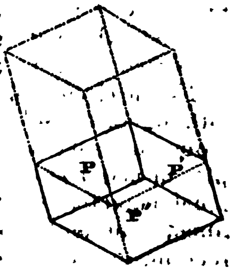
Nitrate of Soda.

The primary form is an obtuse rhomboid.

P on P′......................	106° 30′
P on P″......................	73 30

and there are not any modifications on the crystals measured. Some of these are lengthened into apparently oblique rhombic prisms, as shown by the produced dotted lines in fig. 7, but this disproportionate extension of some of the primary planes has been already stated not to be unfrequent among crystals.

Fig. 7



I am, dear Sir, yours truly,

H. J. Brooke.

I have just learned that Mr. Levy has very recently taken up this subject, and has measured and determined with a view to publication, the forms of many of the artificial crystals, without being aware of my having previously occupied myself in a similar manner. He has proceeded mathematically, and will probably still give his results to the public; and there can be no doubt that he will confer an additional interest on the inquiry.

Article X.

Astronomical Observations, 1823. By Col. Beaufoy, FRS.

Bushey Heath, near Stanmore.

Latitude 51° 37′ 44·3″ North. Longitude West in time 1′ 20·93″.

April 29. Emersion of Jupiter's first satellite	8h	19′	43″	Mean Time at Bushey.
	8	21	04	Mean Time at Greenwich.
May 6. Emersion of Jupiter's second satellite	8	26	32	Mean Time at Bushey.
	8	27	53	Mean Time at Greenwich.

These, however, are by no means so numerous or striking as those afforded by the greywacke of North Devon, a circumstance apparently adverse to the theory which would attribute these singular configurations to the agency of heat; for we might certainly expect that the killas, which is easily affected by that agent, near as it is to the central granite, and traversed in all directions by various dykes and veins, would have exhibited more frequent traces of this nature than the refractory and unbending sandstones. But this is a question of mere hypothesis. This portion of the *inferior slate* does not (so far as my knowledge extends) contain any *imbedded* minerals; near Camelford, and at some other spots, I have observed in it small contemporaneous veins or nests (vugs, as they are provincially termed) of crystallized felspar and chlorite. Most of its varieties are readily fusible.

(*To be continued.*)

ARTICLE IX.

On the Crystalline Forms of Artificial Salts. By H. J. Brooke, Esq. FRS.

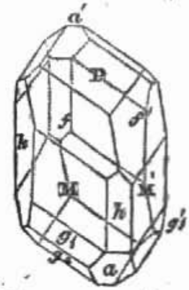
(*Continued from* vol. v. p. 452.)

IN my last communication I noticed the irregularity that frequently occurs in the forms of crystals, whether natural or produced by art, occasioned by an enlargement of some of the planes, and a consequent comparative diminution of others. This irregular character may be said to be almost general, and very frequently might lead to an erroneous determination of the true forms of crystals, if we do not attend sufficiently to the positions of their planes, to their cleavages, and to the measurements of their angles. Another circumstance will also tend to mislead us with regard to the forms of crystals, when compared with the drawings by which they are represented: this is the manner of their attachment to the mass to which they are united; sometimes they are attached by a *lateral* edge or plane of the figure exhibited in the drawing, and sometimes by the *upper* summit; in which latter case, the crystal would appear to be inverted, and the order of the lateral planes of several of the classes of prisms, when observed from left to right, would be reversed.

The measurement of corresponding planes on different crystals will frequently differ more than half a degree, and may occasion a difficulty in determining particular planes by measurement, when they meet at nearly the same angle. The angles given here are generally the mean of a considerable number of measurements.

Acetate of Soda.

The primary form deduced from cleavage is *an oblique rhombic prism*, the cleavages being parallel to the planes P, M, and M′, of the annexed figure. Some or all of the secondary planes on that figure occur on many of the crystals. On some crystals only the planes *k*, or *k* and *f*, accompany the primary planes, and on others only the planes *a* and *g*, with the addition sometimes of the planes *h*.



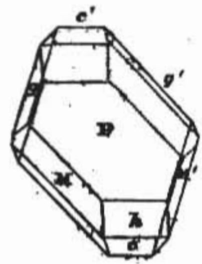
All the planes except *f* have been measured by the reflective goniometer.

P on M or M′	104° 25′
P on *f*	136 nearly
P on *a′*	103 35
M on M′	84 30
M on *k*	137 45
M on *h*	132 15
M on g_1	156 54
M on g_2	135 50

Acetate of Zinc.

The crystals are very thin, flexible, and soft, and fissile parallel to P, but do not afford any other measurable cleavage planes.

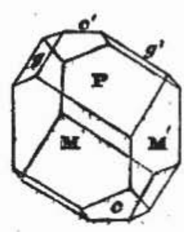
The primary form indicated by the natural planes of the crystals is *an oblique rhombic prism*, measuring as follows:



P on M, or M′	112° 28′
M on M′	67 24
P on *h*	133 30
P on *c*	100 00
P on *c′*	80 00
P on *g*, or *g′*	75 30

Binacetate of Copper.

The primary form developed by cleavage is *an oblique rhombic prism*, the cleavages being parallel to the planes P, M, and M′, of the subjoined figure; the secondary planes *c* and *g* are the only ones I have observed on the crystals, which are sometimes produced in pairs, and united by the planes *c*, in such a manner as to exhibit a second entire plane P, joined by an acute angle to the lower acute angle of that which



is exhibited in front of the figure, but inverted in its position so as to be terminated at its lower extremity by the planes *g* and *c*.

P on M, or M′........	105°	30′
M on M′.............	72	00
P on *c*′...............	119	4
P on *g*, or *g*′..........	131	45

The planes M and M′ are generally curved, and the cleavage planes parallel to these partake also of the same character.

Sulphate of Magnesia.

The primary form of this substance has been given by the Abbé Haüy as a *right prism* with a *square base*. But from the measurement of several crystals, and from the character of the secondary forms of some of those, the primary may be regarded as a *right prism* with a *rhombic base*, whose angles are 90° 30′ and 89° 30′.

I have found only one cleavage, which is parallel to the short diagonal of the prism, and consequently to the plane *h* of the accompanying figures.

Fig. 1.

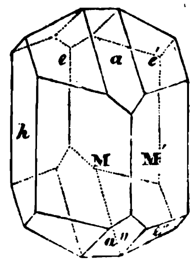


Fig. 1 represents a crystal of a form which frequently occurs, and of which the following are the measurements :

M on M′........	90°	30′
M on *h*.........	134	45
M on *e*.........	129	00
a on *a*′.........	120	nearly.

Fig. 2.

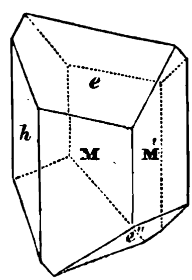


Fig. 2 represents a form under which the crystals also frequently appear. In this form, only two of the four planes *e* are seen on each summit, and alternating in position as shown in the figure.

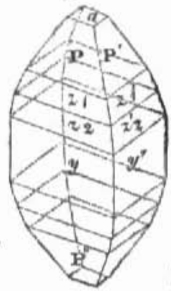
On some of the crystals, however, which resemble this figure, the two other planes *e* may be perceived, but they are very minute.

Tartrate of Potash and Antimony—Emetic Tartar.

The general character of the crystals of this compound is that of an *octahedron with a rhombic base*. I cannot discover more than one distinct cleavage, which is parallel to the plane *a* of the accompanying figure.

The following are the nearest to coinciding measurements taken on several crystals:

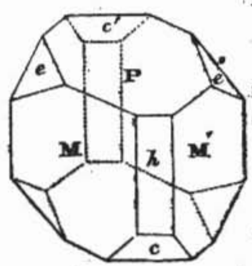
P on P′	108° 16′
P over the edge on the left.	104 15
P on z_1	166 40
P on z_2	165 40 nearly
a on P, or P′.	122 00
a o n*y*	90 00



The planes *z* and *y* are generally striated, and afford imperfect reflections; and the crystals are frequently elongated in the direction of one of the edges of the base, so that the plane P terminates in an *edge* instead of a *point*, an irregularity of figure common to all the classes of octahedrons.

Sulphate of Potash and Magnesia.

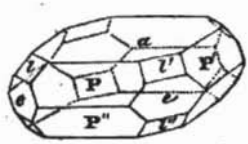
I have not found any cleavage of these crystals, but the predominating form, and which may be regarded as the primary, is *an oblique rhombic prism*, modified by the planes *c*, *e*, and *h*, and measuring as follows:



L on M, or M′	102° 20′
M on M′.	108 45
P on *c*′	116 45
P on *e*, or *e*′	154 30
P on *h*.	105 8

Ferroprussiate of Potash.

The crystals are soft, flexible, and very fissile parallel to the plane P of the annexed figure, and there is not any distinct cleavage that I have been able to perceive in any other direction. There are, however, in some crystals, apparent natural joints parallel to the planes P of this figure; these would give *an octahedron* for the primary form, which, from the angles of the secondary planes, is found to have a square base. The most distinct measurements are the

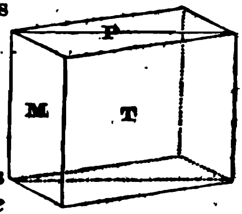


P on P″	137° 00′
P or P′ on *a*	111 30
a on *l*.	119 9
a on *e*.	90 0
e on *e*′.	90 0

Bicarbonate of Potash.

The primary form of this substance is *a right oblique-angled prism,* which is not readily traced in the secondary crystals, but may be derived from cleavage, and is shown in fig. 1. There is also a cleavage parallel to a plane passing through the diagonals marked on the terminal planes.

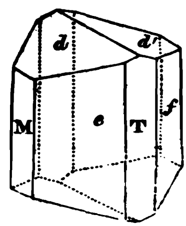
Fig. 1.



P on M, or T	90°	00′
M on the diagonal plane	53	15
M on T.	103	25

The planes which appear on the crystals are represented in fig. 2; but the planes *e* are sometimes very disproportionately extended, so as nearly to efface T and *f*, giving to the crystals the character of another primary form.

Fig. 2.



The planes T do not commonly occur on the crystals, and without these they nearly resemble a secondary form of the *right rhombic prism;* they may, however, be distinguished by the unequal inclination of M on the two adjacent planes. On cleaving or otherwise breaking the crystal, water may be observed between the laminæ, which probably occasions the measurements on the cleavage planes not accurately to agree.

This is also the case with many other of the factitious salts.

M on plane parallel to *f*	127°	35′
M on *e*	126	45
T on *e*	156	50
T on *f*.	128	50
e on *f*	105	40
M on *d*	111	00
d on *d′*.	138	00

Cyanuret of Mercury.

I have received for examination from Mr. Cooper, of Lambeth, some crystals obtained from oil of bitter almonds by digesting it with red oxide of mercury.

Mr. C. has also supplied me with some crystals of cyanuret of mercury, procured in the ordinary way by boiling the red oxide with prussian blue. The crystals derived from both of these sources correspond perfectly in their crystalline forms.

I have not succeeded in cleaving them, but from their measurements and modifications, a right square prism may be regarded as the primary form.

Fig. 1.

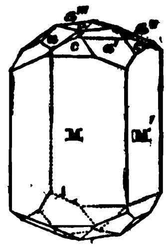
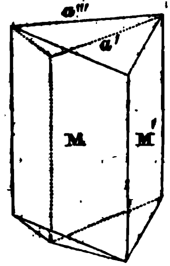


Fig. 1 represents the prism with the modifying planes which I have observed on two or three crystals, and on these only, out of a considerable number that I have examined.

Their general form is that shown in fig. 2, in which two of the planes *a* alternately efface all the other terminal planes at the two extremities of the prism. There are also many crystals which nearly resemble fig. 2, but in which the planes *a* and *a''* are visible, although very minute. This irregularity of form is of the same character as has been already noticed as belonging to sulphate of magnesia. The measured angles are as follows:

Fig. 2.

a'''



M on M'............	90°	00'
c on M *c'* on M' }	132	45
a on M *a'* on M, or M' }	112	40
a' on *a'''*.............	114	00

Article X.

Astronomical Observations, 1823.
By Col. Beaufoy, FRS.

Bushey Heath, near Stanmore.

Latitude 51° 37' 44·8" North. Longitude West in time 1' 20·93".

May 18. Emersion of θ Leonis from the moon .... 13h 41' 18" Siderial Time.

Article VI.

On the Crystalline Forms of Artificial Salts. By H. J. Brooke, Esq. FRS.

(*Continued from* p. 43.)

The crystallographical characters of natural and artificial productions appear to have received less general attention than the other branches of science connected with mineralogy. I have already alluded to the inadequate descriptions of crystalline forms contained in Dr. Henry's excellent work on Chemistry; and I may refer to another recent and valuable publication which happens to lie before me, Dr. Ure's Dictionary, for abundant evidence of the neglect which the crystallographical character has experienced among chemists of the first rank.

Crystalline forms which are incompatible with each other are frequently quoted in these works as belonging to the same substance; and sometimes those forms are described in terms to which no very definite meaning can be attached; as where *Andalusite* is said, in Dr. Ure's work, to crystallize occasionally in *rectangular four-sided prisms verging on rhomboids.*

The crystalline form of morphia is given in Dr. Henry's work, on the authority of three different chemists, as a *rectangular prism with a rhomboidal base;* as a *regular parallelopiped with oblique faces;* and as a *four-sided rectangular prism;* and Dr. Ure quotes the form given by Choulant, as a *double four-sided pyramid with square or rectangular bases.* The first of these forms is impossible, unless we suppose the base *oblique* to the axis of the prism, and then it is incompatible with the third and fourth. The second is not very intelligibly described. The last two are not incompatible with that which is given below.

If we inquire into the causes which have occasioned this neglect of a science, not really difficult in itself, we shall perhaps find that it is owing chiefly to the very profound manner in which it has been treated by the late Abbé Haüy, in whose hands the subject first assumed a strictly scientific form. His complicated analytical operations were probably repulsive to most readers, and so much so, that even in France there are scarcely, as I have been very recently informed by one of his friends, a dozen persons who have followed him in his researches.

Another cause of the little acquaintance which appears generally to exist with even the forms of crystals, may, perhaps, be traced to the nomenclature which the late Abbé established to designate them; by this they were presented to the reader as independent rather than as related forms, and the mind was thus led away from the consideration of their relations to each other, rather than assisted in comprehending them.

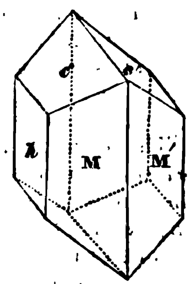
It is probable that the study of crystals will be much assisted by a general series of forms, serving as a type, with which all the crystals of different substances might be readily compared. This series I have attempted to supply in the volume already alluded to, which contains tables of all the modifications of which the simple crystalline forms are susceptible.

The letters placed on the figures which accompany these remarks correspond with those used in the tables here referred to; and by means of these, the reader may trace the relations of all the planes on these figures, to the simple primary form from which they are supposed theoretically to be derived. I have, therefore, omitted, in most instances, to give a figure of the primary form of the substances described.

Morphia.

These crystals are very minute, and have only one cleavage that I can perceive, parallel to the plane *h*. The primary form is a *right rhombic prism*, only the lateral planes of which appear on the crystals. For these I am indebted to Mr. R. Howard, of Stratford.

M on M′	127°	20′
M on *h*	116	20
h on *c*	132	20
c on *c*′	95	20



Tartaric Acid.

The crystals from which this form has been determined, were also given to me by Mr. R. Howard. I have not succeeded in cleaving them, but the primary form is *an oblique rhombic prism*. Fig. 1 exhibits the crystal as usually modified, with the planes symmetrically placed. Fig. 2 exhibits the same modified form, with the planes irregularly disposed as they appear in most of the crystals, the corresponding planes in both being marked with the same letters. This affords another instance of irregularity, which renders it not easy immediately to perceive the relations of the several planes to each other.

Fig. 1.

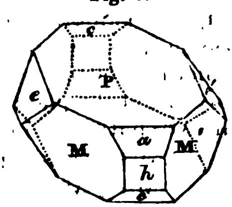
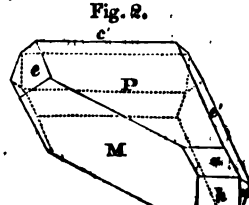


Fig. 2.

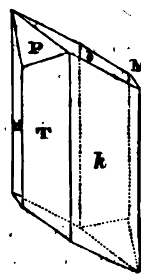


P on M, or M′	97°	10′
M on M′	88	30
P on *e*, or *e*′	128	15
P on *a*	134	50
P on *h*	100	47
P on *c*′	122	45

Gallic Acid.

These crystals, which were prepared by Mr. R. Phillips, and are very minute, have one distinct cleavage parallel to the plane P, and apparently another parallel to M.

The primary form is a *doubly oblique prism*, and the measurements are as follows:



P on M	95°	00′
P on T	125	20
M on T	84	00
T on *k*	160	00
k on M′	116	00
P on *b* about	116	00
b on M′ about	150	00

(*b* is a very dull plane.)

Oxalic Acid.

The primary form is *an oblique rhombic prism*. There are distinct cleavages parallel to the planes M and M′, but I have not observed any other. The crystals are usually attached by one of the lateral ends of the figure, in consequence of which the planes P, *a*, and *c*, appear like lateral planes of a prism, and M, M″, as its dihedral termination.

Fig. 1.

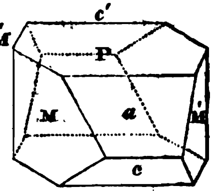
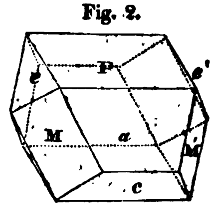


Fig. 1 exhibits the common form of the crystals; and fig. 2 a modified form which sometimes occurs, and not unfrequently with only one of the planes *e* apparent at the lateral extremity, the other not being visible.

Fig. 2.



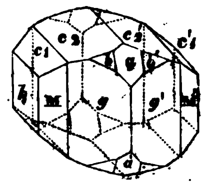
P on M, or M′	98°	30′
M on M′	63	5
P on *a*	129	20
P on *c*′	103	15
P on *e*, or *e*′	107	00

Citric Acid.

Cleaves readily parallel to the planes M, M′, and *h*, of the annexed figure, but I can observe no cleavage in any other direction.

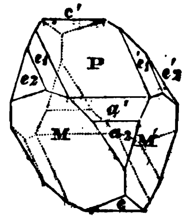
From the character of the secondary planes, the primary form is *a right rhombic prism*, and the measurements taken chiefly on a crystal I received from M. Teschemacher, are nearly those which follow. The crystals, however, so speedily lose their brilliant surfaces when exposed to the air, or even when inclosed in a bottle, that the measured angles of the secondary faces are less to be relied upon than those afforded by the cleavage planes.

M on M′.	101°	30′
M on *h*	129	15
M on *g*.	163	23
g on *g′*	134	45
a on *a′*	111	50
a on *b*.	161	30
h on c_1	139	45
h on c_2	121	15
c_1 on c_2.	161	30
c_2 on c'_2	117	30



*Sulphate of Iron.—Sulphate of Cobalt.**

The crystalline form assigned by the Abbé Haüy to sulphate of iron is *a rhomboid;* but it was, I believe, first observed by Dr. Wollaston, that its true form was *an oblique rhombic prism.* I do not find any published account of the ordinary figure of the crystals, or of the measurements of the planes; and as its form approaches very nearly to that of sulphate of cobalt, I am induced to give the measurements of both substances in reference to the annexed figure.



In sulphate of cobalt another plane sometimes appears as e_2, which measures about 124° with P. And in both these sulphates there are also other planes *a* and *e*, which occur on some of the crystals.

	Sulphate of iron.			Sulphate of cobalt.	
P on M, or M′.	99°	20′	. . . .	99°	45′
M on M′.	82	20	. . . .	82	20
P on e_1.	153	00	. . . .	152	45
P on e_2	123	55	. . . .	122	55
P on a_1.	159	00	. . . .	0	0
P on a_2	136	10	. . . .	135	55
P on *c′*	119	15	. . . .	118	53

Chromate of Potash.

The primary form has been determined from some very perfect and brilliant crystals which I have received from M. Teschemacher, and the measurements given below have very nearly coincided on several of these.

There is a distinct cleavage parallel to the plane *h*, but apparently in no other direction. The primary form inferred from that of the crystals, as shown in fig. 1, is *a right rhombic prism.*

* For this salt I am indebted to Mr. Cooper.

Fig. 1.

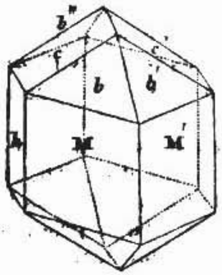


Fig. 2.

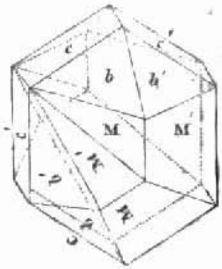


Fig. 2 represents one of the varieties of intersected crystals which occur very frequently among the single ones, the nature of which will be readily understood from the similar letters placed on the corresponding planes.

M on M′.	107°	26′
M on b } M′ on b' }	133	52
M on h.	126	17
h on c	119	43
c on c'.	120	34
c on the lateral plane		
c' fig. 2	119	43

Article VII.

On the Constitution and Mode of Action of Volcanoes, in different Parts of the Earth. By Alexander Von Humboldt.*

When we consider the influence which scientific travels into distant regions, and a more extended geographical knowledge, have for some centuries past exerted upon the study of nature, we soon discover how this influence has varied according to the objects of inquiry, which have been, on the one hand, the forms of the organic world, and, on the other, the inanimate formation of the earth;—the knowledge of rocks, their relative ages, and origin. Different forms of plants and animals enliven the earth in every zone, as well in the plains, where the heat of the atmosphere is determined by the geographical latitude and the different inflexions of the isothermal lines, as where it changes suddenly on the steep declivities of the mountains. Organic nature gives a peculiar physiognomical character to every zone, which is not the case with the inorganic world where the solid crust of the earth is divested of its vegetable covering. The same rocks approaching

* Read before the Royal Academy of Sciences of Berlin, Jan. 24, 1823.

Article IX.

On the Crystalline Forms of Artificial Salts. By H. J. Brooke, Esq. FRS.

(*Continued from* p. 288.)

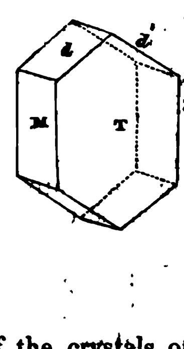
Having dissolved and recrystallised several of the salts described in these communications, I have observed differences in the figures of what may be termed different *crops* of crystals obtained from the same solution. Having dissolved some chromate of soda, the crystals first deposited, or *first crop*, as we may term them, were all lengthened in the direction of the great diagonal of their terminal planes, so as to be almost acicular. These crystals having been taken out of the solution, a second crop was soon deposited, many of which nearly agreed in form with the engraved figure already given, but most of them were much flattened or reduced in height, so as to become what has been termed tabular, and apparently bearing no relation to the slender crystals first produced.

The same difference of character is found to obtain in many other salts. When these varieties of figure occur, the goniometer will afford sufficient evidence that their differences are only apparent, and that they are really analogous forms whose character has been varied by a disproportionate extension of some of the planes of the crystals in particular directions.

Acetate of Lead.

I have received some brilliant crystals of this substance from Mr. R. Phillips, several of which have given measurements on the corresponding natural planes agreeing within 3′ or 4′, and affording an example of unusual regularity of form.

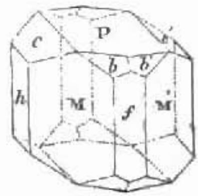
The crystals may be cleaved parallel to the lateral and terminal planes, of a *right oblique angled prism*, which may be regarded as its primary form. The only modification I have observed is exhibited in the annexed figure.



d on d′	128°	0′
d on M	116	0
d on T	98	30
M on T	109	32

Oxalate of Ammonia.

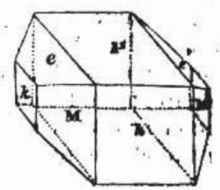
I have not observed any distinct cleavage of the crystals of this salt, but their forms are referable to *a right rhombic prism* as the primary. They are subject, however, to an irregularity of figure, analogous to some which have been before noticed; there being on some of the crystals only one of the planes *b* replacing each of the solid angles on which two are placed in the drawing, and these being the alternate planes. Many of the crystals present, however, the pairs of planes *b*, as shown in the figure.



P on M, or M'.	90°	0'
P on *c*, or *c'*	143	30
c on *c'*	107	0
c on *h*.	126	30
M on M'	104	6
M on *f*.	142	3
M on *h*	127	57
M on *b*	121	0
M' on *b*.	97	21

Carbonate of Magnesia.

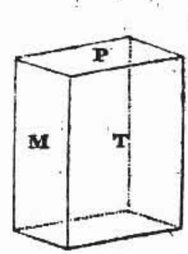
The crystals from which this figure has been given, I have received from M. Teschemacher. The primary form is *an oblique rhombic prism*, which may be cleaved, but not distinctly in the small crystals I have attempted to operate upon, parallel to the planes M and M'.



P on M, or M'.	102°	0'
P on *e*, or *e'*.	120	30
M on M'	86	30
M on *h*.	133	15
M on *k*.	136	45

Sulphate of Cinchonia.

Mr. Pope, of Oxford-street, has favoured me with some minute crystals of this salt: from which the primary form appears to be *a doubly oblique prism*, having cleavages parallel to all its planes. The cleavage, however, parallel to P is not very distinct. Some of the crystals are of the form I have given, but there are others whose figure does not appear to be immediately related to it. These are probably hemitrope, or rather quadruple crystals, united by secondary planes; but they are not sufficiently distinct in character to enable me at present to trace their precise relations to the primary form.



P on M	95°	50'
P on T.	90	0
M on T	83	30