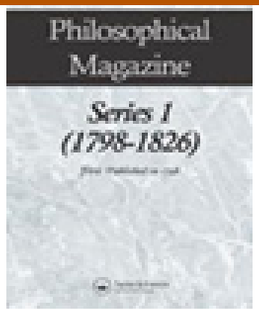

Philosophical Magazine Series 1

ISSN: 1941-5796 (Print) 1941-580X (Online) Journal homepage: http://www.tandfonline.com/loi/tphm12

VI. Extract of a memoir on argental mercury. Read before the French National Institute

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To cite this article: C. Cordier (1802) VI. Extract of a memoir on argental mercury. Read before the French National Institute , Philosophical Magazine Series 1, 14:53, 41-45, DOI: 10.1080/14786440208676157

To link to this article: http://dx.doi.org/10.1080/14786440208676157

Published online: 18 May 2009.

ſuch groſs errors. An artiſt poſſeſſing common ſenſe will never act ſo abſurdly as to mix in the ſame picture things antique and modern; an error common among the Venetian, Flemiſh, and Dutch maſters.

If the ſubject we mean to handle lies in Egypt, Athens, or Rome, let us endeavour to tranſport ourſelves thither by the warmth and activity of our imagination, and, by removing every thing local, lead the ſpectator through the delightful and magical mazes of ſcience, ſo that he may actually imagine the ſcene tranſacting before his eyes.

VI. *Extract of a Memoir on Argental Mercury. Read before the French National Inſtitute, by* C. CORDIER, *Engineer of Mines*.*

THE mineral called formerly native amalgam of ſilver, and which ſince the labours of C. Haüy is now known under the name of *argental mercury*, is one of thoſe natural metallic combinations, the mineralogical and chemical properties of which had been the leaſt perfectly deſcribed and examined. It is however probable that an accurate knowledge of this ſpecies would have been obtained, had not its great rarity prevented chemiſts from ſacrificing the only ſpecimens of it which they poſſeſſed in order to ſubject them to complete examination. The places where argental mercury is found are the mines of Roſenar in Hungary, thoſe of Morſfeldt in the ci-devant Palatinate, now the department of Mont-Tonnerre, and particularly thoſe of Muſchel-Landſberg in the ſame country: theſe are the only mines by which it has been hitherto furniſhed.

Though this mineral is at preſent too rare to be the object of the labours of the miner, it will be ſeen that it deſerves the attention of the mineralogiſt, and to make a figure among the moſt remarkable of the metallic ſpecies.

Argental mercury is found always diſſeminated throughout the maſs of the veins, ſometimes in very thin leaves which fill up the fiſſures, ſometimes in ſmall cryſtals totally engaged in the matrix, or entirely inſulated in the cavities.

This mineral ſubſtance has the colour and reſplendence of ſilver or poliſhed tin, or rather more frequently of liquid mercury, becauſe it almoſt always retains at its ſurface a thin ſtratum of the laſt mentioned metal.

Its regular forms are the dodecaedral-rhomboidal, and all its modifications.

* From the *Journal des Mines*, No. 67.

The

The ſmall lamellæform leaves of argental mercury are for the moſt part bent, and follow the undulations of the rock to which they are applied. Their ſurface is generally ſmooth and poliſhed, but much leſs than that of its cryſtals. This metal is eaſily ſcratched by a piece of ſharp-pointed ſteel. By ſcraping it loſes almoſt all its ſplendour, and becomes dull. When rubbed on copper it leaves a white metallic trace. It is brittle and eaſily broken: its conſiſtence approaches to that of martial pyrites. Its fracture is conchoid, and exhibits no appearance of laminæ. The fragments of it are indetermined, with very obtuſe edges.

Its ſpecific gravity, determined from a mean of ſeveral experiments, is 14·1192; argental mercury therefore, next to platina and gold, is the heavieſt of bodies. When this mineral is heated at the blow-pipe, the mercury becomes volatilized, and a ſmall button of ſilver may be eaſily obtained.

The varieties of the regular forms are, 1ſt, The perfect rhomboidal dodecaedron (fig. 1. Plate III). The incidence of the two contiguous faces is 120°. The cryſtals not being ſuſceptible of any mechanical diviſion, it is not poſſible to know preciſely whether this ſolid be the primitive form of argental mercury, as is probable, and as we ſhall ſuppoſe it to be, in order to have the expreſſion of the laws of decrement and the value of the angles. This ſuppoſition can produce no error, becauſe the reſults of the calculation may be eaſily transferred, ſo as to apply them to the octaedron, the tetraedron, or the cube, which are the only other forms poſſible.

2d, The dodecaedron truncated on the ſix ſolid angles compoſed of four planes. The ſix new faces are produced in virtue of a decrement by one row: they belong to the cube, and make with the faces of the primitive form angles of 135°. According to the ingenious method of C. Haüy, the abridged expreſſion of the laws of decrement which produce this form is $P \overset{1\ 1}{E}$.

3d, The ſame as the preceding, the place of each ridge of which is ſupplied by a facet making an angle of 150° with the adjacent primitive face: theſe new facets take place by the ſubtraction of a row of moleculæ on all the edges. Its expreſſion is $P \overset{1}{B} \overset{1\ 1}{E}$.

4th, The dodecaedron truncated on all the ridges and all the ſolid angles, and having new facets on the edges of the truncatures which take place on the edges, and the ſolid angles compoſed of four planes. This form, which had not been

Fig. 1.

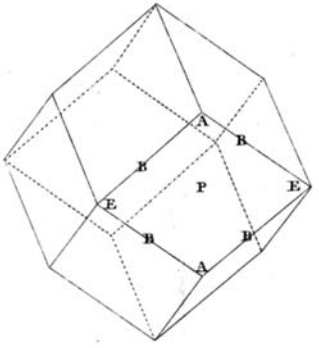
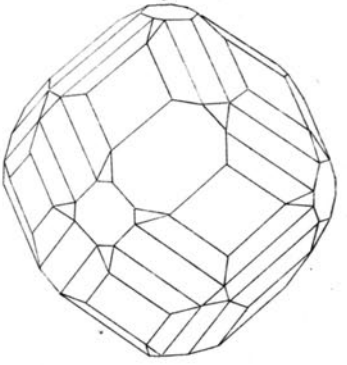


Fig. 2.



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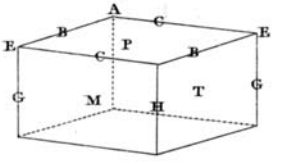


Fig. 4.

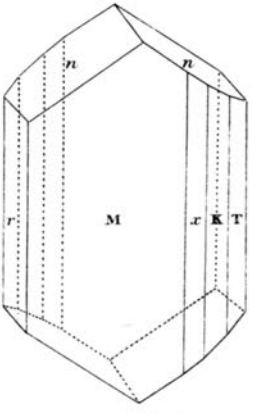


Fig. 5.

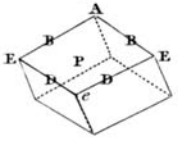


Fig. 6.

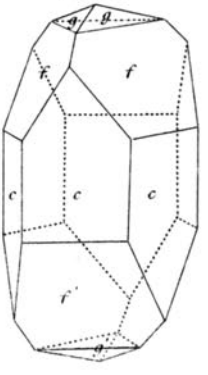
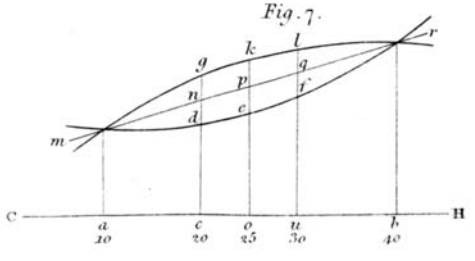


Fig. 7.



been before obſerved, is the moſt complex of all thoſe exhibited by mineral ſubſtances. It is produced by the interſection of the faces which belong to the following ſix kinds of regular or ſymmetric ſolids, viz. the cube, the octaedron, the rhomboidal dodecaedron, the ſolid with 24 trapezoidal facets, the ſolid with 24 iſoſceles triangular facets, and the ſolid with 48 ſcalene triangular facets. The complete cryſtal is terminated by 122 faces. The expreſſion of this form, repreſented fig. 2, is $P \overset{1}{B} \overset{2}{B} A \overset{1}{E} \overset{1}{E} \overset{3}{E}$.

The incidence of the faces of the primitive form with thoſe of the octaedron is 125° 15′ 52″; with thoſe of the ſolid having 24 triangular facets is 153° 28′ 4″; with thoſe of the ſolid having 48 faces 16° 53′ 36″.

Hitherto no complete anatomy of argental mercury has been publiſhed; mineralogiſts were ſatisfied with acquiring an approximate knowledge of its compoſition from ſimple experiments: it was therefore of importance to determine with accuracy the elementary principles of this mineral, and to fix the proportions. This analyſis was attended with no kind of difficulty *.

Sixty parts of this mineral were expoſed in a crucible to the action of a low heat, which was ſucceſſively increaſed, and continued as long as was neceſſary to volatilize all the mercury. The cryſtals, without ſuffering any ſenſible loſs of volume, were changed into ſpongy maſſes, which towards the end of the operation ſunk down and united into a metallic button; the weight of this button was found to be 16·5 parts, from which it was concluded that the weight of the mercury volatilized was 43·5.

This button was perfectly malleable, and had all the appearances of the pureſt ſilver. To aſcertain its purity it was expoſed to the action of nitric acid proved by nitrate of ſilver. The ſolution was effected without any reſiduum.

Oxygenated muriatic acid was poured into the ſolution, and the precipitate of muriate of ſilver was collected on the filter. The liquor tried by carbonate of potaſh furniſhed no precipitate: the ſilver then contained no foreign metallic ſubſtance.

In regard to the ſtate of the mercury in its combination, it is certainly not neceſſary to prove that it exiſts in a ſolid ſtate. To be convinced of it, nothing will be neceſſary but

* The cryſtals ſubjected to analyſis were covered with a ſtratum of liquid mercury, which was removed by preſſing them between the fingers in ſoft wax.

to

to conſider, firſt, that it forms almoſt three fourths of the whole maſs; in the next place, that the ſpecific denſity of the natural combination not only ſurpaſſes, by a great deal, the mean ſpecific denſity of ſilver and liquid mercury, but alſo that it is much more conſiderable than that of the latter metal, which is the heavier of the two. The ſpecific gravity indeed of the combination, calculated according to the formula of C. Haüy, would be only 12·5448, ſuppoſing the mercury liquid, whereas it is 14·1192; that of the mercury is only 13·5681.

A hundred parts of argental mercury, ſolid and cryſtalliſed, contain then of ſolid mercury - -	72·5
Silver - - - - - - - -	27·5
	100

Two other trials, made indeed with quantities leſs conſiderable, gave abſolutely the ſame proportions.

The identity of the reſults of the analyſis of this mineral, its peculiar ſpecific gravity, its faculty of cryſtallizing, its conſiſtence, and all the other mineralogical characters belonging to it, evidently prove that it ought to be conſidered as a real chemical combination, poſſeſſing fixed and invariable proportions, and that it is with propriety that a particular ſpecies has been formed of it in the mineralogical nomenclature.

It may be of utility to remark here how improper the denomination of native amalgam was to denote this mineral ſubſtance. The name ſtill employed in chemiſtry and the arts does not denote a ſolid combination, but a paſte-like mixture, compoſed of exceedingly ſmall cryſtals of argental mercury, adhering to each other by the medium of a certain quantity of liquid mercury. The conſiſtence of the maſſes of artificial amalgam is even very variable: it may be increaſed or diminiſhed at pleaſure, ſometimes by adding mercury, ſometimes by taking away a part of this metal, interpoſed by means of a proper filter, ſuch as a piece of ſhammoy leather. It is the difficulty, perhaps, of ſeparating entirely the exceſs of mercury in the ſolid combination that has occaſioned a belief that ſilver and mercury may be combined in all proportions: this opinion ſeems to be as unfounded as that in conſequence of which argil, rendered ductile by the means of water, was conſidered as a real combination, the proportions of which might be indefinitely varied. It is proper to add, that at the common temperature argental mercury is always perfectly ſolid, and beſides that

that it is insoluble in liquid mercury: this has been ascertained by experiment.

An exact knowledge of the specific density of argental mercury, as well as of the proportions of its two component principles, has suggested the idea of making some researches in regard to the density of solid mercury. Chemists have set out with the supposition that the moleculæ of the two metals experience no dilatation nor penetration in combining: knowing the specific gravity of silver = 10·4743, that of argental mercury = 14·1192, and the ratio of the two metals $\frac{2}{11}$, it will be found that the specific gravity of solid mercury ought to be 16·2662. In the case of there being a penetration of moleculæ, as is probable, the real density would be somewhat less: on the other hand, if there be dilatation, it will be found to be more considerable. In a word, this approximative result ought the less to be neglected, as it is probable that it will be always very difficult to attain *directly* to an estimation perfectly exact.

VII. *Extract of a Notice, read in the French National Institute, on a new Variety of Epidote.* *By* CHAMPEAUX *and* CRESSAC, *Engineers of Mines* *.

THE substance which forms the object of this notice was found in the primitive chain which traverses the country of the Grisons, and unites the mountains of St. Gothard to those of the Tyrol.

It has always been found united to a variety of red garnet, which Saussure has described † as a particular species under the name of *hyacinth de Diissentis*. To complete the description of this species, he gives a short description of the substance which forms the subject of this article, and he gives it the name of *phrenite*, because he thought he could distinguish in it characters which brought it near to the phrenite of Oisans.

In this description we shall follow the method adopted by professor Haüy.

Essential Character.

Divisible in a direction parallel to the planes of a right rhomboidal prism, which form with each other angles of 114° 37′ and 65° 23′.

* From the *Journal des Mines*, No. 67.

† Voyage dans les Alpes, § 1902.

Physical