this swells exceedingly in drying, and would otherwise run over.

Mr Chaptal found, that by exsiccation in a red heat, alum of his own manufacture lost 0.67, Roman alum 0.50, English alum 0.47, and Levant alum only 0.40. These differences arise principally from different proportions of water of crystallization, but also from an excess of alumina, which the last contains.

According to Kirwan, crystallized alum consists of 17.66 acid, 12 alumina, and 70.24 water, and alum desiccated at 700°, of 36.25 acid, and 63.75 basis, by which it would appear, that at that heat it loses not only all its water, but also more than half its acid.

Dried alum is only applied externally, as a gentle escharotic to fungous ulcers.

Chap. V.—METALLINE PREPARATIONS.

ANTIMONY.

Sulphuretum antimonii præparatum. *Ed.*
Prepared Sulphuret of Antimony.

Sulphuret of antimony is prepared in the same way as carbonate of lime.

Dub.

Reduce it to powder, and separate for use the impalpable particles, in the manner directed for the preparation of chalk.

By reducing the sulphuret of antimony to the state of an impalpable powder, it is both rendered much more active, and is prevented from irritating the stomach mechanically, of which there would be some danger, from the sharpness of its spiculæ. Even in this state, however, it is not a very certain remedy. In general, it operates as a mild sudorific or cathartic; but sometimes, if it meet with much acid in the stomach, it becomes more active, producing vomiting and hypercatharsis. Therefore, it seems prudent to evacuate the primæ viæ before it be exhibited, and to combine it with an absorbent earth.

It is principally given in scrofula, glandular obstructions, cutaneous diseases, and rheumatism. Its dose is from 10 to 30 grains, and upwards; and it is best exhibited in the form of a powder or bolus. It seems to constitute a quack remedy which has acquired some reputation in Ireland for the cure of cancer. It is used externally for dressing the sore.

OXIDUM ANTIMONII CUM SULPHURE, PER NITRATEM POTASSÆ; olim CROCUS ANTIMONII. *Ed.*

Oxide of Antimony, with Sulphur, by Nitrate of Potass; formerly *Crocus of Antimony.*

Take of

Sulphuret of antimony,

Nitrate of potass, equal weights.

After they are separately powdered, and well mixed, let them be injected into a red hot crucible; when the deflagration is over, the reddish matter is to be separated from the whitish crust, and reduced to powder, which is to be edulcorated by repeated washings with hot water, till the water come off insipid.

IN this process, the nitric acid of the nitre, and part of the sulphuret, are mutually decomposed: the sulphur is acidified, and combines with the potass of the nitre, while the antimony is converted into protoxide, which combines with the undecomposed portion of the sulphuret, and forms a dark brown, opaque, vitrified mass; so that, after the scoriæ, and other saline matters, have been removed by washing, the substance which remains, according to Proust, consists of three parts of protoxide of antimony, and one of sulphuret of antimony.

With regard to the mode of preparation, Bergman observes, that by the common process of throwing the mixture into an ignited uncovered crucible, there is sometimes a loss of nearly one half; and, therefore, advises the mixture to be put into a cold crucible, which is to be covered, and heated till the matter melts, by which means there is very little loss. With Dörfurt, however, this process did not succeed; because, as soon as the applied heat reached a certain degree, the whole mass took fire, and deflagrated violently. Indeed, in this process, the application of heat to the crucible is perfectly unnecessary, and the Berlin Pharmacopœia directs the mixture to be put into a clean iron pot, and kindled by touching it with a bit of live coal, or, what is better, the end of a tobacco pipe, or iron rod heated to redness. In this the fusion and separation of the scoriæ is no less complete than when the mixture is gradually projected into a heated cruci-

ble, and, unless for very great quantities, it is more convenient.

What is kept in the shops, is almost universally prepared with less nitre than is here ordered. The consequence is, that too much sulphur remains not acidified, the antimony is scarcely oxidized, and the preparation is unfit for the uses to which it ought to be applied. When nitre has been thus culpably economized, the crocus has a steel grey, instead of a liver brown colour.

The sulphuretted oxide of antimony is a very uncertain preparation, often operating with very great violence. Its internal use is, therefore, almost proscribed, or at least confined to veterinary practice. It is used in pharmacy, as the basis of other preparations in some Pharmacopœias; but the London college have rejected it altogether.

OXIDUM ANTIMONII, CUM SULPHURE VITRIFICATUM; olim VITRUM ANTIMONII. *Ed.*

Vitrified Oxide of Antimony with Sulphur, formerly *Glass of Antimony*.

Strew sulphuret of antimony, beat into a coarse powder, like sand, upon a shallow, unglazed, earthen vessel, and apply a gentle heat underneath, that the sulphuret of antimony may be heated slowly: stirring it, at the same time, continually, to prevent it from running into lumps. White vapours, of a sulphureous smell, will arise from it. When they cease with the degree of heat first applied, increase the fire a little, so that vapours may again arise; proceed in this manner, till the powder, when brought to a red heat, exhales no more vapours. Melt this powder in a crucible, with an intense heat, till it assumes the appearance of melted glass; then pour it out on a heated brass-plate.

GLASS of antimony, according to Proust, consists of one part of sulphuret of antimony, combined with eight of oxide of antimony. Hence, in this process, the greatest part of the antimony is deprived of its sulphur, and is, at the same time, converted into the protoxide, which combines with the small portion of sulphuret which remains undecomposed. But, as this preparation is not easily made in the manner here directed, unless in a furnace constructed on purpose, apothecaries may advantageously adopt the synthetical method of Bergman, which consists in melting in a crucible, with one twelfth or eighth of its weight of sulphur, protoxide of antimony, prepared by deflagrating it with more than twice its weight of nitre. At the temperature necessary for melting it, part of the protoxide of antimony loses its oxygen, and is con-

verted into sulphuret, and combines with the remaining protoxide, in the proportions which form the glass of antimony.

The glass of antimony is transparent, and has a fine hyacinthine colour. On dissolving it in muriatic acid, it gives out sulphuretted hydrogen gas. Its medical operation is so uncertain, that it is only used in making other preparations.

OXIDUM ANTIMONII VITRIFICATUM CUM CERA; olim VITRUM ANTIMONII CERATUM. *Ed.*

Vitrified Oxide of Antimony with Wax, formerly *Cerated Glass of Antimony.*

Take of

Yellow wax, one part;

Vitrified oxide of antimony with sulphur, eight parts.

Melt the wax in an iron vessel, and throw into it the powdered oxide; roast the mixture over a gentle fire, for a quarter of an hour, continually stirring it with a spatula; then pour it out, and, when cold, grind it into powder.

THE glass melts in the wax, with a very gentle heat: after it has been about twenty minutes on the fire, it begins to change its colour, and in ten more, comes near to that of Scotch snuff, which is a mark of its being sufficiently prepared; the mixture loses about one-ninth of its weight in the process.

This medicine was for some time much esteemed in dysenteries. The dose is from two or three grains to twenty, according to the age and strength of the patient. In its operation, it makes some persons sick, and vomit; it purges almost every one; though it has sometimes effected a cure without occasioning any evacuation or sickness. It is now, however, much less used than formerly.

SULPHURETUM ANTIMONII PRÆCIPITATUM. *Ed.*

Precipitated Sulphuret of Antimony.

Take of

Water of potass, four pounds;

Water, three pounds;

Prepared sulphuret of antimony, two pounds.

Boil them in a covered iron pot, over a slow fire, for three hours, adding more water, if necessary, and frequently stirring the mixture with an iron spatula; strain the liquor, while warm, through a double cloth, and add to it, when filtered,

Diluted sulphuric acid,

as much as is necessary to precipitate the sulphuret, which must be well washed with warm water.

Lond.

Take of
Sulphuret of antimony, in powder, two pounds;
Solution of potass, four pints;
Distilled water, three pints.
Mix and boil, with a gentle fire, for three hours, constantly stirring, and adding, from time to time, as much distilled water as to keep up the original quantity. Quickly filter the solution through double linen, and gradually drop into it, when still hot, as much diluted sulphuric acid as may precipitate it; then wash away the sulphate of potass with warm water; dry the precipitated sulphuret of antimony and triturate it to powder.

SULPHUR ANTIMONIATUM FUSCUM, *Dub.*
Brown Antimoniated Sulphur.

Take of
Prepared sulphuret of antimony.
Subcarbonate of kali, each one ounce.
Melt them previously mixed, in a crucible. Powder the mass, when cold. Put it into a matrass, with pour pints of water, and boil for a quarter of an hour. Remove the vessel from the fire, and cover it; let it rest a little, and, as soon as the liquor has become limpid, decant it cautiously from the sediment. The antimoniated sulphur will, in part, be separated by the cooling of the liquor: add a sufficient quantity of diluted sulphuric acid to precipitate the whole of it, which happens with excess of acid; agitate the mixture, that what is last thrown down (which is of an orange colour) may be mixed with the rest. After allowing it to stand a sufficient time, pour the liquor from the sediment, which is to be washed with cold water, as long as it affects litmus paper. Lastly, dry it upon blotting paper.

IN both of these preparations, the result is a hydro-sulphuret of antimony with excess of sulphur. Formerly there were two officinal antimonials of this nature, one of which (*Kermes mineral*) contained no excess of sulphur, and the other (*Sulphur auratum antimonii*) contained a much larger proportion of sulphur than those now officinal, which, therefore, hold a

middle place between them. According to Thenard, they consist of

	Sulph. aur.	Kermes min.
Brown oxide of antimony	68.3	72.760
Sulphuretted hydrogen	17.877	20.298
Sulphur -	12.	4.156
Water and loss -	1.823	2.786
	100.	100.

Thenard considers the sulphur as only mechanically and accidentally mixed; and that the essential difference between these preparations consists in the degree of oxidizement of the antimony.

But, notwithstanding the great celebrity of Thenard as a chemist, and his having paid particular attention to the combinations of antimony, we may be allowed to doubt the accuracy of his opinion; for it must appear to every one, an affected refinement of analysis, to discover in such substances a difference of only 2 *per cent.* of oxidizement, more especially as he admits an inaccuracy in his analysis of at least as much: and as Proust has since shewn that both preparations contain the protoxide, the only difference between these bodies appears to be the proportion of sulphur they contain.

Hydro-sulphuret of antimony is prepared either in the dry way, as directed by the Dublin, or in the humid way, as in the receipt of the Edinburgh and London colleges. When sulphuret of antimony is boiled in a solution of potass, water is decomposed, the hydrogen combines with the sulphur, and the antimony is oxidized; and, as long as the solution boils, it contains a mixture of hydro-sulphuret of potass and hydro-sulphuret of antimony. But, on cooling, a great part of the latter precipitates in the form of a red powder (Kermes mineral).

In the dry way, when sulphuret of antimony and carbonate of potass are melted together, the carbonic acid is expelled with effervescence, and a sulphuret of potass and antimony is formed. On boiling this in water, water is decomposed, the antimony is oxidized, and the hydrogen combines with the sulphur. The sulphuretted hydrogen, thus formed, combines partly with the potass, and partly with the oxide of antimony.

Such is the present theory. With regard to the practice; for the preparation of Kermes mineral, Lemery melted sixteen parts of sulphuret of antimony, and one of sulphur, with eight parts of carbonate of potass. The last edition of the

Prussian Pharmacopœia directs two parts of sulphuret of antimony, and one of exsiccated carbonate of soda, to be melted, and afterwards boiled fifteen minutes in six or eight parts of water, which, on cooling, deposites a considerable quantity of kermes. The fluid from which the kermes has been deposited may be again boiled in the residuum of the first decoction, and it will dissolve a fresh proportion of kermes; and this process may be repeated as long as there remains any to dissolve. After this the residuum, when melted, consists almost solely of antimony. It therefore seems, that the alkali renders almost all the sulphur soluble, and only disposes the oxidizement of as much antimony as is capable of combining with the sulphuretted hydrogen. There appears to be no reason why the whole of the antimony should not be converted into kermes, by employing a proper addition of sulphur and alkali.

Kermes is also made in the humid way. Fourcroy boils, in twenty parts of water, six parts of pure potass of commerce, and into the boiling solution throws about the twentieth part of the weight of the alkali, or 0.3 of a part, of powdered sulphuret of antimony, and continues the boiling for seven or eight minutes, then filters, and allows the kermes to precipitate by cooling. Hermbstadt uses very different proportions; for he boils twelve parts of sulphuret of antimony, and three of salt of tartar, in ninety-six parts of water, down to sixty-four, and then filters, &c. Gren employs four parts of sulphuret of antimony, sixteen of carbonate of potass, and sixty-four of water, and boils for several hours. Göttling boils eight parts of sulphuret of antimony, and two of sulphur, in a sufficient quantity of solution of potass, down to one half.

The precipitated sulphuret of antimony, like the kermes, may be prepared either in the dry or in the moist way. The latter mode seems to be the most universally employed on the Continent. Göttling boils two parts of sulphuret of antimony, and three of sulphur, in a sufficient quantity of a recent solution of potass, filters the solution, and precipitates with sulphuric acid, diluted with twelve times its weight of water. The Prussian college use equal parts of sulphuret of antimony and of sulphur. Wiegleb treats in the same manner two parts of sulphuret of antimony with one of sulphur. But to his proportions it has been objected, that the product resembles kermes more than sulphur auratum. If this objection be just, it must apply, in a still stronger degree, to the formula of the British colleges, in which no sulphur is added.

In the dry way, two parts of sulphuret of antimony and three of sulphur may be melted with five or six of pure carbonate of potass in a covered crucible, as quickly as possible, poured into an iron mortar, reduced to powder, and dissolved by boiling the powder in water. The solution is to be filtered warm, diluted with a sufficient quantity of water, and precipitated by dilute sulphuric acid. By some, the solution is allowed to remain at rest for twenty-four hours before it be filtered, and some precipitate by nitrous acid.

The process for making the golden sulphuret of antimony depends on the property which the hydroguretted sulphuret of potass possesses, of dissolving, and retaining dissolved, even at ordinary temperatures, a portion of orange oxide of antimony; and as the attraction by which potass exists in this compound is weaker than its affinity for acids, on the addition of any acid, the potass unites with the acid, a portion of sulphuretted hydrogen gas escapes, and the oxide of antimony, combined with the rest of the sulphur and hydrogen, are precipitated in the form of a light orange powder. When the acid is added gradually, the proportion of oxide of antimony decreases, while that of the sulphur increases in each successive portion of precipitate. Hence, in the old manner of preparing this substance, from the scoriæ formed in reducing antimony from its sulphuret, and which contained but little sulphur, the two first portions of precipitate, being dark coloured, were rejected, and only the produce of the third precipitation retained for use. The want of economy in this process is sufficiently obvious, as well as the very great improvement in modern times, of adding a sufficient quantity of sulphur, and precipitating the whole at once.

Medical use.—In its action on the body, the hydro-sulphuret of antimony is an active substance, and, according to the dose, acts as a diaphoretic, cathartic, or emetic. Its use is, in this country, in a great degree superseded by more certain preparations.

Murias antimonii. *Ed.*
Muriate of Antimony.

Take of
Oxide of antimony, with sulphur, by nitrate of potass,
Sulphuric acid, each one pound;
Dried muriate of soda, two pounds.

Pour the sulphuric acid into a retort, gradually adding the muriate of soda and oxide of antimony, previously mixed. Then perform the distillation in a sand-bath. Expose the

distilled matter for several days to the air, that it may deliquesce, and then pour the liquor from the fæces.

Muriate of antimony was originally prepared by distilling sulphuret of antimony with muriate of quicksilver. Muriate of antimony, or butter of antimony, as it was called from its appearance when recently prepared, passes over into the receiver, and black sulphuret of quicksilver remains in the retort; or by increasing the heat, red sulphuret of mercury, which, when obtained by this process, was formerly termed Cinnabar of antimony, is sublimed. But this mode of preparation is both expensive and dangerous to the health of the operator.

Scheele invented a method of avoiding these inconveniences. A sulphuretted oxide of antimony is prepared by deflagrating two parts of sulphuret of antimony with three of nitrate of potass in an iron mortar. The mass thus obtained is powdered, and one pound of it put into a glass vessel, on which is poured first a mixture of three pounds of water and fifteen ounces of sulphuric acid, and afterwards fifteen ounces of powdered common salt. The whole is digested for twelve hours, and stirred all the while, and the solution, when cool, strained through linen. On the residuum one-third of the above menstruum is poured, and the mixture digested and strained.—Mr Stott says, that the digestion need not be continued longer than two or three hours, and that the heat must be kept moderate, as the muriate of antimony begins to evaporate before it boils. Although this preparation, as we shall afterwards see, answers the purpose for which it is intended, it is a mixture of sulphate of soda and muriate of antimony.

The muriate may be obtained separately from the other salts by distillation. This was proposed by Gmelin, and improved by Wiegleb, who distilled a mixture of one part of sulphuret of antimony, four of muriate of soda, and three of sulphuric acid diluted with two of water; but the product is rendered impure by the admixture of sulphur, and there is great danger of the vessels bursting, from the immense quantity of sulphuretted hydrogen gas disengaged.

The process of the Edinburgh college was first introduced into the London Pharmacopœia in 1781.

The Prussian Dispensatory pours upon two ounces of crocus of antimony, and six of dried muriate of soda, introduced into a retort, four ounces of sulphuric acid previously diluted with two ounces of distilled water, and distils. But we have already observed, that the antimony in the crocus is seldom sufficiently oxidized or deprived of its sulphur, which occa-

sions the production of much sulphuretted hydrogen gas; and from the concentrated state in which the materials are employed, the muriatic acid gas is sometimes disengaged, especially if the heat be improperly applied, so rapidly, that it has not time to act upon the oxide of antimony.

At last, in 1797, Göttling, by substituting the glass of antimony for the crocus, diluting further the sulphuric acid, and using the muriate of soda crystallized, removed these inconveniences. He introduces into a retort a mixture of four ounces of glass of antimony in powder, with sixteen of muriate of soda, and then pours into it twelve ounces of sulphuric acid, diluted with eight of water. He lutes on a tubulated receiver with gypsum, and distils to dryness in a sand-bath, with a heat gradually increased. By this process, he says, about twenty ounces of very strong fuming solution of muriate of antimony are obtained. The residuum in the retort is sulphate of soda, but unfit for internal use, on account of its being mixed with some antimony.

Muriate of antimony or antimonane, as it is called by Sir H. Davy, is crystallizable, but in general is a soft semitransparent substance, of a yellowish-white colour, very fusible and volatile at a moderate degree of heat. It is remarkably deliquescent, and forms a permanent solution; but if more than a certain proportion of water be added, it is decomposed; a large quantity of submuriate of antimony being precipitated, in the form of white silky crystals, while a supermuriate remains in solution. Antimonane consists, according to the experiments of Mr John Davy, of 56 antimony and 44 chlorine, or of *one* proportion of antimony and *two* of chlorine.

Muriate of antimony has been used as a caustic, but not for a long time; it is so extremely unmanageable. It is now only prepared as preliminary to the precipitation of the submuriate or oxide of antimony from it.

Oxydum antimonii nitro-muriaticum, *Dub.*
Nitro-Muriatic Oxide of Antimony.

Take of

Prepared sulphuret of antimony, two ounces;
Muriatic acid, eleven ounces by measure;
Nitrous acid, one drachm by measure.

Add the sulphuret gradually to the acids, previously mixed in a glass vessel, avoiding the vapours. Digest with a heat gradually increased, until the effervescence cease, and then boil for one hour. Filter the liquor when cold, and receive it when filtered in a gallon of water. The oxide of anti-

mony will fall to the bottom. Wash this repeatedly in a sufficiently large quantity of water, until the liquor poured off be perfectly free from acid, as known by the test of lithmus; and, lastly, dry the oxide upon bibulous paper.

In this preparation, the antimony oxidized by the nitric acid is dissolved in the muriatic; and the muriate of antimony thus formed is decomposed by water. According to Sir H. Davy, a portion of the water furnishes oxygen to the antimony, and hydrogen to the chlorine, which are thus converted into protoxide and muriatic acid; a supermuriate of antimony remains in solution, and an insoluble submuriate is precipitated in the form of white acicular or silky crystals, formerly known under the title of *Pulvis Algarotti*, and is the *oxydum antimonii nitro-muriaticum* of the Dublin college. That this is a submuriate, is proved by its yielding a small proportion of muriate on distillation, as pointed out by Bergman.

Antimonii oxydum. *Lond.*
Oxide of Antimony.

Take of

Tartarized antimony, one ounce;
Subcarbonate of ammonia, two drachms;
Distilled water, what is necessary.

Dissolve the salts separately in water, then mix the liquors, and boil until the oxide of antimony be precipitated. Wash this with water, and dry it.

This process, which is now introduced by the London college as a substitute for the numerous impure oxides of antimony in preceding Pharmacopœias, will furnish a very pure protoxide of antimony, and does not seem liable to any objection. What its effects as a medicine are, I know not; but I am disposed to think that they will be more uniform than those of the more uncertain products, and that therefore the introduction of the formula is a real improvement upon the pharmaceutical treatment of antimony.

Oxidum antimonii cum phosphate calcis. *Ed.*
Oxide of Antimony, with Phosphate of Lime.

Take of

Sulphuret of antimony, in coarse powder;
Shavings of hartshorn, equal weights.

Mix, and put them in a wide red-hot iron pot, and stir the mixture constantly, until it be burnt into a matter of an ash-grey colour, which is then to be removed from the fire,

ground into powder, and put into a coated crucible. Lute to this crucible another inverted over it, and perforated in the bottom with a small hole, and apply the fire, which is to be raised gradually to a white heat, and kept in that increased state for two hours. Lastly, grind the matter, when cold, into a very fine powder.

PULVIS ANTIMONIALIS. *Dub.*
Antimonial Powder.

Take of
Sulphuret of antimony, in coarse powder;
Shavings of hartshorn, of each two pounds.

Boil the hartshorn in a sufficient quantity of water, to separate the animal jelly. Then dry it, and mix it with the antimony. Throw the mixture into a wide iron pot, heated to redness, stirring continually until the sulphureous vapour cease, and the mass acquire an ash-grey colour. When cold, reduce it to powder, and put it into a luted crucible. Invert another crucible, having a small hole in its bottom, over this, and lute them accurately together. Roast the powder for two hours, with a heat gradually increased to whiteness, and, when cold, grind it to a very fine powder.

Lond.

Take of
Sulphuret of antimony in powder, one pound;
Horn-shavings, two pounds.

Mix, and throw them into a wide iron pot, heated to whiteness, stirring them assiduously until they become of an ash-grey colour. Take them out and powder them. Put the powder into a coated crucible, to which another crucible, having a small hole in its bottom, and inverted over it, is luted. Then apply heat, and gradually increase it, until it be kept white for two hours. Triturate the residuum into very fine powder.

THIS is supposed to be nearly the same with the celebrated nostrum of Dr James, the composition of which was ascertained by Dr George Pearson, to whom we are also indebted for the above formula.

By burning sulphuret of antimony and shavings of hartshorn in a white heat, the sulphur is entirely expelled, and the antimony is oxidized, while the gelatine of the hartshorn is destroyed, and nothing is left but phosphate of lime, combined with a little lime. Therefore, the mass which results is a mixture of oxide of antimony and phosphate of lime, which

corresponds, at least as to the nature of the ingredients, with James's powder, which, by Dr Pearson's analysis, was found to consist of 43 phosphate of lime, and 57 oxide of antimony. M. Pulley also analysed some James's powder, and found it composed of protoxide of antimony 37, phosphate of lime 21, sulphate of potass 24, and potass combined with protoxide of antimony 18. On which occasion, M. Cadet, ignorant that even quack-medicines were often imitated and adulterated, accuses Dr Pearson of having sanctioned with his name a false analysis, in order to conceal a secret so profitable to his country! Mr Chenevix, by considering the uncertainty of the application, and the precarious nature of the agency of fire, by which means a variable portion of the oxide of antimony may be volatilized, and that which remains may be oxidized in various degrees, proposes to prepare a substitute for James's powder by dissolving together equal weights of submuriate of antimony, and of phosphate of lime, in the smallest possible quantity of muriatic acid, and then pouring this solution gradually into water sufficiently alkalized with ammonia. As muriate of antimony is partially decomposed by water, it is absolutely necessary that the muriatic solution be poured into the alkaline liquor, for, by an opposite mode of procedure, a great part of the antimony would be precipitated in the state of submuriate, and the first portion of the precipitate would consist chiefly of antimony, and the last of phosphate of lime.

Phosphate of lime is most conveniently obtained pure by dissolving calcined bone in muriatic acid, and precipitating it by ammonia. If the ammonia be quite free from carbonic acid, no muriate of lime is decomposed. Mr Chenevix also found, that his precipitate is entirely soluble in every acid which can dissolve either phosphate of lime or oxide of antimony separately, and that about 0.28 of James's powder, and, at an average, 0.44 of the pulvis antimonialis of the late London Pharmacopœia, resist the action of every acid.

In the new edition, twice the proportion of hartshorn shavings is used, which is said to obviate the inconvenience of the vitrification of part of the antimony when too high a temperature was applied, to render the process more manageable, and to furnish a whiter product, but it does not correspond with Dr Pearson's analysis of James's powder, for which it was intended as a substitute, and alters materially the strength of an established preparation.

Medical use.—The oxide of antimony with phosphate of lime, howsoever prepared, is one of the best antimonials we

possess. It is given as a diaphoretic in febrile diseases, in doses of from three to eight grains, repeated every third or fourth hour. In larger quantities, it operates as a purgative or emetic. From its being insoluble in water, it must be given either in the form of a powder, or made into a pill or bolus.

TARTRIS ANTIMONII, olim TARTARUS EMETICUS. *Ed.*
Tartrite of Antimony, formerly *Tartar-Emetic.*

Take of
Oxide of antimony with sulphur by nitrate of potass, three parts;
Supertartrate of potass, four parts;
Distilled water, thirty-two parts.
Boil in a glass vessel for a quarter of an hour, strain through paper, and set aside the filtered liquor to crystallize.

ANTIMONIUM TARTARIZATUM. *Lond.*
Tartarized Antimony.

Take of
Sulphuret of antimony in powder, two ounces;
Nitrate of potass, one ounce;
Supertartrate of potass, two ounces;
Sulphuric acid, two ounces by weight;
Distilled water, a pint and a half.
Mix the acid with the water (half a pint, Dr Powell) in a proper glass vessel, and heat them in a sand-bath. When they have become moderately heated, gradually add the sulphuret and nitrate mixed; then filter, and boil to dryness. Wash the residuum with distilled water until it be free from taste, and while still wet mix it with the supertartrate of potass, and throw it into a pint of distilled water; then boil down the solution, and set it aside to crystallize.

TARTARUM ANTIMONIATUM SIVE EMETICUM. *Dub.*
Antimoniated or Emetic Tartar.

Take of
Nitromuriatic oxide of antimony, two ounces;
Crystals of tartar, in very fine powder, two ounces and a half.
Distilled water, eighteen ounces by measure.
Boil the water in a glass vessel, then gradually throw into it the oxide and tartar, previously mixed, and boil for half an hour; then filter the liquor through paper, and crystallize by slow cooling.

The tartaric acid is capable of combining, in many examples, with two bases at the same time, forming with them triple crystallizable salts. In the present instance, it is combined with oxide of antimony and potass; and as the potass is essential to its constitution, and the real tartrate of antimony is a different salt, its name, on chemical principles, should certainly have been Tartrate of Antimony and Potass.

In the preparation of this salt, the different combinations of protoxide of antimony have been employed. Any of them will afford a very pure salt. The crocus, precipitated oxide, submuriate and glass, are all occasionally employed. The Edinburgh college uses the crocus. To this the principal objection is, that it is never found in the shops in a state fit for this purpose. Even when properly prepared, it is with difficulty acted upon by the supertartrate of potass, unless it be levigated and elutriated. Mr Phillips found, that 100 parts of cream of tartar dissolved only 6 parts out of 100 of very finely powdered crocus, 16 when levigated, but 75 when it was elutriated; and in the last case, the liquor assumed a deep green colour, which, though proceeding from the presence of iron, is a test that a sufficient proportion of the metallic oxide is dissolved, as it does not occur until the tartar has taken up three-fourths of its weight of the crocus. But, besides the expence of levigating and elutriating the crocus, it is liable to be mixed with carbonate of lime, derived probably from the stones employed in the levigation; and the crystals of tartarized antimony procured in this way, are consequently contaminated even with a larger proportion of tartrate of lime than is furnished by the tartar. The glass is more easily soluble than the crocus, as, when finely powdered, 78 parts were dissolved, and gave the solution a dark green colour. But this oxide is very expensive, and glass of lead is sometimes fraudulently substituted for it. When the glass or crocus is used, Mr Phillips recommends, that after being powdered or levigated, they should be boiled in dilute sulphuric acid to remove any carbonate of lime, and that a small quantity of sulphuric acid should be added to decompose the tartrate of lime. To the oxide of antimony, as prescribed by the London college 1809, Mr Phillips objected its great expence, its quantity being too small in proportion to the tartar, and that the crystals of tartar-emetic formed with it, as well as with the crocus or glass, are contaminated with the tartrate of lime usually contained in the tartar. To the use of the submuriate, as directed by the Dublin college, this last objection does not apply, because the muriatic acid retains the tartrate of lime

in solution when the tartrate of antimony crystallizes. Having criticized the processes of all the colleges, Mr Phillips proposed to substitute one of his own. The qualities requisite in an eligible method of preparing tartar-emetic, he says, are, the certainty of obtaining protoxide of antimony unmixed with peroxide or sulphuretted oxide, yet not absolutely pure, but mixed with a substance capable of preventing the crystallization of the tartrate of lime; moderate expence, and the possibility of using iron vessels, both in preparing the oxide of antimony and the tartarized antimony. These requisites, Mr Phillips thinks, he has found in employing the sulphate of antimony prepared by boiling powdered metallic antimony in twice its weight of sulphuric acid to dryness in an iron vessel over a common fire, and stirring it with an iron spatula. The greyish coloured product was thrown into water, and washed, till the uncombined sulphuric acid was removed. 100 parts of the subsulphate thus procured were boiled in a solution of an equal weight of tartar; about 76 parts of the subsulphate were readily dissolved, and the solution, when filtered, afforded at the first crystallization rather more than 90 parts of crystals of tartarized antimony, perfectly white and unmixed with any extraneous salt. The solution, by further evaporation, furnished an additional quantity of crystals of emetic tartar, slightly incrusted with sulphate of lime, from which, however, they were completely purified by solution, and repeating the crystallization. A considerable quantity of sulphate of lime was also deposited and separated during the evaporation. This process Mr Phillips asserts to be neither tedious, difficult, uncertain nor unsafe. The process adopted in the present edition of the London Pharmacopœia is of the same nature, depending upon the formation of a sulphate of antimony, although in a more complicated way. I have not repeated it, but Dr Powell tells us that the new formula, which " has, after numerous trials, been adopted, is due to Mr Hume of Long-Acre, to whose practical skill it is right to acknowledge great obligation. It is necessary that the whole of the supertartrate of potass should be combined with the oxide, and therefore that there should be a full sufficiency of the latter, otherwise the first crystals, as it cools, will be of the supertartrate only; whilst, on the other hand, if a superabundance of oxide of antimony be used, it will remain upon the filter, and not influence the crystals: the former inconvenience, therefore, is especially, to be avoided, and for that purpose, more oxide than may be strictly neces-

sary is directed. The evaporation must not be carried too far, as there appears to be some tartrate of potass in the solution, whose crystals will, in that case, be mixed with the triple salt. The crystals ought always to be formed, for it is only when they are that the proportions of the salt can be considered as precise." But whatever form of protoxide of antimony may be preferred, the quantity of water employed must be sufficient to dissolve the tartar-emetic formed. The time during which the ebullition is to be continued, is stated differently by different pharmaceutists. No harm can arise from continuing it longer than is absolutely necessary; but it is certainly a waste of time and fuel to protract it for hours.

Another circumstance which renders tartar-emetic variable in its effects, is, the mode of crystallization. Some evaporate it to dryness; others to a pellicle, and set it aside to crystallize; and others again crystallize by slow evaporation. On account of the silica which is combined with the oxide of antimony, and which, being held in solution by the potass, impedes the crystallization, and varies the nature of the product, Vauquelin recommends that the solution be first evaporated to dryness, and that the saline mass obtained should be redissolved in boiling water, and then crystallized; for, towards the end of the first evaporation, the silica separates, and becomes totally insoluble. In this way, he says, that we obtain both a purer salt, and in larger quantity. If we employ an excess of supertartrate of potass, part of it will remain undecomposed, and will crystallize before, or along with the tartar-emetic. This source of impurity is easily avoided, by using an excess of the antimonial oxide, which remaining undissolved, occasions no error, and prevents the necessity of throwing away the crystals which form on the filtering paper, if the solution be saturated.

The primitive form of the crystals of tartrate of antimony and potass seems to be the regular tetrahedron, but it assumes a variety of secondary forms. It has a styptic metallic taste. It is soluble in three times its weight of water at 212°, and in fifteen at 60°. As this statement of its solubility is very different from that of most writers, from Bergman to Fourcroy, who say that it requires 80 parts of water at 60°, and somewhat less than 40 of boiling water, it is necessary to mention, that it was ascertained by careful experiment, with very fine crystals of tartar-emetic, more than half an inch in length, and perfectly free from the admixture of any foreign salt. The crystals, by exposure to the air, become white and opaque, but do not readily fall to powder. The property of

deliquescing, ascribed to them by Göttling, must have arisen from the presence of other salts, as he does not prepare his tartar-emetic by crystallization, but by evaporating the solution to dryness. The solution of tartar-emetic slightly reddens tincture of turnsole. It is decomposed by acids, alkalies, alkaline carbonates, sulphuretted hydrogen and its compounds, vegetable juices, decoctions, and infusions, and many of the metals.

According to Thenard, tartar-emetic consists of tartrate of antimony 54, tartrate of potass 34, water 8, and loss 4; or, oxide of antimony 38, tartaric acid 34, potass 16, water and loss 12; and by estimation from the analysis of tartrate of potass, and supertartrate of potass, by the same chemist, it appears, that to saturate 38 parts of protoxide of antimony, 70.4 of supertartrate of potass are necessary: the whole of the superfluous acid, being 16, combines with the oxide, while 34 of the tartrate of potass combine with the tartrate of antimony thus formed, and 20.4 of tartrate of potass remain in solution in the mother water. But Mr Phillips found, that 100 parts of supertartrate of potass dissolve 70 of protoxide of antimony, which makes me distrust Thenard's estimates.

From what has been said, it will appear, that without any fraudulent intention, tartar-emetic is often imperfect. Its goodness should be ascertained by taking a few crystals promiscuously from every fresh parcel, washing them in water, and then introducing each crystal separately into dilute solutions of sulphuret of potass, when, if the salt be perfect, a considerable orange precipitate will occur in each. But tartar-emetic is more commonly sold in the form of powder, to conceal its imperfections; this ought to be examined in the same way as the crystals; but as it may consist of a mixture of tartarized antimony and tartar, it ought to be rejected, if, in attempting to prepare with it the *liquor antimonii tartarizati*, it do not readily and totally dissolve in the water, and form a perfectly clear solution, previous to and after the addition of the wine.

I have been thus particular in the account of the preparation and chemical properties of tartar-emetic, because it is not only of all the preparations of antimony the most certain in its operation, but is almost indispensable for the successful practice of medicine.

Medical use.—In doses of from one to three grains it operates as an emetic, and sometimes as a cathartic. In smaller doses, it excites nausea, and proves a powerful diaphoretic and expectorant. As an emetic, it is chiefly given in the beginning of fevers and febrile diseases, in chincough, and, in

general, whenever we wish to evacuate the stomach quickly. When great debility is present, and in the advanced stages of typhoid fever, its use is improper, and even sometimes fatal. As a diaphoretic, it is given in small doses, of from an eighth to a quarter of a grain; and as an expectorant, in doses still smaller.

The only proper form for exhibiting it is in solution; and as the intensity of its action on the body is liable to variation, from differences in its own strength, and in the constitution of the patient, it should almost always be given in divided doses, at short intervals, if we wish to excite vomiting; and at longer intervals, if we wish it to act only on the skin or lungs.

VINUM TARTRITIS ANTIMONII, olim VINUM ANTIMONIALE. *Ed.*
Wine of Tartrite of Antimony, formerly *Antimonial Wine.*
Take of
Tartrite of antimony, twenty-four grains;
Spanish white wine, one pound.
Mix them, so that the tartrite of antimony may be dissolved.

LIQUOR ANTIMONII TARTARIZATI. *Lond.*
Solution of Tartarized Antimony.
Take of
Tartarized antimony, one scruple;
Boiling distilled water, four fluidounces;
Wine, six fluidounces.
Dissolve the tartarized antimony in the boiling distilled water, then add the wine.

FORMERLY antimonial wine was a fortuitous preparation, by steeping glass of antimony in white wine; a portion of the glass of antimony was dissolved by the supertartrate of potass contained in the wine; and as the quantity of this is variable, so also the quantity of oxide of antimony dissolved varied: and, therefore, the preparation is with propriety entirely rejected, since its strength could never be known. It was also formerly to be regretted, that the strength of the solutions of tartar-emetic in wine, as prescribed by the different colleges, was not uniform. According to the Edinburgh college, one ounce contained two grains of tartar-emetic, while, according to the London, it contained four grains. Both now contain two grains.

In its employment and effects, the vinous solution of tartar-emetic does not differ from one made with water.