

ing. In dropsy the friction should always be made over the whole surface under which the effusion exists. Ovarian dropsy is the least tractable to its operation.

Dr. Turnbull gives a prescription for making pills of the tartrate of veratria, the proportion of the latter in each pill being one-sixth of a grain, which is to be taken every third hour, until the heat and tingling of the surface manifest itself. This internal employment of veratria applies to the same cases as its external application. Dr. Turnbull does not himself appear to have used the remedy internally.

Dr. Copland has been far from equalling the success of the author last named, in his employment of veratria; and indeed it is very probable that Dr. Turnbull has overrated the heroic qualities of the remedy. Dr. Copland has used it chiefly in painful affections; in rheumatism and gout he has found it of no avail, unless its application was accompanied with internal treatment of the digestive organs.

However useful, the exceedingly high price of veratria will probably, for a long time, prevent its general employment.—*Tr.*]

PRUSSIC OR HYDROCYANIC ACID.

In a memoir presented to the Academy of Sciences, in November, 1817, I made known the happy results which had followed the use of prussic acid, in diseases of the chest. The medicine has been since employed by a great number of physicians, both in Europe and America; its success has been uniform, and it may now be regarded as one of the most important of therapeutical agents.

Prussic acid was discovered by Scheele in 1780, but this chemist obtained it mixed with a variable quantity of water; M. Gay-Lussac first made us acquainted with it in a pure state.

Physical Properties.

At an ordinary temperature, it is liquid, transparent, and colourless; its taste is at first cool, but soon becomes acrid and irritating: it reddens slightly the tincture of turnsol. Its odour is powerful, and may be deleterious; it is only supportable when diluted with a certain quantity of air, and then resembles the smell of bitter almonds.

Chemical Properties.

Prussic acid is very volatile: it boils at $26^{\circ} 5$ under a pressure of $0^m, 76$, and at 10° sustains a column of mercury of $0^m, 38$. It is, however, easily congealed, and this takes place at 50° of cold; when also a few drops are poured upon paper, a part evaporates so rapidly as to produce a degree of cold sufficient to crystallize the remainder. It is the only liquid which possesses this property. Prussic acid is little soluble in water; hence when agitated with ten or twelve times its volume of this fluid, it collects again on the surface like oils and ethers. Alcohol readily dissolves it. When left to itself in a closed vessel, it is sometimes decomposed in less than an hour: it can rarely be preserved for more than a fortnight. According to M. Gay-Lussac, hydrocyanic acid consists of

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| Carbon..... | 44.27 |
| Azote | 52.08 |
| Hydrogen | 3.65 |

Or, of one volume of vaprous carbon, one of azote, and one of hydrogen, condensed into two volumes; or, again, of one volume of cyanogen, and one of uncondensed hydrogen.

Preparation of Prussic Acid.

The crystallized deuto-cyanuret of mercury is reduced to powder, and treated with two-thirds of its

weight of fuming hydrochloric acid. The apparatus to be used consists of a small tubulated retort, to which is adapted a tube of sufficient length, bent to a right angle at one of its extremities; this is placed in a very narrow bottle, or, what is better, in a test tube, surrounded with ice and salt. The horizontal part of the tube, which is adapted to the retort, should contain some fragments of carbonate of lime, succeeded by others of chloruret of calcium. The apparatus being thus adjusted, and placed on a small furnace, the deuto-chloruret of mercury, and the hydrochloric acid, are to be introduced into the retort through the tube. A gentle heat is then applied, and the decomposition of the deuto-cyanuret of mercury proceeds; the hydrocyanic acid resulting from the action of the hydrochloric acid on the deuto-cyanuret, passes through the tube, and condenses in the test tube, having been deprived, by its contact with the carbonate of lime and chloruret of calcium, of all the water and hydrochloric acid which may have been volatilized along with it.

Vauquelin has proposed to obtain hydrocyanic acid by decomposing cyanuret of mercury with sulphuretted hydrogen. The apparatus differs little from the last. We substitute for the retort a globe containing a mixture of sulphuret of iron and diluted sulphuric acid. The cyanuret of mercury is placed in the horizontal tube already described, and near the end adapted to the globe; beyond this are placed fragments of carbonate of lead and chloruret of calcium, the one to absorb the small quantity of sulphuretted hydrogen that may not have been decomposed by the cyanuret of mercury, the other to absorb the water which the hydrocyanic acid may have brought along with it. This preparation is almost always impure, and contains sulphuretted hydrogen, because a portion of this gas eludes the carbonate of lead intended to absorb it.

If in the preparation of hydrocyanic acid, according to Gay-Lussac's method, too much hydrochloric acid is added, M. Pelouse states that by the addition of 3 atoms of water, the composition becomes precisely

that of formiate of ammonia, and that therefore a great quantity of the latter, and very little prussic acid, is formed.

Action on Animals.

If one drop of pure prussic acid be introduced into the fauces of the strongest dog, he falls dead after one or two convulsive respirations. A few particles applied to the eye produce similar effects almost as suddenly. One drop of the acid diluted with several of alcohol, and injected into the jugular vein, kill the animal as rapidly as if it were struck by lightning. In animals thus poisoned, scarcely any trace of irritability is discoverable in the muscles a few moments after death.

In the Transactions of the Medical Society of Copenhagen, (vol. ii. 1821,) there is a memoir by Dr. Viborg, in which he states that he has given prussic acid to animals, in very large doses, without causing death. It is evident that the acid he employed must have been prepared by Scheeles' process, or some other which yields the acid very impure. To obtain uniform results, which may be compared with each other, the same process should always be adhered to, and we recommend that of Gay-Lussac or Vauquelin.

Action on man in health or disease.

Prussic acid when pure produces the same effects on man as on animals. Even its vapour should be cautiously avoided, since, when respired, it occasions acute pains in the chest, and a feeling of oppression, which does not subside for some hours. Properly diluted, its action in disease is to allay morbid irritability in certain organs. Given at too short intervals, though in a proper dose, it has been known to produce headach and vertigo, which passed off in a few minutes.

Cases to which it is applicable.

Prussic acid, properly diluted, is employed with success in all cases of morbid irritability of the pulmonary organs. It is advantageously used in nervous and chronic coughs, asthma, and hooping cough, as also in the palliative treatment of phthisis; in the early stage of the latter disease there is reason to believe that it may effect a cure. In England it has been administered with success in hectic cough, sympathetic of some other affection, and also in dyspepsia. Dr. Elliotson has often prescribed it, both in hospital and private practice, prepared according to Vauquelin's process.* He has reported more than forty cases of dyspepsia, with or without vomiting, accompanied with considerable pain of the epigastrium, and pyrosis, which were cured by the use of the medicinal prussic acid. He also cites a case of painter's colic, in which Dr. Prout administered the acid with instantaneous benefit. Dr. Elliotson has prescribed it in many affections of the chest, and has almost always found it relieve the harassing cough. Applied externally in lotions, in different diseases of the skin, it has afforded no very marked results in the hands of Dr. Elliotson. Dr. Thomson,† however, alleges that he has used it with constant success against the itching and smarting so annoying in these affections, and that he has cured with it several species of cutaneous disease, and especially *acne rosacea*.

M. Jacob Bouchenel ‡ has published a very interesting paper on prussic acid as a remedy in chronic pulmonary catarrh, of which he gives four successful cases. He observes that this medicine in small doses produces no more inconvenience than a common linctus; that its use is not proper in the acute stage; and that its success is always most certain when antiphlogistic measures

* This is mentioned here, because in England the process of Scheele is almost exclusively used.

† London Med. and Phys. Journ. Feb. 1822.

‡ Bulletin de l'Athénée de Médecine.—Nouvelle Bibliothèque Méd. Août, 1824.

have been previously adopted. He has also employed prussic acid in a case of phthisis, but only with momentary relief of the cough; and doubts whether prussic acid has ever really cured confirmed phthisis. I can, however, maintain, without hazarding a rash assertion, that I have cured with this medicine individuals who had every symptom of phthisis in the first degree, and even those in a more advanced stage.

In Italy the medicinal hydrocyanic acid has been used to allay morbid irritability of the uterus, even in cases of cancer, and to diminish the activity of the heart in all sthenic diseases.

Professor Brera* extols its effects in pneumonia, and recommends it also in rheumatism, and as an anthelmintic. Since the professor has employed it in diseases of the heart, Dr. Macleod has tried it in similar cases, and found it allay nervous palpitations, especially those caused by a deranged state of the digestive functions; he has also used it as a palliative in some cases of aneurism of the heart. He never exceeded 28 drops in the twenty-four hours, and has not seen any accident result from the administration of the medicine.

Dr. Frisch, of Nyborg, has relieved intolerable pains occasioned by cancer of the breast, and which had resisted all the antispasmodics, by washing the ulcerated surface with diluted prussic acid. He has likewise found benefit from this medicine in several cases of phthisis, one of which was cured.†

Medicinal Employment.

Prussic acid, prepared as Scheele directs, is not sufficiently uniform on account of the latitude which his process allows to the operator. Prepared according to Vauquelin's method, it retains a portion of

* Prospetti de Resultamente nella Clinica Medica, page 29. 1816.

† Bibliotek forlægeret Nyc Hyæga.

sulphuretted hydrogen. It is, therefore, better to use the acid afforded by Gay-Lussac's process duly diluted. I mix it with six times its volume, or 8.5 times its weight of distilled water. This is the mixture which I call *medicinal prussic acid*.

The medicinal prussic acid may also be made by diluting the hydrocyanic acid with six times its volume of alcohol; it thus preserves its active properties better, and evaporates much less quickly than when mixed with water. It has been recently proposed to employ a more concentrated preparation, as for example, three-fourths of water to one of acid; but this method appears to have no advantage over that in general use. The following I most frequently employ:

Pectoral Mixture.

Medicinal prussic acid..... 1 gros.
Distilled water 1 livre.
Pure sugar..... 1 once.

Dose, a table spoonful night and morning. The dose may be increased to six, or even eight table spoonful in the twenty-four hours. Care must be taken to shake the mixture before using it, as the acid accumulates on the surface, from which serious consequences might ensue.

Pectoral Potion.

Infusion of ground ivy 2 ounces.
Prussic acid 15 drops.
Syrup of marshmallows 1 once.

Dose, a table spoonful every three hours, shaking the phial.

Cyanic Syrup.

Simple syrup, well clarified.. 1 livre.
Medicinal prussic acid..... 1 gros.

This is added to pectoral mixtures, and substituted for other syrups.

Mixture for Lotions.

Medicinal hydrocyanic acid 1 to 2 gros.
Lettuce water..... 1 pinte.

The proportion of acid may be increased to four gros. Used as a lotion in tetter and cases of ulcerated cancer, and as an injection in cancer of the uterus.

Remarks on Prussic Acid.

The employment of the *prussic acid of Scheele* is objectionable on the ground that the proportion which the acid bears to the water is never uniform. When it is attempted to remedy this inconvenience, by preparing the acid called Scheele's, by diluting the pure acid of Gay-Lussac with water, what quantity of the latter is to be added? M. Robiquet (*Journal de Pharmacie* 1818) has proposed to mix two parts of water with one of pure acid. Scheele's acid thus prepared, is twice as strong as that we recommend, and is therefore inconvenient in its application. This inconvenience is increased by the inaccurate manner in which the process of M. Robiquet is given in the *Parisian Codex*. Citing the memoir of M. Robiquet, this formulary orders the prussic acid to be diluted with an equal quantity of water; it then gives a receipt for a syrup in which prussic acid, thus mixed, enters in the proportion of one part to nine of simple syrup. The syrup thus prepared could be administered only by drops; if by mischance an ounce of it were blended with a mixture, the effect might be fatal.*

Notwithstanding all we have said concerning the

* Many serious consequences have occurred from the use of the syrup of the new codex.

Dr. Magendie relates some instances in proof of his assertion as to the uncertainty and consequent danger of this formula of the codex. I have omitted the details, since they refer to the errors of a pharmacopœia with which British practitioners are not liable to come into contact.—*Tr.*

strength of Scheele's prussic acid prepared according to the codex, and the method of M. Robiquet, many physicians believe it to be much weaker than our *medicinal prussic acid*, and order it sometimes in the dose of a gros of a four-ounce mixture to be taken by spoonfuls. The Parisian apothecaries are for the most part so accustomed to see the *prussic acid of Scheele* enter in large quantity into medical prescriptions, that, in order to prevent accidents, they prepare this acid by diluting the acid of Gay-Lussac with forty parts of water. This quantity of water, which is altogether arbitrary, enables them at least to fulfil without danger the directions they receive when they see by the largeness of the dose that it is not my medicinal acid, that the physician means to prescribe.

[The want of uniformity in the strength of hydrocyanic acid in Paris is perhaps no more deplorable than the same in London. My learned friend Mr. Everitt, professor of chemistry to the Medico-Botanical Society, read a paper to that institution in December last on the subject. In it he stated that he examined samples of the acid procured from various shops in town, and that the frightful difference of strength had induced him to call the attention of the profession to the subject. Thus, samples from Allen, Hanbury and Co. yielded 5.8 per cent; from Apothecaries' Hall from 2.1 to 2.6 per cent. and from several other sources only 1.4 per cent. In all these instances he asked for Scheele's strength. Hence, if a practitioner were pushing the exhibition of prussic acid gradually to a maximum dose, the prescriptions being carried to a shop where the acid had only 1.4 per cent. and then by some accident, or other cause, taken to where Allen's acid was used, a sudden and perhaps fatal increase would be the result, for more than a triple quantity would be taken. Mr. Everitt, in confirmation of the possibility of such an event, referred to a case of seven individuals near Paris, being killed by a slightly increased dose; a few

years ago. And the death of a gentleman from taking his ordinary dose of the medicine, was related in the newspapers not long ago—an event that must have been owing to the varied strength of the acid.

Mr. Everitt also mentions, in a paper published in the London and Edinburgh Philosophical Magazine for February, 1835, that as the decomposition of the ferrocyanuret of potassium, by means of sulphuric acid, is likely to become the only method by which hydrocyanic acid will be prepared for chemical and medical purposes, on account of the cheap rate at which this salt is now to be had pure, it would be well to ascertain the precise re-action that takes place in the process, and the requisite quantities of the re-agents. His experiments and reasoning go to show that to every 212.47 grains of ferrocyanuret of potassium dissolved in two ounces of water, as much dilute sulphuric acid should be added as shall contain 120 grains of real acid, and that by conducting the distillation carefully 41 grains of hydrocyanic acid pass off with the first third of the water. But the process he prefers over all others, is as follows: “Into a phial capable of holding rather more than one fluid ounce, put 40 grains of the cyanuret of silver, (the preparation of which may be found in most modern works on chemistry,) add 7 ounces 10 minims of water and 40 minims of the dilute hydrochloric acid; cork closely, shake several times for the first quarter of an hour, set aside to allow the chloride of silver to fall, decant the clear liquid into another bottle, to be preserved for use; every fluid drachm will contain one grain of real hydrocyanic acid.” The cost of this preparation would be one shilling per ounce of the acid.

With regard to the therapeutical agencies of prussic acid, the accumulated evidences in its favour to be found in all our British Journals leave no place for doubting its efficacy. Its utility in pectoral affections is well known, but as a general remark it may be said that it is more particularly applicable in coughs of a spasmodic character, hooping cough for instance. In fact,

all spasmodic movements or pains appear to yield to its power. In more than one instance I have given it with the best effects in gastralgia, and in dyspeptic cases, accompanied with spasm of the stomach. At this time, in conjunction with Dr. James Blundell, I am administering it in such a case with success.

A curious fact in reference to the effects of prussic acid on the animal system, is stated by Dr. Scanlan, (Dublin Journal of Med. and Chem. Science, March, 1832,) namely, that it *ergotizes* the crane-fly (*tipula*,) promoting parturition, by strong convulsive efforts.—*Tr.*]

SOLUTION OF CYANURET OF PURE POTASSIUM AS A SUBSTITUTE FOR PRUSSIC ACID.

In consequence of the liability to uncertainty in the strength of medicinal prussic acid, MM. Robiquet and Villermé were induced to think that the cyanuret of potassium might be advantageously substituted for that medicine, the more as its effects on the animal economy are the same.

Mode of Preparation.

M. Robiquet's process consists in exposing ferruginous prussiate of potass for some time to well-sustained heat in a stone crucible, taking care to stop the mouth of it during the period of its cooling. By this means the cyanuret of iron is completely decomposed, and that of potass remains unaltered. The residue of this intense calcination is a blackish lamellar mass, which is, in fact, the cyanuret of potassium, rendered dark by the iron and carbon belonging to the cyanuret of iron. This mass is to be washed in water: it deposits iron and carbon, whilst the cyanuret of potassium dissolves, and is transformed into hydrocyanate of potass.

When the operation has been well conducted, the solution is perfectly colourless, and retains no portion