

**A formulary for the preparation and medical administration of certain new remedies / translated from the French of M. Magendie, with annotations and additional articles by James Manby Gully, M.D.**

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# A FORMULARY

FOR THE  
PREPARATION AND MEDICAL ADMINISTRATION  
OF CERTAIN  
NEW REMEDIES.

TRANSLATED FROM THE FRENCH OF  
M. MAGENDIE,  
WITH  
ANNOTATIONS AND ADDITIONAL ARTICLES,

BY  
JAMES MANBY GULLY, M.D.

TRANSLATOR AND EDITOR OF THE ENGLISH EDITION OF TIEDEMANN'S  
"COMPARATIVE PHYSIOLOGY."

*Second Edition.*

LONDON:  
JOHN CHURCHILL, PRINCES STREET, SOHO;

AND  
JOHN CARFRAE AND SON, EDINBURGH.

MDCCCXXXVI.



A FORMULARY

FOR THE

PREPARATION OF AGRICULTURAL ADVERTISEMENTS

BY

J. C. H. R. M. D. E. S.

OF THE

M. MAGNIFICENT

AND

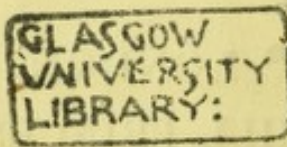
ANALYTICAL AND ADDITIONAL ADVERTISEMENTS

BY

JAMES MAXWELL GILLY, M.D.

OF THE

Second Edition



LONDON :

IBOTSON AND PALMER, PRINTERS, SAVOY STREET, STRAND.

W. H. & C.

TRANSLATOR'S  
PREFACE TO THE FIRST EDITION.

---

THE popularity of this work in France has been testified by the necessity for an eighth edition, which issued from the press in the month of March of the present year.

The previous English editions of the Formulary were also well received in this country, and I considered that fact sufficient inducement to undertake the present one. But besides this, in beholding the parliamentary pace of our British Pharmacopœias in the official recognition and adoption of the numerous and active remedies which the chemists of France are continually sending forth, and her physicians assiduously making application of in disease, I see every reason why such a publication as the present should be necessary to, and approved of by, the laudably curious and inquiring medical man. And it is not improbable that much of the apathy displayed by the majority of British practitioners in the discovery and applications of many of those remedies, is owing to the absence of such adoption of them on the part of the corporations to which they habitually look as the judges of what is, and what is not, adapted for medicinal employment.

Be this as it may, it is certain that whereas most of the substances forming the subject of this work have been in common use on the continent for several, and some for many, years, very few of them have been so



employed in this country, and many are only known in name to the mass of practitioners. It is only by placing before them in a compendious form the properties and modes of administration of the substances in question, that the desirable end of their ultimate and general introduction into British practice can be attained. This, I conceive, the present Formulary admirably adapted to do.

Like the greater number of French writers, M. Magendie is sometimes given to slide into *longueurs*. In such instances I have made rather a paraphrase than a close translation of his words. Again, as the continual transformation of the French measures and doses would have led to confusion, if not error, I have preferred to retain them in the original terms, referring the reader to the subjoined comparative table of the French and English weights and measures. In all other respects I have closely adhered to the text.

To many of the articles I have appended in brackets such notes as my own reading and observation, or those of my more talented medical friends, have given me opportunity of compiling.

As Creosote is a remedy that promises to take a conspicuous station among therapeutical agents, I have, under the head of "Additional Articles," given an account of its preparation, properties, and applications. In the same category I have placed the Ioduret of iron.

11, Gerrard Street, Soho.

J. M. GULLY.

May 1835.



## TRANSLATOR'S

### PREFACE TO THE SECOND EDITION.

---

WITHIN the space of twelve months from its publication, a large edition of this work has been exhausted. Not so, however, are the demands for it; they, as I have reason to know, being still numerous.

Such being the case, I could not but second what appears to be the wish of the medical public, and the present edition has accordingly been issued.

In it I have endeavoured to make several improvements, most of which are in accordance with the judicious criticisms that have been passed on its predecessor in various periodicals, as well as with the progression of facts, having reference to the particular subjects of this work. The latter is more especially the case in the article "Creosote," to which I have made considerable additions. I have also endeavoured more closely to approximate the relative proportions of the English and French weights. Where, however, the word "gros" occurs I have called it a drachm, the quantities implied by both terms being as



nearly as possible equivalent. The "cuillerée à bouche" I have translated into "table-spoon" and the "cuillerée à café" into "tea-spoon."

It has been urged against this translation that it is too condensed. How condensation can be a fault when the facts are preserved, it is hard to comprehend. But if it be so, it is one which passed unnoticed in the first English editions; indeed they are much more condensed than the present one. Besides, I confidently appeal to those who, like myself, have translated extensively from the French medical writers, to state whether it is expedient, not to say philologically correct, to adhere with scrupulous closeness to their voluminous modes of expression. I cannot think that exact counterparts of such would be palatable to the majority of English readers.

*Gerrard Street, Soho.*

*August 1st, 1836.*

*Comparative Table of French and English Weights  
and Measures.*

FRENCH WEIGHTS.	ENGLISH WEIGHTS.			
	Avoirdupois.			
	lb.	oz.	dr.	gr.
Kilogramme, or 1000 grammes .....	2	3	0	0
Gramme.....	0	0	0	15
Livre, or 500 grammes .....	1	0	8	0
Once, or $31\frac{1}{4}$ grammes.....	0	0	9	6
Gros, or $3\frac{7}{8}$ grammes.....	0	0	0	60
Grain.....	0	0	0	$0\frac{2}{10}$

FRENCH MEASURES.	ENGLISH MEASURES.		
	oz.	dr.	min.
Litre .....	35	2	0
Pinte*.....	32	3	0
Livre.....	16	2	0
Once .....	1	1	0
Gros.....	0	1	5
Gramme .....	0	0	16

The French chemists always calculate fluids by weight.

\* This is an old French measure, the weight of which is 58.110 cubic inches; that of the litre is 61.0280: yet in 1812 both were declared to be the same!





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# FORMULARY

FOR THE

EMPLOYMENT OF SEVERAL NEW REMEDIES.

---

## RESIN OF NUX VOMICA.

IN the year 1809 I presented to the senior class of the French Institute an account of a series of experiments which had led to the discovery that a whole vegetable family, the bitter strychni, possessed the property of stimulating the spinal marrow to an extraordinary development of its functions, without implicating, otherwise than indirectly, those of the brain; and I then observed that this discovery might be beneficially applied in the treatment of disease. This conjecture has since been abundantly confirmed by numerous evidences at the bedside of the patient. M. Fouquier had, some years before, published several cases of palsy which he had cured by *nux vomica*, and similar experiments had been made with success by myself. Since that time I have never ceased to employ the alcoholic extract of *nux vomica* with the best results, not only in paralysis, but in several other kinds of general or partial debility of the system.

### *Preparation of the Alcoholic Extract of Nux Vomica.*

Exhaust a given quantity of rasped *nux vomica* with alcohol at 40°, and at the lowest possible temperature; then evaporate slowly to the consistence of an extract.

B



A weaker spirit gives a much weaker product, as much gummy matter is then taken up by it. The most eligible spirit, because it is most easily obtained, is that at 36° of Cartier's areometer.

*Dry Spirituous Extract of Nux Vomica.*

Filter and evaporate to a pilular consistence, any quantity of very strong alcoholic tincture of nux vomica. This extract should be kept in a dry locality, on account of its avidity for moisture: for the same reason, when made into pills, they should be well covered with liquorice powder.

*Physiological Action.*

A grain of the extract absorbed by any part of the body, or taken with food, very shortly kills a middle sized dog, by inducing tetanic attacks, which ultimately obstruct the respiration, and produce asphyxia. A stronger dose produces the same effects, by a direct action on the nervous system. (See Segalas, in *Journal de Physiologie Expérimentale*, 1822.) M. Defermon describes, and I have myself seen a contracted state of the spleen consequent on poisoning by this substance. A shock resembling that from electricity takes place in the animal under the action of this poison whenever it is touched: this may be frequently repeated. The division of the cervical spinal marrow, and even complete decapitation, do not prevent the operation of the resin in question—a characteristic which distinguishes the strychnos from all other stimulants.

No traces of its action are found after death.

*The action of this extract on the healthy system of man* resembles that above described. Nor can any traces of its action be detected in the tissues, except those of the asphyxia that has immediately caused or accompanied death.



*Action on the Morbid System.*

The effects above described more particularly refer to the diseased parts, which are especially the seats of the tetanic shocks, and the creeping sensation and local sweat that announce the action of the remedy. In hemiplegia so treated, whilst the sound side remains quiet, the diseased side is affected with rapidly-succeeding shocks, copious local sweat, and a general tremor. Sometimes an anomalous eruption is seen on the affected side, the opposite side meantime being altogether free from it. Even one side of the tongue is occasionally sensible of a decidedly bitter taste, which does not exist in the sense of the other. If the dose is augmented, both sides enter, but unequally, into a tetanic state, which is sometimes violent enough to throw the patient out of his bed. In very small doses the action of the extract is scarcely appreciable until after several days.

*Diseases in which the spirituous Extract of Nux Vomica is applicable.*

The cases for its exhibition are all diseases of local or general debility, and all kinds of general or partial paralysis. M. Edwards cured amaurosis with palsy of the upper eyelid, with it. I have seen most beneficial results from its use in debility of the genital organs, incontinence of urine, in languid stomachs accompanied with somnolency, and in partial atrophy of the upper and lower extremities. It should not be given in paralysis immediately after sanguineous effusion on the brain; indeed, much benefit cannot be anticipated from it when any great organic lesion exists. M. Chauffart (*Journal Gén. de Méd.* 1825) gave twenty grains in a case of palsy after apoplexy, without success, though the patient had strong tetanic shocks from its long continued employment. On the other hand, he relates three cases of palsy—one of them of the rectum—that were cured by the remedy.



In the 8th vol. of the New York Medical Repository, Dr. Baxter has recorded the successful treatment of hemiplegia after measles in a child three years and a half old; he gave the patient half a grain of the extract of nux vomica every four hours. M. Gendron (Journ. Gén. de Méd. 1824) also gives an instance of the success of the medicine in paralysis of the left arm; the cure was effected in a fortnight, and the dose pushed to 36 grains in twenty-four hours: the patient complained of a prickly feeling of the limbs and shooting pains of the toes. M. Cazenave, of Pau, has successfully used it in a case of chorea.

*Mode of employing the Extract.*

Pills are the preferable form, and each of them should contain a grain of the extract. The commencing dose is one or two of these, and it may be gradually increased until the desired effect is produced. They should be given in the evening, the night being the best time for ascertaining their effect. Occasionally, it is necessary to raise the dose to 30 or 36 grains in the day, before tetanic shocks are produced: 4 or 6 grains, however, are more usually sufficient. If the remedy is suspended for a time, it should be recommenced in small doses, and then be only gradually increased. Is a slow effect to be produced, half a grain or a grain in the day is sufficient. A spirituous tincture, according to the following formula, may likewise be employed:

*Tincture of Nux Vomica.*

Alcohol at 36° . . . . .	1 ounce.
Dry extract of nux vomica . . . .	4 grains.

A few drops of this may be given in any mixture: it may be also rubbed into palsied or atrophied parts, as is frequently done in Italy. I have used it in this manner, but I generally find that it succeeds better in combination with ammonia, as in this formula:

Tincture of nux vomica . . . . .	1 ounce.
Concentrated ammonia . . . . .	2 drachms.



With this liniment I have been tolerably successful in treating the Asiatic cholera.

[Though the beneficial effects of nux vomica on the mucous membranes are well known, it is probable that its application to them is much less frequent than might be. Dr. Geddings, (North American Archives of Medical and Surgical Science, Nov. 1834,) has recently employed the nux vomica in cases of dysentery, where the febrile symptoms were not strongly developed, but where the frequent necessity of going to stool, tenesmus, sense of weight in the rectum and passage of sanguinolent mucus, alone stamped the dysenteric character of the disease. In some of these cases the remedy proved useful, though not effectual in the cure; in others, the action was most beneficial.

He begins by administering powdered nux vomica in the dose of seven grains, three times a-day. In one individual the disappearance of the colic, tenesmus, &c. was surprisingly rapid. The same remedy succeeded in other cases, as did also Pelletier's alcoholic extract given in the dose of two grains three times a-day, and the acetate of strychnia in quantities from 1-12th to 1-6th of a grain. Dr. Geddings thinks it advisable to add a small proportion of opium to any of these forms of nux vomica.

A recent writer, Dr. Most, has used nux vomica with advantage in what he terms pituitous dysentery: he recommends the following formulary:

Take 60 grains of nux vomica: boil for half-an-hour in a quantity of water, so that it shall be reduced to 6 ounces; then add a drachm of tincture of opium. Of this a dessert spoonful may be taken every two hours.

A Swede, Hagstrom, was the first who used and recommended nux vomica in dysentery. Hufeland also gave it with advantage in epidemic dysentery. Thoman and Richter say it is a powerful calmer of the painful colics of that disease: the latter prescribes it thus:



Extract of nux vomica . . . .	2 scruples.
Mucilage . . . . .	1 ounce.
Distilled water . . . . .	6 ounces.
Syrup of marsh mallows . . . .	1 ounce.—Mix.

A table-spoonful every two hours.—*Tr.*]

## STRYCHNIA.

The spirituous extract of nux vomica, nux vomica itself, St. Ignatius's bean, the Javanese poison, (the *upas tieuté*,)\* and the snake-wood, all owe their violent action on animals to two vegetable alkalies discovered by Pelletier and Caventou, one called *strychnia*, the other *brucia*. These alkalies are found in combination with a vegetable acid, the *igazuric*. (See Ann. de Chim. 1819.)

### *Preparation of Strychnia.*

Dissolve the spirituous extract of nux vomica in water, and add solution of acetate of lead until all precipitation ceases. On separating the superfluous matter, the strychnia remains in solution with some colouring matter, and sometimes an excess of acetate of lead, which is to be separated by a current of sulphuretted hydrogen; then filter and boil with magnesia, which combines with the acetic acid and gives a precipitate of strychnia and brucia. Wash these in cold water, redissolve in alcohol in order to separate any excess of magnesia, and by evaporation a mixture of strychnia, brucia, and colouring matter is obtained. Macerate the whole in a little weak alcohol, in which the brucia and colouring matter are easily soluble, while the strychnia remains in the shape of a powder,

\* This is different from the *upas anthiar*, causing death by tetanus, whilst the *anthiar* is fatal by producing excessive vomiting. MM. Pelletier and Caventou have extracted a vegetable salifiable base from the last-named plant, which is highly poisonous. (Ann. de Chim. et de Phys. t. 26.)



and is taken up by boiling rectified alcohol. Evaporate, and the strychnia crystallizes. A small quantity of the alcoholic mother-waters should be left in order to withdraw the remains of the brucia. By a second crystallization the strychnia is obtained still more pure. It is, however, almost impossible to get a perfectly pure strychnia from *nux vomica*, and which does not redden with nitric acid—the sign of its purity. The strychnia procured from the St. Ignatius' bean approaches that state, but the *upas tieuté* readily affords a perfectly pure substance.

[M. Deloche proposed to the Société de Pharmacie (July 1, 1835,) to procure strychnia and brucia by fermentation alone. M. Corriol, however, informed the society that he had already tried that method, and procured only a copious deposit of lactate of lime.—*Tr.*]

#### *Physical and Chemical Properties.*

Strychnia obtained by the above process appears in the form of microscopic crystals, which are four-sided prisms terminated by pyramids with four depressed faces. When rapidly crystallized it is white and granular, is intolerably bitter, and leaves a taste like that of some metallic salts: it has no smell. It is not changed in the air, and is neither fusible nor volatile, melting only at a degree of heat which decomposes and chars it—a degree lower than that at which most vegeto-animal matters are destroyed. Exposed to a naked fire, it swells, blackens, gives off empyreumatic oil, some water and acetic acid, some traces of carbonic acid, carburetted hydrogen, and carbonate of ammonia. Distilled with deutoxide of copper it yields a large quantity of carbonic acid and azote.

According to M. Liebig, a hundred parts of strychnia give—

Carbon . . . . .	76.43
Azote . . . . .	5.81
Hydrogen . . . . .	6.70
Oxygen . . . . .	11.06



He also found the atomic composition to be C. 30, A. 2, H. 32, O. 3.

Notwithstanding its intensely bitter taste, strychnia is almost insoluble in water, requiring 6,667 parts of water for its solution at a temperature of 10°, and 2,500 parts, or less than half that quantity, of boiling water. It is remarkable, that a cold solution of strychnia which only contains 1-6000th part of its weight may be diluted with 100 times its volume of water, and still be decidedly bitter. The principal chemical characteristic of strychnia is its power of forming neutral salts with acids.

The above-mentioned processes, according to Pelletier and Caventou, show the existence in *nux vomica* of two alkaline principles, one strychnia, the other brucia, which they had already found in the spurious *angustura*. The strychnia should be repeatedly crystallized from alcohol, and is then pure and free from brucia, which being exceedingly soluble in alcohol and difficultly crystallizable, remains in the alcoholic mother-waters. The presence of brucia is, however, of minor consequence, as its properties resemble those of strychnia, only in minor degree.

M. Henry obtains strychnia by boiling *nux vomica* in water, evaporating to the consistence of a syrup, and adding lime which unites with the igazuric acid, and sets free the strychnia. Alcohol separates the latter from the lime, and it is obtained by evaporation; by repeated crystallization it is purified. This process is good, for it affords a pure and cheap article.

In order to ascertain the presence of brucia with strychnia procured from *nux vomica*, the resinous matter obtained in evaporating the alcohol of strychnia should be treated with sulphuric acid, and precipitated from the solution of the double sulphate, whilst still warm, with very weak watery solution of ammonia. The strychnia first precipitates in powder, the brucia subsequently in soft masses: by pouring off the fluid after the first precipitation, a rough separation of the two principles may be effected, and may suffice when manufacturing strychnia in large quantities.



Henry proposes another method of purifying strychnia, by combining it with nitric acid; but the great care that is requisite to prevent the re-action of this acid is an objection to its use. The muriatic or sulphuric acids are preferable. After decolorizing the salt that is formed by animal charcoal, the strychnia is precipitated by ammonia. At the time Henry proposed this process, the co-existence of brucia with strychnia in nux vomica was not known, and accordingly he makes no mention of the former. When, however, strychnia is obtained by crystallization, it will be free from brucia; when by precipitation, brucia will be present to a considerable extent, and the powers of the remedy diminished.

Unfortunately, the St. Ignatius's bean is seldom found in commerce, for it contains strychnia, according to Pelletier, almost entirely free from brucia.

#### *Action of Strychnia on Man and the lower Animals.*

This resembles in all particulars the action of the preceding extract of nux vomica, being only much more violent. The eighth of a grain kills a large dog, and a quarter of a grain has generally a marked action on a healthy man.

#### *Diseases in which Strychnia is used.*

Strychnia is applicable in the same cases as the resin of nux vomica, which might indeed altogether supersede strychnia, were it always procured in the same way, and therefore always of a certain strength. From the greater uniformity of the strychnia, I think it is in general to be preferred, the more as I have derived equal benefit from it as from the spirituous extract.

M. Cattaneo has published a memoir in the *Annali Universali*, No. 32, entitled *Della Strychnina, nuovo alcali vegetale*, &c. &c. which contains many interesting facts in relation to its therapeutical effects.



*Mode of prescribing Strychnia.*

Pills containing one-twelfth or one-eighth of a grain may be made according to this formula :

Very pure strychnia . . . . .	2 grains.
Conserve of roses . . . . .	$\frac{1}{2}$ drachm.

Mix accurately, and divide the mass into twenty-four pills.

*Tincture of Strychnia.*

Alcohol at 36° . . . . .	1 ounce.
Strychnia . . . . .	3 grains.

From six to twenty-four drops in any mixture or drink.

I have frequently employed the following mixture :

Distilled water . . . . .	2 ounces.
Very pure strychnia . . . . .	1 grain.
White sugar . . . . .	2 drachms.
Acetic acid . . . . .	3 drops.

A tea-spoonful to be taken morning and evening.

Strychnia is sometimes combined, as in the following :

Strychnia . . . . .	2 grains.
Black oxide of iron . . . . .	1 drachm.
Powdered sugar and gum, of each	1 drachm.

Mix and divide into eight powders.

The subcarbonate of iron may be substituted for the black oxide.

Strychnia may be advantageously used in the endermic method, by blistering the epidermis, and powdering the surface with it. I have frequently done this on the temples in amaurosis and palsy of the eyelids.

*Salts of Strychnia.*

United with acids strychnia forms crystallizable, and for the most part soluble salts—a fact that should



be attended to in prescribing it in such beverages as lemonade and other acid drinks. The subcarbonate of strychnia is of very sparing solubility. The following are some details concerning these salts.

*Sulphate of Strychnia* is soluble in less than ten parts of cold water, and crystallizes in minute transparent cubes, if neutral, and in needles if the acid is in excess. It is excessively bitter, is decomposed by all soluble salifiable bases, is not altered by exposure to the air, and when heated at a temperature of one hundred degrees it loses no weight, but becomes opaque. At a higher temperature it fuses and falls into a mass, with a loss of three per cent. in weight: further application of heat decomposes it. Its composition is

Sulphuric acid . . . . .	9.5
Strychnia . . . . .	90.5

According to Dumas and Pelletier, 100 parts of the base saturate 10,486 of acid.

The *hydrochlorate* is still more soluble than the sulphate; it crystallizes, and the crystals appear, through a lens, to be quadrangular prisms: heated to the decomposing temperature of its base, it gives off muriatic acid.

The *phosphate* is only obtained perfectly neutral by double decomposition. It crystallizes in four-sided prisms.

The *nitrate* is procured by dissolving strychnia in very diluted nitric acid; on evaporation it crystallizes in pearly needles. It is much more soluble in warm than in cold water. Its action is even more energetic than that of strychnia.

The acetic, oxalic, and tartaric acids form exceedingly soluble salts with strychnia, which are crystallizable, particularly if the acid be in excess. The neutral acetate is very soluble, and crystallizes with difficulty. Hydrocyanic acid also forms a crystallizable salt with this base.

The subcarbonate is obtained in the shape of white flakes; it is sparingly soluble.

*Hydriodate of strychnia* is readily obtained by mix-



ing a solution of ioduret of potassium and a concentrated solution of acetate of strychnia, when a pure hydriodate of strychnia is immediately precipitated as a white crystalline powder, sparingly soluble in water, but soluble in alcohol.

A large proportion of acid combined with a small quantity of strychnia would possess the double medicinal property of acting on the nutrition of the organs and of exciting the nervous system.\*

### *Action of the Salts of Strychnia.*

These salts, from their greater solubility, are more active, and consequently more poisonous than their base.

### *Mode of Employment.*

When the patient is habituated to the action of strychnia, the salts may be sometimes advantageously substituted for it. I have tried the sulphate, and found it produce decided effects in the dose of 1-12th of a grain in a paraplegic female. I have also for some time past used the iodate with the best results in reputedly incurable cases. (*For the preparation of the iodate, see the article Iodine.*)

I must remark, in conclusion, that too much attention cannot be paid by chemists to the preparation and dispensing of these violently poisonous substances.

[Pills of 1-12th of a grain of strychnia have been successfully employed by various British practitioners in numerous cases of paralysis, paraplegia of long standing, hysteria, epilepsy, chlorosis, dyspepsia, intermittent fever, neuralgiæ of the scalp, eye, nose, tongue, face, superior and inferior extremities, in chronic rheumatism, gout, and rheumatic gout, and diarrhœa with rice-coloured evacuations which prevailed during

\* I am at a loss to see any distinction in these actions; any change in the nervous masses or organs must be accompanied with some modification of nutrition in them.—*Tr.*



malignant cholera. Few patients bear more than four or five pills, though the alvine evacuations are regularly induced by aperients during the use of this remedy. Several forms of hysteria, even when the disorder approaches catalepsy, have been known to be cured by it. Dr. Ryan tells me he has known a few doses of the above pills suppress diarrhœas of fifty rice-coloured evacuations, and when the extremities of the patient were blue. In the former case the medicine caused constipation, which continued for three days. It is remarkably efficacious in neuralgiæ of different parts. It cured epilepsy in young persons after all other remedies had failed to afford relief. He is in the habit of ordering an aperient composed of compound extract of colocynth, calomel, and oil of peppermint, to keep the bowels regular during the use of the strychnia: he has even found the medicine afford alleviation in disorganizations of different parts, which produced pain and disorder in all the other functions. In paraplegia caused by exposure to cold, and without any spinal curvature, which was of fourteen years' duration, and which had been declared incurable, the strychnia afforded such benefit that the sufferer was shortly able to walk with the aid of a cane. This was remarkable, as the patient was a tailor, who was compelled to follow his trade in order to maintain his wife and family. The position of this man at work was injurious to his condition. The remedy is valuable in chlorosis combined with hysteria and the numerous other anomalous symptoms usually attendant on that disorder. The general health is to be attended to at the same time. In the varied forms of indigestion and hypochondriasis, strychnia is valuable combined with other remedies, as with the compound rhubarb pill, blue pill, and a few drops of peppermint oil.

Such a combination is efficient in the milder forms of dyspepsia; but when the bowels are more obstinately constipated, compound colocynth extract may be substituted for the rhubarb pill, and calomel for the blue pill, a little extract of hyoscyamus being added, to obviate griping and irritation.



Dr. Ryan states, that he has known this remedy fail in relieving all cases of hysteria, neuralgiæ, &c. He also dwells upon the fact, that few patients can bear more than 4 or 5-12ths of a grain daily. He has also employed the different preparations of this remedy, except the iodate or ioduret of strychnia, recommended by M. Magendie. He assures me that he prescribes it constantly, but has never observed it to induce bad effects, when the bowels were properly regulated and the medicine exhibited in appropriate cases.

My learned friend, Dr. Copland, who has made extensive experiments of the uses of this remedy, says, that in cases where the habit of body is greatly debilitated, and where therefore the purely tonic effects of *nux vomica* and its preparations are required, he has found in general the alcoholic extract preferable to strychnia. Instances of such cases are the amenorrhœa of debility and chlorosis. Of all the kinds of paralysis, he has found strychnia most decidedly beneficial in that arising from lead poison. The local external application of strychnia he has also made, and made with success: rubbed into the temples in cases of amaurosis he has found it answer a good purpose. Cases of success, with a similar treatment, may be found in the *Medical Gazette*, vol. v. p. 541—575.

Together with Dr. Badgley, of Kensington, I have seen the benefits arising from the use of strychnia, in epilepsy; in the case in question the patient was a robust, full-blooded man, and the remedy was given after sanguineous and alvine depletions.

I have known strychnia put a stop to a most inveterate hiccup of some weeks continuance. I am at this time using it in a case of catalepsy, and with marked advantage; the patient is a young lady of highly hysterical temperament and great cerebral developement, yet none but good effects result from a grain given in the course of thirty hours.

Since the last edition of this translation I have employed strychnia in large doses, and by the endermic



method in a case of amaurosis, but without beneficial effect, though tetanic convulsions evidenced its decided action on the spinal cord.

Further and numerous observations of British practitioners on this remedy may be found in Bardsley's Hospital Reports, and the Transactions of the Midland Association, vols. i. and ii., to which the nature of the present work does not allow me to do more than refer the reader.

The French practitioners do not appear to have gone beyond paralysis in their application of nux vomica.

Long ago, Linnæus conjectured the highly tonic powers of the strychnos nux vomica, from the intense bitterness of its aqueous solution.—*Tr.*]

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## BRUCIA.

This organic salifiable base was discovered in 1819, by Pelletier and Caventou, in the bark of the spurious angustura (*brucea antidysenterica*,) in which it is combined with gallic acid. They subsequently found it in combination with strychnia in the nux vomica. In the St. Ignatius's bean and the upas tieuté, the brucia bears the same relation to the strychnia, which cinchonia does to quinia; the more active cinchonas containing the most quinia, just as the bean and the upas tieuté, which are much more active than the nux vomica, contain only a small proportion of brucia, and a large quantity of strychnia, which, in the upas, is nearly pure.

### *Preparation of Brucea.*

It is obtained from the bark of the angustura, by a process resembling that for the extraction of strychnia, only, that in the case of brucia the magnesian precipi-



tate is to be much more sparingly washed with water, the brucia being more soluble in that fluid than strychnia. By evaporating the alcoholic liquors, in which the magnesian precipitate has been treated, brucia is obtained in an impure, non-crystallized form. To purify it, combine it with oxalic acid, and digest the oxalate in a mixture of alcohol, at 40°, and ether at 60°, by which the colouring matter is dissolved, and the oxalate of brucia will remain in the form of a white powder. This may be decomposed by magnesia, and the brucia taken up by alcohol. In evaporating the alcoholic solution in the open air, brucia in crystals will be obtained; if the evaporation is made with heat the brucia will be fused, but is not on that account less pure.

It may be also easily obtained by boiling the bark of the brucia antidysenterica in acidulated water, decomposing the fluid by an excess of quick lime, and treating the deposit with alcohol. This distilled, leaves brucia, which is then easily combined with sulphuric and hydrochloric acids to form salts.

### *Properties of Brucia.*

It is intensely bitter, is sparingly soluble in water, though more so than strychnia. It dissolves in 500 times its weight of boiling water, and 850 times of cold water. When a regular crystallization takes place, it is in the shape of oblique prisms with parallelogramic bases. Brucia in crystals is a true hydrate; its affinity for water is considerable, whereas pure strychnia never passes into hydrate. By fusion brucia loses a considerable quantity of water.

Two hundred parts of brucia crystallized from water yield,

Residue . . . .	163 parts.
Water . . . .	37 parts.

One hundred and sixty-one parts crystallized from alcohol yield,



Residue . . . . .	134 parts.
Water . . . . .	27 parts.

by which the constitution of the hydrate, taking the mean of these numbers, is made to be,

Brucia . . . . .	100 parts.
Water . . . . .	21.165 parts.

Brucia fuses at a temperature nearly approaching that of boiling water, and on cooling looks like wax. Exposed to moist air, it swells, whitens, and becomes pulverulent. It combines with acids, and forms neutral salts, most of which are regularly crystallizable. Nitric acid causes it to take on an intensely blood-red colour, which, on the application of heat, turns to yellow. If in this state a solution of proto-hydrochlorate of tin be added, a magnificent violet-coloured precipitate is formed; this is peculiar to brucia. Hence when strychnia from nux vomica takes on a violet colour by a similar treatment, we may be certain that it is mixed with brucia, for the phenomenon in question never occurs in the pure strychnia got from the St. Ignatius's bean. Moreover, pure strychnia does not redden with nitric acid.

M. Liebig's analysis of brucia, which agrees with its capacity for saturation, and with its atomic number 3485.23, is as follows:

Carbon . . . . .	70.88 = C. 32
Azote . . . . .	5.07 = A. 2
Hydrogen . . . . .	6.66 = H. 36
Oxygen . . . . .	17.39 = O. 6

#### *Action on the Animal System.*

This is similar to, though less violent than that of strychnia, being perhaps in energy as one to twelve of pure strychnia. Four grains of brucia were required to kill a rabbit; and a middle-sized dog had strong tetanic attacks from the same dose, but did not die.

According to M. Andral's experience, it required six grains of brucia to produce the effects of one



grain of pure strychnia. Brucia may therefore be sometimes used instead of strychnia where less energy of action is required.

*Mode of Administration.*

Like strychnia, it may be given in pills or tincture, in graduated doses. In medical use that obtained from the spurious angustura is preferable, as that from the nux vomica is apt to be mixed with more or less strychnia, which prevents any accurate calculation of its effects.

*Cases for the employment of Brucia.*

As this substance possesses the properties of strychnia, though in a milder degree, it may be given in doses of 1, 2, or even 3 grains, without fear of the consequences, in the same circumstances where the preparations of nux vomica are indicated. The dose may be probably much greater, but must be increased with caution. M. Andral has given from half a grain to 5 grains of brucia with advantage, in several cases of paralysis; (See Journ. de Physiol. 1823;) and I have myself used it successfully in two cases of atrophy, one of the arm and the other of the leg. The patient took 6 pills daily, of the eighth of a grain each.

*Brucia Pills.*

Pure brucia . . . . .	12 grains.
Conserve of roses . . . . .	$\frac{1}{2}$ drachm.

Mix accurately, and divide into 24 equal pills.

*Tincture of Brucia.*

Alcohol at 36° . . . . .	1 ounce.
Brucia . . . . .	18 grains.



From 6 to 24 drops of this may be given in mixture or common drink.

### *Stimulating Mixture.*

Distilled water . . . .	4 ounces.
Very pure brucia . . . .	6 grains.
White sugar . . . .	2 drachms.

A table-spoonful to be taken morning and evening.

### *Salts of Brucia.*

Brucia forms both neutral and acid salts. *Sulphate of brucia* crystallizes in long needles resembling four-sided prisms terminated by extremely delicate pyramids. It is very soluble in water and alcohol, is excessively bitter, is decomposed by potass, soda, ammonia, baryta, strontia, lime, magnesia, morphia, and strychnia. The acid supersulphate more readily crystallizes than the neutral sulphate: it is formed of

Sulphuric acid . . . .	8.84
Brucia . . . .	91.16

*Hydrochlorate of brucia.*—This salt crystallizes in four-sided prisms terminated by an oblique surface; it does not change in the air, and is exceedingly soluble in water. Sulphuric acid decomposes it, and nitric acid even decomposes the brucia. The hydrochlorate consists of

	Atoms.
Acid . . . . .	13.06 = 1
Brucia . . . . .	100.00 = 1

The *phosphate* is also crystallizable, is very soluble, and slightly efflorescent. The acetate, tartrate, and oxalate may also be crystallized.

The *nitrate* is a mass resembling gum.

As the sulphate and muriate of brucia are more



soluble than their base, some advantages in use may be derived from their probably greater activity, and they may therefore be occasionally placed instead of brucia in the two foregoing formulæ.

## MORPHIA, AND ITS SALTS.

It appears from the chemical researches of MM. Seguin, Sertuerner, Robiquet, Robinet, Pelletier, and Couerbe, that opium is composed of, 1, a fixed oil; 2, caoutchouc; 3, gum; 4, fecula; 5, resin; 6, ligneous matter; 7, morphia; 8, narcotine; 9, narceine; 10, meconine; 11, codeine; 12, meconic acid; 13, another brownish acid. Among these mention will only be made of such as refer to therapeutical employment.

M. Robiquet's late researches go to show that neither codeic acid nor codeate of morphia exist in opium: that which has been taken for them being in fact an acid salt, or the hydrochlorate of morphia. This salt will even vary with the nature of the saline solution to which the opium is submitted. Thus it may be a sulphate or a nitrate of morphia, according as the sulphate of soda or nitrate of potass be used to obtain the supposed codeate.

M. Robinet has, however, ascertained the fact that morphia has the property of producing a blue colour by the action of the per-salts of iron—a property by which morphia, when used for poisoning purposes, might possibly be detected.

### *Preparation of Morphia.*

M. Robiquet employs the following method. A concentrated solution of opium is boiled with a small quantity of magnesia—about 3 drachms to a pound of opium—for a quarter of an hour. A greyish deposit forms, which is filtered and washed with cold water.



Being well dried, the precipitate is then treated with weak alcohol, and allowed to macerate for some time with a heat under ebullition, by which a very little morphia and a great quantity of colouring matter are withdrawn. The mass is again filtered and washed with cold alcohol. Subsequently, it is taken up by a greater quantity of rectified alcohol, which is kept boiling: and while in that state, is filtered once more; on cooling, the liquor yields morphia, which is discolored by repeated crystallizations and animal charcoal.

Dr. Thomson (*Annals of Philosophy*, June, 1820) has given the elementary composition of, and the following mode of obtaining morphia. He precipitates a strong infusion of opium by caustic ammonia, separates the whity-brown precipitate by filtering, evaporates the infusion to a sixth of its bulk, and again adds ammonia, by which a fresh precipitate of pure morphia is procured. This he receives on a filter and washes with cold water. When it is completely drained he dashes it with a small quantity of alcohol and passes it through a filter, the alcohol taking up a large portion of the colouring matter and some little morphia. He then dissolves the morphia in acetic acid and treats the solution with ivory-black, in order to withdraw all colour from it. This mixture is frequently shaken for twenty-four hours and is then thrown on a filter; the liquor passes into the recipient totally colourless, and being then treated with ammonia, morphia is precipitated in the form of a white powder. By solution in alcohol and spontaneous evaporation it is then procured in regular crystals, which are perfectly white and of an opaline transparency, without smell but intensely bitter, and representing four-sided rectangular prisms.

The manner most usually followed at present is that of M. Hottot: it is a modification of that of Ser-tuerner.

MM. Henry and Plisson have a method of obtaining morphia without using alcohol: it furnishes a very pure article, but the quantity procured is less than by Robiquet's method. Opium is infused in water acidulated



with hydrochloric acid and concentrated to two-thirds. When the fluid is cold a slight excess of liquid ammonia or diluted caustic soda is added. The deposit is then treated with water very slightly acidulated with hydrochloric acid until the acid ceases to be saturated. The united solutions are then carefully evaporated in a sand-bath. The crystals formed are impure and brown. They are separated from the mother-water, which is again evaporated and decomposed by ammonia, and the crystals are purified by repeated crystallization. This hydrochlorate of morphia dissolved in water is then decomposed by a slight excess of ammonia, and the precipitate is pure morphia: if required to crystallize, it must be dissolved in hot alcohol, which is evaporated.

M. Blondeau says he obtains pure morphia by aiding the fermentation of the aqueous solution of opium, by which a viscid colouring matter is destroyed, and morphia in greater quantity and of purer quality than by any other process is obtained.

#### *Elementary composition of Morphia.*

M. Bussy and MM. Dumas and Pelletier have made various analyses of morphia, the results of which are given in the following table:—

M. Bussy.	MM. Dumas and Pelletier.
Carbon . . . . 69.0	Carbon . . . . 72.02
Hydrogen . . . . 6.5	Hydrogen . . . . 7.61
Azote . . . . 4.5	Azote . . . . 5.53
Oxygen . . . . 20.0	Oxygen . . . . 14.84

According to Brande (*Annals of Philosophy*, 1824) the chemical constitution of morphia is,

Carbon . . . . .	72.0
Azote . . . . .	5.5
Hydrogen . . . . .	5.5
Oxygen . . . . .	17.0

M. Liebig's analysis is,



		Atoms.
Carbon . . . . .	72.340	= C. 34.
Azote . . . . .	4.995	= A. 1.
Hydrogen . . . . .	6.366	= H. 36.
Oxygen . . . . .	16.299	= O. 6.

He also ascertained that morphia is a hydrate; anhydrous morphia is opaque and has a thick, resinous, and yellowish appearance.

The representative of the atom of morphia as deduced from its combination with hydrochloric acid is 3,613, which gives the composition of the hydrate.

Water . . . . .	112.48.
Morphia . . . . .	7226.00.

#### *Action of Morphia on Man and the lower Animals.*

Pure morphia, though sparingly soluble, and therefore presenting difficulties in its detection as the narcotic principle of opium, has nevertheless been proved to be so beyond the possibility of doubt. My own clinical experience is in confirmation of the fact; for I have seen decidedly narcotic effects proceed from so small a dose as a quarter or half a grain, which effects are still more palpable when the salts of morphia are employed, probably on account of their greater solubility.

It is now more than fifteen years since I first used the acetate, the sulphate, and the muriate of morphia medicinally; and I have ascertained that all the advantages of opium may be derived from them without its unpleasant effects. (See *Nouv. Journ. de Med.* 1818.) I found the muriate less beneficial than the acetate and sulphate, and discontinued its employment: perhaps further trials of it are worthy to be made.

#### *Preparation of the Acetate of Morphia.*

This salt may be made by a direct combination of acetic acid and morphia in a capsule, and slow eva-



poration to dryness in a stove at 25°; this mode has been had recourse to on account of the extreme deliquescence and difficult crystallization of the salt.

It may be also obtained by dissolving morphia in alcohol, filtering the solution, saturating the liquor with acetic acid, and evaporating to dryness. This product is an acetate with excess of base, as may be proved by dissolving it in water, when the excess of morphia remains undissolved. This, however, may occur to the perfectly neutral acetate, for that salt has the property when placed in water of separating into two others, one with an excess of acid and soluble, the other with excess of base and insoluble: this, joined with the difficulty of procuring an accurately neutral acetate, renders the sulphate a preferable salt for medicinal purposes.

A crystallized acetate may however be obtained by dissolving morphia in alcohol, saturating with acetic acid, filtering and leaving the liquid to evaporate slowly in a capsule covered with gauze; the acetate then crystallizes on the sides of the capsule in ramified figures.

#### *Preparation of Sulphate of Morphia.*

Morphia is dissolved in diluted sulphuric acid. The warm solution being evaporated gives silky crystals on cooling. This salt closely resembles the sulphate of quinia, with which it might be confounded, but that its crystallization is much more compact, and that it becomes red when nitric acid is added, which is not the case with sulphate of quinia.

It may be likewise obtained by dissolving morphia in alcohol, saturating with sulphuric acid and evaporating.

M. Pelletier is of opinion that this salt is preferable to the acetate, because it may always be obtained the same, whereas the acetate is frequently mixed with narcotine, which is more soluble in alcohol than morphia is. The acetate is moreover in part decomposed by the drying process that is requisite to preserve it.



Besides which, as the sulphate readily crystallizes, a subsalt is never formed, as is the case in preparing the acetate obtained by evaporation.

Sulphate of morphia is soluble in twice its weight of distilled water ; it is composed of

	Atoms.
Acid. . . . .	10.35 = 2
Morphia . . . . .	75.35 = 1
Combined water . . . . .	4.66 = 2
Water of crystallization . . . . .	9.64 = 4

### *Mode of administering pure Morphia.*

Though morphia is considerably less soluble than its salts, I have often used it in pills containing a quarter or half of a grain, in chronic and painful diseases. Its effect appears to me to be more permanent than that of the salts: much however will depend on the type of the diseases treated with it.

### *Employment of the Salts of Morphia.*

In the preparations of these salts I have endeavoured to imitate as nearly as possible the most commonly used preparations of opium.

#### *Syrup of Morphia.\**

Clarified simple syrup . . . . .	1 pound.
Acetate of morphia . . . . .	4 grains.

This may be used instead of the syrup of poppies, and is even preferable, the degree of potency being arbitrary. The dose is a tea-spoonful every three hours until sleep is procured, though a single spoonful taken at bed-time is frequently sufficient for the purpose.

#### *Syrup of Sulphate of Morphia.*

Clarified syrup . . . . .	1 pound.
Sulphate of morphia . . . . .	4 grains.

\* So in the French text ; the acetate is plainly meant.—Tr.



The dose is the same as of the preceding syrup.

I employ this syrup when patients are accustomed to the syrup of the acetate. In general these salts of the medicinal alkalis may be maintained in their action on the system by simply varying them, no increase in the dose being then necessary.

### *Solution of Acetate of Morphia.*

Acetate of morphia . . . . .	16 grains.
Distilled water . . . . .	1 ounce.

Three or four drops of acetic acid and a drachm of alcohol should be added to keep the salt in solution.

This solution may be used as a substitute for laudanum, Rousseau's drops, tincture of opium, &c. The dose is from six to twenty-four drops.

### *Solution of Sulphate of Morphia.*

Some patients cannot bear the acetate of morphia, in which cases the sulphate may replace it in the preceding formula, sulphuric acid being substituted for acetic. The dose will be the same.

The acetate and sulphate may be used in pills, electuaries, and mixtures, in the dose of a quarter of a grain to two or three grains in twenty-four hours. I have given as much as four grains of them, both in hospital and in private practice, without inconvenience.

The activity of this remedy has been much exaggerated: it is by no means the violent poison it has been imagined to be. A large dose, and its retention by the stomach, are necessary to induce poisonous effects; and as in such dose it seldom fails to cause vomiting, these effects are likely to be of rare occurrence.

### *Solution of the Citrate of Morphia.*

Black drop has long been employed in Great Britain, and is now in extensive use in America. Various means



are employed in making it, all however implying the combination of an impure vegetable acid with opium. The acids most commonly used are the citric and acetic, and some aromatic and saccharine substances are added.

The physicians who employ this preparation assert that it does not irritate the stomach, causes no headache, vertigo, nausea, &c., and that it has none of the exciting properties of opium.

Dr. Porter, of Bristol, has introduced a preparation which seems to exhibit all the above advantages: he calls it *liquor of citrate of morphia*. It is thus prepared.

Take of opium four ounces, citric acid two ounces, to which add a pint of water, and macerate for twenty-four hours; then filter.

Dr. Porter calls this a citrate of morphia: but it evidently contains morphia, narcotine, and all the other crystallizable products latterly found in opium. In preparing it, pure morphia or the extract of opium deprived of narcotine, should be used, by which a compound more nearly approaching to a pure citrate would be procured. It would then be less exciting and more exclusively narcotic than Porter's preparation.

*The applications of the Citrate of Morphia* have been treated of by the American physicians. They say that its effects are quicker than, but not so permanent as, those of opium in substance or tincture; and that it is more active than opium, one part being equivalent to about three parts of the latter when a small dose suffices, but where large doses are required only a double power is to be expected.

Lime water, the liquor ammoniæ, and other alkaline fluids, decompose this solution of the citrate of morphia, and should therefore never be prescribed with it.

The tartrate of morphia has the same properties as the citrate. The latter generally shows its narcotic effects in ten minutes. Some practitioners are of opinion that the citrate is less effectual in dysenteric purging than the other preparations of opium.



I frequently substitute the following formula for that of Porter :

*Solution of Citrate of Morphia.*

Pure morphia . . . . .	16 grains.
Citric acid . . . . .	8 grains.

Dissolve in one ounce of distilled water, and colour it with two drachms of the tincture of cochineal. The dose is from 6 to 30 drops during the day.

The salts of morphia may be used in the endermic mode, in the same manner as was stated of strychnia. Larger doses of it may be administered in this way. The neuralgiæ are the principal diseases in which it has been so used.

The relative quantities of morphia in Turkey and English opium have been examined by M. Hennel, who found that 700 grains of Turkey opium contained 48 grains, and the English opium 35 grains.

[According to Dr. Copland, the best salts of morphia for medicinal use are the muriate and the acetate. It is perhaps difficult to assign a reason for the fact, but he says that, in a case of extreme watchfulness, he found the acetate to fail, and the muriate to succeed in procuring sleep, though the dose of each was the same. He makes a practical remark which deserves attention: in two cases of nervous affections, in which he was induced to prescribe morphia in small doses, an alarming degree of sinking and faintness succeeded. The possibility of this occurrence has been verified in my own person only a few weeks ago. Having been rendered sleepless by drinking green tea, I was induced to take black drop, in which citrate of morphia predominates; the consequences were most alarming to myself and those around me, and it required large and frequently repeated doses of brandy to prevent the utter annihilation of the pulse, and the sinking of the powers of life. Hence it might be judicious to



combine morphia and its salts with some aromatic or stimulant spirit, particularly where general debility is present. Dr. C. tells me of two cases, in which opium in every shape, even in black drop and Batley's solution, produced the distressing sensations of sinking and impending dissolution; but in which morphia, with the addition of an aromatic spirit, (*spiritus caryophyllæ* or *myristicæ*,) was tolerated without any unpleasant sensations.

Dr. Charles Lee (*New York Medical and Physical Journal*, 1829) strongly recommends a tepid wash, composed of two grains of sulphate of morphia to one ounce of water, in acute conjunctivitis. It renders the intolerance of light much less urgent, and gives ease from the hot and throbbing sensations in and about the diseased organ.

Bellingeri, in a *Memoir on Neuralgia*, which may be found in the *Annali Universali di Medicina*, for April, 1833, states that acetate of morphia is of little use taken internally, but is more efficient when used in friction, with oil, on the neuralgic part, or sprinkled on the denuded dermoid surface.

He also quotes a case of violent and obstinate hiccup, wherein acetate of morphia was used by the endermic method over the epigastrium. A curious effect ensued: it produced a sensation of compression of the back part of the head: the patient could neither move nor speak; both epididymes swelled. In the course of an hour these symptoms disappeared, and were replaced by a general and intolerable itching, particularly of the forehead, nose, chin, and scrotum; at length, after two hours, the itching ceased, and the hiccup was found to be cured.

Black drop is a most uncertain preparation: I daily hear the most discordant opinions given as to its power, as compared with tincture of opium, some esteeming it as only equivalent to the latter, others as of double, treble, or quadruple strength. It might be well if each surgeon-apothecary at least prepared a solution of acetate of morphia of determinate strength, and re-



gulated his doses by it, rather than by the liquor opii sedativus, of which he can have no knowledge, until perhaps it has done mischief.—*Tr.*]

*Extract of Opium deprived of Morphia.*

A certain quantity of morphia always remains with the opium after the process for the extraction of that alkaline base. Taking M. Robiquet's hint on the subject, I made some experiments with the residue in question, and found that it still has a narcotic power, though much inferior to the common aqueous extract. Four grains are scarcely equivalent to a grain of the latter, and to a quarter of a grain of morphia.

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NARCOTINE.

Though I have no reason to consider this substance in the light of a medicine, yet it may not be out of place shortly to give its physiological history.

*Action of Narcotine on the Animal System.*

One grain dissolved in oil induces in dogs a state of stupor, which might be mistaken for sleep, though from that it materially differs; for the eyes are open, the respiration by no means so deep as in sleep, and it is impossible to rouse the animal from his dull and stupid condition. Death generally supervenes within twenty-four hours.

Combined with an active acid, the effects are altogether different: animals bear as much as 24 grains without perishing; and while under its influence they are agitated by convulsive movements resembling those caused by camphor, together with the similar signs of fear, backward movements, the same incapability of progressing, the same foaming at the mouth, agitation of the jaws, &c.



I observed both the effects above described on administering a combination of morphia and narcotine to an animal. Having introduced a grain of morphia and the same quantity of narcotine dissolved in acetic acid, into the pleura of a dog, drowsiness, and, at intervals, some real sleep, were exhibited; while, at the same time, the stimulating effects of the narcotine were in curious combat with the effects of the morphia. This continued for more than half an hour, until at length the animal fell, under the sole influence of the morphia, into a profound sleep. It may be hence inferred that it is to the presence of both these principles in the aqueous extract that is owing the exciting property of that preparation.

M. Bally has given 60 grains of narcotine in 24 hours without fatal consequences. It would be well to ascertain whether the article he used was pure, and whether the whole was retained on the stomach.

Narcotine taken alone causes an unnatural brilliancy of the eyes, contraction of the pupils, and giddiness—signs of its strong exciting powers.

M. Liebeg's analysis of narcotine is

Carbon . . . . .	65.00
Hydrogen . . . . .	5.50
Azote . . . . .	2.51
Oxygen . . . . .	26.99

M. Pelletier's last analysis gives

	Atoms.
Carbon . . . . .	65.26 = 17
Azote . . . . .	4.31 = 1
Hydrogen . . . . .	5.45 = 17
Oxygen . . . . .	25.08 = 5

Narcotine may be obtained by making an ethereal tincture of opium, by which only the caoutchouc and narcotine are dissolved: it is subsequently purified with alcohol.



## EXTRACT OF OPIUM DEPRIVED OF NARCOTINE.

I have ascertained by experiments that narcotine is decidedly injurious, if not united with an acid, and that it is exceedingly exciting when so combined. This latter fact M. Orfila has very recently denied, but I still assert the accuracy of my experiments. M. Robiquet bethought himself to prepare an extract of opium entirely free from this substance, and possessing a decided advantage over the aqueous extract. For this purpose the last-named extract is to be treated with ether, which takes up the whole of the narcotine. It is only fair to acknowledge, however, that many years before M. Robiquet's memoir on the subject, M. Limousin Lamotte obtained the same result by boiling opium in water with resin, filtering and concentrating the liquor.

*Mode of preparing this Extract.*

Macerate sliced crude opium in cold water: filter and evaporate to the consistence of a thick syrup: digest this with rectified ether, and shake it well before pouring off the ethereal tincture. After separating it, distil in order to get rid of the ether; repeat this operation so long as crystals of narcotine are obtained from the distillation. When the ether no longer acts, evaporate the solution of opium to a pilular consistence.

M. Dublanc has modified this process of M. Robiquet in the following manner:

Take 300 grammes of extract of opium prepared in the cold; dissolve it in 150 grammes of distilled water; pour the solution into a retort, and upon it add 2000 grammes of pure ether. The apparatus is to be arranged for the reception of the products of the distillation, and a gentle heat applied. Having drawn off



about 500 grammes of ether, the apparatus is removed, and the supernatant ether is to be quickly poured off the extract in the retort. Meantime the ether obtained by distillation will serve the purpose of washing the still warm extract ; after which, the latter is evaporated to a proper consistence. Lest the ether poured off from the extract after the distillation should leave some narcotine behind in the mass, the concentrated extract is to be dissolved in distilled water and filtered, when minute crystals of narcotine will be seen on the filter mixed with a pulverulent extractive matter, insoluble in the small quantity of water employed to take up the extract. Evaporation is then practised in order to reduce the extract to its usual form. Thus obtained, the extract may be considered as entirely deprived of narcotine. It rapidly imbibes the humidity of the atmosphere ; dissolves with facility in water, to which it imparts a much lighter colour than the common extract, and in which it deposits no foreign substance.

A digester may be also employed for the purpose of obtaining the pure extract of opium by means of ether.

#### *Action on the Animal System.*

This extract is employed in the same manner as the watery extract of opium.

I have tried it on animals, and it appeared to me to be purely narcotic, and to possess an exactly similar action to, though somewhat weaker than, that of morphia.

I have also used it in medical practice with advantage, particularly in the case of a young Greek physician, with whom the common aqueous extract did not agree. On these accounts I consider the preparation worthy of further attention.



## NARCEINE AND MECONINE.

Narceine was discovered in 1832 by M. Pelletier, and meconine about the same time, by M. Couerbe. They are both obtained from the ammoniacal waters after the precipitation of morphia, which are evaporated to a thick syrup, and left for several weeks, by which time a mass of granular crystals is deposited. These are pressed and treated with boiling alcohol, the fluid is distilled, and a yellowish crystallized residue is procured, again pressed, redissolved in alcohol, and filtered with animal charcoal to ensure their whiteness. These are crystals of narceine and meconine combined with a little narcotine, which is separated by boiling water, and the meconine is separated by ether, which dissolves it and leaves the narceine.

*Chemical properties of Narceine.*

It is white, without smell, crystallizes in long needles, has a bitter and somewhat metallic taste. Acids destroy it if concentrated; diluted with a half of water they combine with it and produce various colours, at first causing a beautiful blue colour, and afterwards upon withdrawing the water by chloride of lime, a rose colour is produced. Nitrid acid changes it to oxalic acid. Hence M. Couerbe gave it the name of "vegetable cameleon."

M. Pelletier states the composition of narceine as :

	At.	Comp.
Carbon . . . . .	54.73 = 16	54.08
Azote . . . . .	4.33 = 1	3.92
Hydrogen . . . . .	6.52 = 24	6.62
Oxygen . . . . .	34.42 = 8	35.37



*Action of Narceine on the Animal System.*

I have several times injected 2 grains of it in the jugular vein of dogs, but no appreciable effects were produced.

*Chemical properties of Meconine.*

It is white, and crystallizes in six-sided prisms, fuses at  $90^{\circ}$ , when it resembles a colourless liquid. It requires 18 parts of boiling and 265 parts of cold water for its solution. It is also soluble in alcohol and ether. Alkalis have no remarkable effect on it. Cold sulphuric acid dissolves it without change of colour, but heated, it changes to the green of chlorophylle. Nitric acid does not change it to oxalic. Chlorine at the fusing point of meconine causes a blood-red colour, and transforms it into an acid, to which the name of *mechloic* has been given.

Meconine is composed of

	Atoms.
Carbon . . . . .	60.247 = 9
Hydrogen . . . . .	4.756 = 9
Oxygen . . . . .	34.997 = 3

*Action on Animals.*

Repeated injections of a grain into the veins of dogs have no effect whatever. I have never tried its action on man.

## CODEINE.

Codeine was discovered in 1832 by M. Robiquet. In treating solution of opium with muriate of lime a muriate of morphia is precipitated, in combination,



however, as M. Robiquet had reason to suspect, with some other substance. This substance is codeine, and forms with the acid and morphia *Gregory's salt*, or the *double muriate of morphia and codeine*. From this the latter is separated by ammonia, the major part of the morphia precipitating. The supernatant solution of codeine and ammonia with some non-precipitated morphia is concentrated until the chlorohydrate of ammonia begins to crystallize, and with it the double salt of morphia and codeine. The crystals are to be dissolved in water, filtered through charcoal, and a slight excess of caustic potass added, by which means the codeine alone is precipitated, and is then taken up by alcohol or ether.

M. Berthemot precipitates the double muriate by magnesia, and finds the codeine with the appearance of an oil, which becomes an hydrate, and forms crystals in the magnesian water.

#### *Chemical properties of Codeine.*

Codeine is insoluble in alkaline solutions, combines with acids, which it saturates, and with which it forms salts that are decomposed by tannin. Nitric acid does not redden it, nor is muriate of iron changed by it. Its geometrical forms are remarkable: according to M. Robiquet its atomic constitution is,

Carbon 31, azote 2, hydrogen 40, oxygen 5, or in 100 parts,

Carbon . . . . .	71.339
Azote . . . . .	5.353
Hydrogen . . . . .	7.585
Oxygen . . . . .	15.723

#### *Physiological properties of Codeine.*

The injection of a grain of codeine into the jugular vein of a middle-sized dog caused almost instantaneously



a deep sleep, which however was easily interrupted, again to be renewed and to continue for several hours, after which the animal was perfectly well. But on making the same experiment with the hydrochlorate of codeine, the animal, after sleeping five or six hours, died.

M. Barbier says, that codeine is peculiar by its specific action on the ganglionic nerves; and particularly those of the epigastrium. (Gaz. Médicale, April, 1834.) If this be established as a fact, it may lead to most important results as regards our knowledge of the functions of those nerves.

#### *Action of Codeine in Disease.*

A whole year's experience of its use has shown me that a single grain of codeine, given in two doses, in general produces a calm sleep, not succeeded, as is often the case with morphia, by lassitude and heaviness of the head. I have reason to think that a grain of codeine is equivalent in action to half a grain of pure morphia.

Two grains of codeine cause nausea; and even one grain cannot be long continued in with convenience.

#### *Salts of Codeine.*

The hydrochlorate I have found more active than simple codeine. Two grains induce vertigo, nausea, and vomiting. But I have found most obstinate facial and ischiatic neuralgiæ yield to it when all else had been tried.

#### *Medicinal employment of Codeine.*

As with morphia, codeine is applicable when pain is to be reduced and sleep procured. Being less active than morphia, it should always precede it as a remedy.



*Mode of prescribing Codeine.*

I generally mix one, two, or three grains with some julep, and not unfrequently give it in pills, which, however, never contain more than a grain in each.

*Mode of prescribing the Salts of Codeine.*

They may be given in the same forms as codeine itself, but being more active than it, the doses must be somewhat smaller. Hitherto I have only employed the hydrochlorate and the nitrate.

Many of my patients, who had ceased to be affected by morphia and its salts, received great benefit from the alternate employment of codeine and its salts.

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DOUBLE MURIATE OF MORPHIA AND CODEINE, OR GREGORY'S SALT.

I have already shown under the head of Codeine that this salt is procured by decomposing the meconate of morphia and codeine in infusion of opium by solution of muriate of lime. The whole is filtered in order to separate the meconate of lime; the clear liquor is passed through animal charcoal, and needle crystals obtained by concentration.

*Medicinal employment of Gregory's Salts.*

It may at any time be used as a substitute for morphia and codeine, and in the same cases.



## EMETINE.

In a memoir presented to the Académie des Sciences in 1817, by M. Pelletier and myself, we demonstrated by a series of chemical and physiological experiments, that the various species of ipecacuanha owe their emetic power to a peculiar principle, denominated by M. Pelletier *emetine*; and as it is much more active than, and does not possess, the nauseating taste and odour of ipecacuanha itself, we considered that it might be advantageously substituted for that substance. The disagreeable smell of ipecacuanha resides in a fatty matter unconnected with its emetic virtue; for M. Caventou took six grains of it with impunity.

M. Boullay has since discovered emetine in the root of the *viola odorata*; and has denominated it *violine*, or indigenous emetine. M. Torreri has also found emetine in the root of the *iris florentina*.

*Preparation of coloured Emetine.*

Reduce ipecacuanha to powder and digest it in ether at 60°, in order to dissolve the odorous fatty matter. When the ether takes no more up from the powder, digest it with alcohol several times. Collect all the spirituous tinctures in a water-bath, and re-dissolve the residue in cold water, by which it is made to yield some wax, and the fatty matter it had still retained. Finally, macerate it with carbonate of magnesia, re-dissolve in alcohol, and evaporate to dryness.

Emetine thus procured is not pure, though sufficiently so for medical purposes. (See the following article.) It presents itself in the form of transparent reddish-brown scales; it has scarcely any smell, has a bitter, but not sickly taste. It supports a degree of heat equal to that of boiling water without changing; it is highly deliquescent, and soluble in water, and uncrystallizable.



*Physiological Properties of Emetine.*

Half a grain to two or three grains of emetine, given to dogs and cats, produces vomiting, followed sometimes by long-continued sleep: a large dose (ten grains) induced frequent vomiting in dogs, succeeded by stupors, from which the animal does not recover, as when the substance has been given in a small dose, but in which it dies for the most part within twenty-four hours. On inspecting the body, death appears to have been caused by an intense inflammation of the pulmonary tissue and mucous membrane of the digestive canal, from the cardiac orifice of the stomach to the anus. I have described very closely analogous phenomena, as arising from tartar emetic. (*De l'Influence de l'Emetine sur l'Homme et les Animaux.*) The effects are the same when emetine has been injected into the jugular vein, or absorbed from any surface of the body.

*Action of Emetine on the healthy system.*

Two grains, taken fasting, gave rise to long-continued vomiting, succeeded by disposition to sleep. A quarter of a grain is sometimes sufficient to excite nausea and vomiting.

*Action on the diseased system.*

It resembles in every particular that on the healthy body. Besides producing vomiting and purging, it has a marked and beneficial influence in catarrhal affections, especially such as are chronic. (See *Recherches Chimiques et Physiologiques sur l'Ipécacuanha*; par Magendie et Pelletier.)

*Action of Violine.*

M. Orfila has ascertained by experiments that this substance has the same physiological properties as emetine.



M. Chomel gave from 6 to 12 grains, in three doses, to nine patients. In six of them vomiting was produced: in two a slight purging. Three grains and a half given in three doses to two patients, caused no vomiting, but only two liquid motions in one; and the second only vomited once; while a third dose of two grains produced neither vomiting nor purging.

*Cases in which Emetine is applicable.*

These are the same as for the employment of ipecacuanha.

To procure vomiting, four grains dissolved in any vehicle, and given in divided doses, will excite vomiting. Were it given in one full dose, a single effort of vomiting would be made that would expel it from the stomach, without any further effect. The following mixture may be used.

*Emetic Mixture.*

Coloured emetine . . . . .	4 grains
Weak orange flower water . . . . .	2 ounces
Syrup of orange flowers . . . . .	$\frac{1}{2}$ ounce

A table spoonful may be given every half hour, until vomiting is produced.

In chronic pulmonary catarrhs, hooping cough, and long-continued diarrhœa, I frequently prescribe the following lozenges.

*Pectoral Emetine Lozenges.*

Sugar . . . . .	4 ounces
Coloured emetine . . . . .	32 grains

Divide into lozenges of 9 grains each. It is usual to colour these lozenges with some carmine, in order to distinguish them from the common ipecacuanha lozenges. One of these may be given every hour: more than this would excite nausea.



*Emetic Lozenges of Emetine.*

Sugar . . . . .	2 ounces
Coloured emetine . . . . .	32 grains

Divide into lozenges of 18 grains each. A single one taken fasting is generally sufficient to induce vomiting in children. Three or four do the same in adults.

The following is a substitute for the ipecacuanha syrup.

*Emetine Syrup.*

Simple syrup . . . . .	1 pound
Coloured emetine . . . . .	16 grains

## PURE EMETINE.

The emetine of the preceding article is not in a state of purity. M. Pelletier has however succeeded in totally separating the active matter of the ipecacuanhas, and finds it to be a new alkali, possessing the properties and requiring the preparation as follow :

*Preparation of Pure Emetine.*

To obtain pure Emetine, calcined magnesia must be substituted for the carbonate, (see the preceding article,) in sufficient quantity to take up the free acid that exists in the liquor, and that which is combined with the emetine. The emetine, thus separated and rendered less soluble, precipitates and mixes with the excess of magnesia. The magnesian precipitate washed with a little cold water, which takes up the colouring matter that is not combined with the magnesia, should be carefully dried and treated with alcohol, which dissolves the emetine. This being obtained by the evaporation of the alcohol, must be re-dissolved in a weak acid, and treated with pure animal charcoal; after which the emetine is precipitated by some salifiable



base. The waters that have served to wash the magnesian precipitate still contain some emetine, which may be procured by a series of operations, though, after all, emetine is retained with the magnesia.

M. Calloud's process for obtaining pure emetine, (see *Mém. de la Société Académique de Savoie*, t. i.) which is very similar to that of M. Henry for procuring sulphate of quinia, is as follows: Mix 125 grammes of the cortical part of ipecacuanha in powder with 800 grammes of water, acidulated, with 16 grains of sulphuric acid; boil the mixture, and keep it a little below that point of heat for half an hour, stirring it constantly with a wooden spatula; then pour the whole into an earthen dish, presenting as great a surface as possible.

The acidulated decoction is left to cool, and 125 grammes of powdered lime are added, and the whole dried in a stove, at a temperature not exceeding 50° of Reaumur.

This mass, which is composed of sulphate of lime, gallate of lime, fatty and colouring matters combined with an excess of lime, free emetine, fecula, and ligneous matter, is then pulverized. On submitting it to the action of boiling alcohol, the emetine, with a very small portion of foreign matter, is dissolved, and may be subsequently obtained by evaporating the alcohol.

In order entirely to separate and blanch the emetine, it must be dissolved in slightly acidulated water, then heated with purified animal charcoal, and the solution filtered and concentrated. Saturate the acid with weak ammonia: filter: wash with a little distilled water, and allow the residue to dry on the filter at the ordinary temperature, and in the dark; this will be pure emetine.

Emetine is procured, according to M. Calloud, from the mother-waters and washings, according to the methods already described.

The following are the proportions of emetine in dif-



ferent parts of the same species of *ipecacuanha*, and in different species:—

*Cephælis Ipecacuanha*, Grey Ipec. of M. Merat, contains in the cortical part of the root 16 parts of emetine in 100; the ligneous part of the root contains only 1.15. Deprived of the ligneous part, M. Pelletier found it to contain 14 parts of emetine in 100. The striated ipec. of M. Merat, (*radix psychotriæ*,) gives 9 parts: the *viola ipecacuanha* only 5 parts in the hundred.

### *Physical and Chemical Properties.*

Pure emetine is white, not unfrequently a little coloured, pulverulent, not changed by the atmosphere: whereas coloured emetine is deliquescent. This substance is slightly soluble in cold water, more so in hot; very much so in ether and alcohol. It has a slightly bitter taste. It is very fusible, melting at about 50° of the centigrade thermometer. It restores the blue of reddened turnsol, and dissolves in all the acids, diminishing without extinguishing their acid properties, at the same time that it forms with them salts that are readily crystallizable,—in this resembling veratria. It is precipitated from its combinations by gall-nuts like the cinchonic alkalis: hence gall-nuts would prove the only antidote in cases of poisoning by emetine. M. Caventou swallowed a dose of emetine, more than sufficient to cause violent vomiting, but he neutralized its effects by a decoction of gall-nuts.

According to MM. Dumas and Pelletier, the composition of pure emetine from the *cephælis ipecacuanha* is

	At. Comp.
Carbon . . . . .	64.57 = 37
Azote . . . . .	4.00 = 2
Hydrogen . . . . .	7.77 = 54
Oxygen . . . . .	22.95 = 10



*Action of Emetine on the Animal System.*

It is the same as that of coloured emetine, but much more energetic. Two grains are sufficient to kill a large dog. I have seen vomiting produced by the sixteenth of a grain, in a man 85 years of age, in whom, however, vomiting was readily excited.

*Mode of administering Pure Emetine.*

I have long given these lozenges:

Sugar	. . . . .	4 ounces.
Pure emetine	. . . . .	8 grains.

Divide into lozenges of 9 grains each.

If it is desired to excite vomiting, a grain of pure emetine previously dissolved in a little acetic or sulphuric acid should be mixed with some compatible vehicle, as in the following formula:

*Emetic Mixture.*

Infusion of lime flowers	. . . . .	3 ounces.
Pure emetine dissolved in acetic acid		1 grain.
Syrup of marsh mallows	. . . . .	1 ounce.

Give a table spoonful every quarter of an hour, until vomiting is produced.

*Syrup of Emetine.*

Clarified syrup	. . . . .	1 pound.
Pure emetine	. . . . .	4 grains.

Dose, a tea spoonful.

[Looking impartially on the history and properties of emetine, I must confess that I do not see in it any of those qualities which render many of the other alkaloids in their isolated condition, preferable to the same, in combination with the other constituents of the vegeta-



ble to which they belong. Besides, there are many substitutes in case of failure with ipecacuanha powder, as tartar emetic, sulphate of copper, &c. &c. The emetic lozenges of emetine may, however, be valuable where it is desired to produce vomiting in children, without trouble to the attendants or disgust to the child.—*Tr.*]

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### FEBRIFUGE ALKALIS.

Some years ago, MM. Laubert, Rheuss of Moscow, and Gomez of Lisbon, published very interesting works on the cinchonas; but they were not agreed as to the principle in which the febrifuge virtue resided. MM. Pelletier and Caventou, led by former researches to believe in the existence of such a principle, and, conducting their inquiries on the plan which had led to the discovery of strychnia, emetine, &c. obtained a substance which they recognised as identical with the *cinchonia* already described by M. Gomez, and which they ascertained to be alkaline, a fact which had escaped previous notice. It was from the grey bark, (*cinchona condaminea*,) that they obtained the cinchonia. The yellow bark (*cinchona cordifolia*) afforded an alkali which, though similar to the cinchonia in many properties, differed too widely in others to be confounded with it; they therefore called it *quinia*. The red bark (*cinchona oblongifolia*) was next made the subject of analysis, and it became an interesting question whether this species, considered by many as the strongest febrifuge of all, contained cinchonia, quinia, or some third variety of alkali. The result was unexpected; the red bark afforded *cinchonia* precisely similar to that of the grey, but in three times the quantity, and *quinia* in nearly double the proportion found in the yellow bark. This quinia, with the exception of its somewhat greater fusibility, and a slight difference in the appearance of the sulphate, presented the same



characters as the other. Further experiments made on a large scale have shown that quinia and cinchonia exist in all these three species of cinchona; but that in the grey the cinchonia is in much larger proportion to the quinia, while the reverse obtains in the yellow, where the quinia predominates so greatly that it is not surprising the other principle should be overlooked in operating on small quantities. Dr. Michaelis, (*Journal der practischen Heilkunde*, April, 1824,) of Magdebourg, has analyzed many species of cinchona, and determined, as follows, the proportions of cinchonia and quinia in a pound of each.

	Cinchonia.	Quinia.	Total.
China rubra . . . . .	32 grains	64 . . . .	96
China loxa . . . . .	18 . . . .	8 . . . .	26
China fusca . . . . .	„ . . . .	75 . . . .	75
China fusca Huanuco . . . . .	50 . . . .	32 . . . .	82
China fusca superf. Huanuco . . . . .	74 . . . .	28 . . . .	102
China fusca superf. Huamalies . . . . .	„ . . . .	12 . . . .	12
China fusca Huamalies . . . . .	48 . . . .	28 . . . .	76
China fusca Huamalies infer . . . . .	60 . . . .	34 . . . .	94
China fusca Tenn superf. . . . .	12 . . . .	44 . . . .	56
China fusca Tenn médiocre . . . . .	12 . . . .	80 . . . .	92
China flava Carthagera . . . . .	28 . . . .	48 . . . .	76
China regia (rolled) . . . . .	„ . . . .	154 . . . .	154
China regia (in flat pieces) . . . . .	„ . . . .	236 . . . .	236

#### *Preparation of Cinchonia and Quinia.*

The cinchona is deprived of its bitterness by means of boiling alcohol, and the tincture distilled to dryness in a water-bath. The alcoholic extract is entirely dissolved in boiling water, strongly impregnated with hydrochloric acid. Calcined magnesia is then added in excess, to fix the red colouring matter, and to clarify the liquor, the latter being affected by some minutes' boiling. It is allowed to cool, filtered, and the magnesian precipitate washed with cold water. The precipitate having been dried on a stove, is repeatedly treated with boiling alcohol, in order to remove all bitterness. The alcoholic liquors are now mixed, and the cinchonia crystallizes on cooling. The cinchonia thus obtained is still impure, from the presence of the



green fatty matter, which may be got rid of by solution in a highly diluted acid; if the acid were too concentrated, it would dissolve a portion of the fatty matter, and the end would be frustrated.

Quinia is obtained from the yellow bark by the same process as cinchonia from the grey.

We have stated that the cinchonia and the quinia are found in all the three species of cinchona. In the following manner they may be obtained by one and the same process.

After having procured the sulphate of quinia by a process hereafter to be detailed, we mix the mother-waters with those derived from washing during that operation. These waters retain the sulphate of quinia, rendered uncrystallizable by the presence of yellow matter and a portion of the fatty matter. The waters are to be decomposed by magnesia, or it may be done by means of lime. The magnesian precipitate having been washed and well dried, is treated with boiling alcohol, which dissolves the quinia and cinchonia. But here the cinchonia crystallizes, if the liquor be sufficiently charged with it; if it be not, it must be a little concentrated, and the cinchonia thus obtained should be purified by crystallization, in order to which, it is to be dissolved in a sufficient quantity of boiling alcohol; it will thus be obtained in a very pure state. The residual alcoholic fluids contain quinia, which is obtained by evaporation.

In a work lately published by MM. Henry and Plisson, these chemists have given a process for obtaining directly the quimates of quinia and cinchonia; they have also rendered it very probable that, in the cinchona, a part of the febrifuge alkalis is combined with the red colouring matter of Rheuss. The following is the process by which MM. Henry and Plisson have obtained the quimates. They treat with cold water the product of the aqueous decoction of yellow or grey cinchona reduced to the consistence of a syrup. The clear liquor decolorized and saturated with hydrate of lead, is filtered and then deprived of



the metallic oxide by means of a stream of hydro-sulphuric acid gas. The liquor being again filtered, is saturated with chalk, and evaporated to the consistence of a syrup; it is then repeatedly treated with alcohol, and the alcoholic liquors left to evaporate spontaneously. The quimates of the febrifuge alkalis crystallize very visibly in an irregular form, but not till after a considerable time. The compound of the red matter of Rheuss and the febrifuge alkalis is nearly insoluble in water; soluble with the aid of heat in weak acids, without being sensibly decomposed, and precipitated on cooling in the form of a reddish powder. It is readily soluble in alcohol, and on the addition of water is deposited in red, orange-coloured, or bluish flakes. The alkalis decompose this compound by uniting with the colouring matter, and setting free the alkaloid. MM. Henry and Plisson propose to employ in medicine the quimates of quinia and cinchonia made very pure by the direct process.

#### *Chemical Properties of Cinchonia.*

Cinchonia is white, translucent, crystallizable in an acicular form, and soluble only in 700 parts of cold water; hence it has little taste. When dissolved in alcohol, and still more in an acid, its taste is strongly bitter and exactly like that of the grey bark. Cinchonia is very sparingly soluble in the fixed and volatile oils, and in sulphuric ether; it unites with the acids, and forms salts which are more or less soluble, and some of which easily crystallize: it is volatilized at a certain temperature, and the greater part is destroyed by this operation; still a sensible portion resists the decomposing agency of heat.

The sulphate and acetate are employed in medicine; the former is very soluble in water, the latter much less so, but is made easily to dissolve by an excess of acid.

The acetate is in the form of a granular powder, and does not crystallize—differing in this respect from



the acetate of quinia, which forms beautiful silky crystals.

*Chemical Properties of Quinia.*

It is white. It did not appear to be crystallizable by solution, but MM. Dumas and Pelletier made it assume a crystalline texture, by subjecting it to igneous fusion in vacuo, and allowing it to cool slowly. When thus treated it loses its resinous appearance and transparency, contracts, becomes opaque, and forms centres of crystallization on its surface, which radiate in all directions, and produce a clouded or wavy appearance. M. Pelletier has since obtained quinia crystallized in fine silky flocculi by submitting to spontaneous evaporation an alcoholic solution of very pure quinia. (Journal de Pharm. June 1825.) Though less soluble in water than cinchonia, its taste is much more bitter. Its salts also are in general more bitter; they are distinguished by their pearly and silky appearance. Quinia is very soluble in ether, while cinchonia is very little so, which affords a means of separating them when united. Quinia becomes electric when melted, and assumes the resinous electricity with much intensity, when rubbed with a piece of cloth.

MM. Dumas and Pelletier give the following as the medium composition of quinia.

Carbon	. . . . .	75. 00
Azote	. . . . .	8. 45
Hydrogen	. . . . .	6. 66
Oxygen	. . . . .	10. 40

A more recent analysis by M. Liebeg afforded,

Carbon	. . . . .	75. 76
Hydrogen	. . . . .	7. 52
Azote	. . . . .	8. 11
Oxygen	. . . . .	8. 61

Whence the formula 'C. 20, H. 24, A. 2, O. 2, which gives 2055.538, for the atomic weight of quinia.

M. Liebeg has estimated the equivalent of this alkali



by the proportion of hydrochloric gas, which it saturates; he found that 100 parts of quinia saturated 24.1 of hydrochloric gas, which gives the number of 1900 as the equivalent of quinia. Another experiment of the same chemist on a basic sulphate afforded the number of 4.300, which, divided by two, gives 1150, nearly equal to that afforded by the elementary analysis. These different results show that M. Liebig's analysis approximates very nearly to the truth.

Some years back MM. Dumas and Pelletier performed the analysis of cinchonia, which afforded

Carbon	. . . . .	76. 97
Azote	. . . . .	9. 02
Hydrogen	. . . . .	6. 22
Oxygen	. . . . .	7. 97

Mr. Brande (*Annals of Philosophy*, April 1824,) obtained a very different result.

Carbon	. . . . .	79. 30
Azote	. . . . .	38. 72
Hydrogen	. . . . .	7. 17
		<hr/>
		100. 19

M. Liebig has given the following as the composition of cinchonia:

Carbon	. . . . .	77. 81
Azote	. . . . .	8. 87
Hydrogen	. . . . .	7. 37
Oxygen	. . . . .	5. 93

The atom, as determined by the capacity of absorbing hydrochloric gas, is equal to 1005.1, which number is nearly equal to that afforded by the formula  $C_{20}H_{22}N_2O_2 = 1942.051$ ; the formula is derived from the numbers representing in total the composition of cinchonia.

#### *Preparation of the Sulphate of Quinia.*

M. Henry has published an expeditious and cheap



process for obtaining directly the sulphate of quinia. He treats the bark three times with hot water, acidulated with sulphuric acid, (50 grammes to a kilogramme of the bark,) filters through linen of close texture, decolorises the liquor with slaked lime, and washes the precipitate to separate the excess of lime. It is then dried, finely pulverized, and several times digested in alcohol at 36°. The alcoholic tinctures are collected in an alembic, which is placed in a water-bath. The spirit amounting to 1-9th of the whole is distilled off, and will serve for future operations; the residue is a brown viscous bitter matter, composed chiefly of impure quinia. This mass is treated to saturation with warm water, impregnated with sulphuric acid; the liquor is then filtered through paper, and on cooling affords crystals of sulphate of quinia, which are rendered perfectly pure by a second solution and crystallization. By a similar process the sulphate of cinchonia has been as successfully obtained from the grey bark. The sulphate of quinia thus obtained is in the form of white crystals little soluble in cold, but more so in boiling water, especially when a little acidulated.

The sulphate of quinia has the remarkable property of becoming luminous at a temperature of 100°, especially if slightly rubbed; this fact was first observed by M. Calloud, of Annecy. MM. Dumas and Pelletier subjected two or three ounces of sulphate of quinia contained in a glass bottle to a boiling temperature in a water-bath, for half-an-hour; it then gave out by friction a moderately intense white light. These gentlemen, by passing through the cork of the bottle a metallic rod terminated by a point at the interior extremity and a ball at the other, making the ball approach the knob of Volta's electroscope, and shaking the bottle previous to each contact, obtained the utmost repulsion among the straws of the electroscope; the electricity was constantly of the vitreous kind. The sulphate of cinchonia has the same phosphorescent and electric properties, but in an inferior degree.



MM. Pelletier and Caventou having established the fact that pure water does not extract all the quinia and cinchonia from the bark, M. Guerette of Toulouse, and several other chemists, made some new experiments and found that the barks which in the hospitals were rejected as useless after the aqueous decoction, might still be made to afford nearly 2-3rds of the alkaloids which they contained in the virgin state; the residue of the cinchona, after decoction should therefore be preserved for further use.

According to MM. Henry and Plisson, what remains in the bark after decoction is a sparingly soluble combination of quinia and cinchonia, with red cinchonic matter.

#### *Preparation of the Supersulphate of Quinia.*

M. Robiquet, by a somewhat different process, has obtained a sulphate whose characters are not the same with those we have described. It is in solid transparent prisms of a flattened quadrangular form, distinctly terminated, and soluble even in cold water. On a comparative examination of the two sulphates, M. Robiquet found that the solution of the prismatic salt was acid, while that of the other was alkaline. He was convinced of the stability of these characters from the salts retaining them unaltered, after repeated crystallizations; the subsulphate, however, lost each time a small portion of its acid. M. Robiquet ascertained, moreover, that his always obtaining the supersulphate was owing to the circumstance that the quinia could only be dissolved in water by means of a slight excess of acid, while if alcohol be used (in which the quinia is soluble) no more acid need be added than is requisite for saturation.

#### *Comparative Analysis of the two Sulphates of Quinia.*

M. Robiquet made an analysis of these two sulphates, and having observed that the subsulphate lost



a portion of its acid by each crystallization, has given the composition of this salt after the first and third crystallization.

100 sulph. quinia . . . .	{	Acid	63. 5	{	82. 6
		Quinia	19. 1		
100 subsulph. 1st crystallization	{	Acid	11. 3	{	90. 73
		Quinia	79. 0		
100 subsulph. 3d crystallization	{	Acid	10. 0	{	90. 9
		Quinia	80. 9		

At the same time it is probable that M. Robiquet did not obtain this subsulphate very pure, since, according to the experiments of MM. Pelletier and Caventou, and those more recently made by M. Baup, what he calls the subsulphate of quinia is uniform in its proportions in the hydrated state. M. Baup regards the common sulphate of quinia, as a neutral salt, and thinks with justice, that this salt *effloresced*, is the best for medical use; as being invariable in its composition. If the neutral sulphate be kept in a moist place it can contain only 76 in 100 of quinia; but if it be kept in a dry place, and in an ill-stopped bottle, it may contain as much as 86. According to M. Baup, the supersulphate, when dry, contains

Acid . . 18. 181	{	100 supersulphate.
Base . . 81. 819	}	
Acid . . 10. 000	{	100 neutral sulphate.
Base . . 90. 000	}	
Acid . . 9. 57	{	100 neutral sulph. effloresced and invariable.
Base . . 86. 12	}	
Water . 4. 31	}	

To obtain this effloresced sulphate, the common sulphate is to be exposed freely to the air, at a temperature of 20°. In four-and-twenty hours the salt will have entirely effloresced, and undergoes no change from further exposure.

#### *Acetate of Quinia*

Is remarkable for the great facility with which it crystallizes in silky needles; it is little soluble in the



cold, even with the addition of an excess of acid; on cooling it forms an amorphous mass.

### *Citrate of Quinia.*

This has lately been prepared by M. Caventou. Citric acid easily dissolves quinia with the aid of heat; the solution is transparent, but becomes solid on cooling. Of all the salts of quinia this perhaps is the one which most resembles the sulphate in form. It may exist in the state of a supercitrate, and may be usefully employed in medicine where the object is to unite a tonic with an antiseptic effect.

The following is a good antiseptic syrup of the supercitrate of quinia;—

Simple syrup . . . . .	1 pound.
Supercit. of quinia . . . . .	36 grains.

The dose is one or two table-spoonsful in twenty-four hours.

### *Quinate of Quinia.*

It is sufficient to state the composition of this salt, which is 0.82 of quinia and 0.08 of chinic acid.

### *Quinate of Cinchonia.*

Is composed of 0.59 cinchonia, and 0.41 chinic acid.

Both are prepared by decomposing a solution of sulphate of quinia or cinchonia in alcohol of 34° or 35°, by means of quinate of lime dissolved in a small quantity of water, separating the precipitate and evaporating the fluid until crystals form.

### *Preparation of the Quinates of Quinia and Cinchonia.*

The best method of obtaining these two salts is by a double decomposition. For this purpose we take a solution of sulphate of quinia or cinchonia in alcohol at



34° or 35°, we add to it, in divided portions, quinate of lime dissolved in a small quantity of water till the precipitation ceases. The deposit is separated, and the evaporation of the liquid affords the salt of quinia, which may require to be dissolved in water and recrystallized. The quinate of lime being necessary for the above process, we describe the method of procuring it, which is as follows:—

A kilogramme of yellow bark is boiled three times in water acidulated with sulphuric acid, (50 grammes to each quantity of water.) The liquors strained, and still hot, are decolorised by a sufficient quantity of hydrate of lead, and the whole is filtered. (The sediment treated with alcohol furnishes quinia.) We thus obtain a nearly colourless liquid, which is treated with sulphuretted hydrogen or with some drops of sulphuric acid. The liquor is then carefully decanted, and a slight excess of lime is added. The quinia and cinchonia of the quinates are precipitated and collected; the quinate of lime remains in solution and is obtained in crystals by evaporation. While it is still of the consistence of syrup it should be left some days exposed to the air; it thus concretes into a mass which, being purified by repeated solutions and crystallizations, yields the quinate of lime pure and very white.

*Action of the Cinchonic Alkalis and their Salts on Animals.*

Scarcely were the alkalis in question discovered, when M. Pelletier sent me a certain quantity that I might try their effects on animals. I soon perceived that neither the alkalis nor their salts were poisonous or even exerted any sudden effect that was appreciable; hence, it was evident that their effects might be safely tried on man.

*Action on man in Health or Disease.*

From numerous experiments, I have come to the conclusion, that these two alkalis possess the medicinal



properties of the cinchona, and consequently may be substituted for them in all cases. MM. Double, Villerme, Chomel, and many other physicians, have arrived at the same result from similar researches. If it be always of importance to the physician to know the exact quantity of the active ingredient in the medicine he employs, it is especially so with reference to the cinchonas, whose activity varies greatly according to the nature and quality of the barks. It is also of great advantage to be able to administer this medicine in a sufficiently small volume and in a form that is not disagreeable. Patients have perished in remittent fevers merely for want of resolution to swallow the necessary quantity of cinchona in powder, or from its exciting vomiting or diarrhœa; even in more favourable cases the stomach is obliged, as it were, to analyze the bark and extract its febrifuge principle; this, however, is a difficult and toilsome process even for the healthiest stomach, and chemistry has therefore rendered a real service to medicine by discovering a method of effecting this separation beforehand.

The Académie Royale des Sciences has decreed to MM. Pelletier and Caventou a prize of 10,000 francs, for their important works on the cinchonas, and the sum of 2,000 francs to M. Henry for his process, which has greatly diminished the price of the sulphate of quinia.

M. Caventou has informed us of the effects which he always experienced from the sulphate of quinia during his conjoint researches with M. Pelletier, when he had frequent occasion to taste liquids containing quinia or cinchonia. He perceived a general excitement similar to that he was always accustomed to experience from coffee. The analogy was so striking as to induce M. Pelletier and himself to analyze coffee, which is recommended by many physicians in the treatment of fever. They found in it neither quinia nor cinchonia, but a proximate principle crystallizable in long white silky filaments resembling amianthus, on which they did not extend their researches, as they



heard that M. Robiquet was occupied with the same subject, and already had in progress a work on this substance, which has been since called *cafeine*. This is not an alkaline base, but a proximate principle like narcotine; it does not saturate the acids, it merely dissolves them and crystallizes. The use of the sulphate of quinia is now general, and its efficacy in all affections of an intermittent type becomes more and more established. Accounts of intermittent fevers cured by this remedy have been published in all the academic collections and medical journals. Among other writers on this subject, we may mention Dr. Elliotson, who has published a very interesting paper in the *Medico-Chirurgical Transactions*,\* on the use of the quinia and its sulphate. In intermittent fever he found the pure quinia as efficacious as the sulphate. He has also used this medicine with advantage in intermittent neuralgia and typhus. He gives the quinia and its sulphate in much larger doses than we do; he nevertheless assures us that his success has been constant. He gives the pure quinia in doses of five grains every six hours; he has even prescribed ten grains at the same intervals, without any bad effect.

Dr. Francis Baker,† senior physician to the Fever Hospital, at Dublin, has reported thirty cases of intermittent fever, of various types, which were all cured by the sulphate of quinia. He gave it in doses of from 1 to 3, or rarely 4 grains, three times a day: 6, 8, or 10 grains, often sufficed to prevent the return of the fever; in some cases, however, from 24 to 30, and in one 44 grains, were taken.

In the same collection is a paper by Dr. John O'Brien, containing an account of six cases of typhus, treated with the sulphate of quinia. From 3 to 4 grains were given per diem, and of the six patients, two were cured as rapidly as if the disease had been intermittent fever; in three the success was as com-

\* Vol. xii. part 2, 1824.

† Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians in Ireland, vol. iv. 1824.



plete but less rapid ; the sixth died. The reader will not be surprised to find sulphate of quinia administered in cases of typhus in England, when he learns that I myself saw Dr. Elliotson give it in large doses in erysipelas at St. Thomas's Hospital, without any bad effect.

M. Bally has also treated at La Pitié a great number of intermittent fevers with the sulphate of quinia, and always successfully. The efficacy of this medicine has also been proved in the treatment of remittent fevers. I have reported in my Journal\* the first cases of this kind cured with the sulphate of quinia. The earliest instance was communicated to me by M. Renauldin, and a short time after I had myself an opportunity of administering the medicine beneficially,† and there is now no doubt either of the utility of this alkali, or of the superiority of the quinia and its salts over all other preparations of bark.

MM. Dupré,‡ Ribes,¶ and Piedagnel,§ have published in the same journal some interesting cases of neuralgia, cured by the sulphate of quinia ; and the power of the remedy has been since confirmed by a number of similar observations. But it is not only in the above-mentioned diseases that the sulphate of quinia has been found useful. Dr. Klokow|| has succeeded in curing with sulphate of quinia, a severe and dangerous hemorrhoidal flux in a woman, fifty years of age. He gave 4 grains at a time, and after the second dose the hemorrhage was arrested ; the mineral acid, alum, ipecacuanha, and opium, had been previously employed without success.

Dr. Goupil cured a man, twenty-eight years of age, of a severe affection of the chest, with hemoptysis of

\* Journal de Phys. Expériment. Juillet, 1821.

† Idem, Octobre 1821.

‡ Journal de Phys. Expériment, Avril, 1822.

¶ Id. Octobre, 1822.

§ Id. Avril, 1822.

|| Journal der practischen Heilkunde, Jun. 1824.



an intermittent type, by administering 18 grains of the sulphate of quinia in twenty-four hours, after having applied fifteen leeches to the anus two days before.\* M. L. Martinet† has also published a memoir on the use of the sulphate of quinia, in large doses in the intermittent fevers of Italy. According to his observation, it required to be given in doses of 20 and 24 grains, in order to arrest the quotidians and quartans; doses of from 12 to 18 grains were found insufficient. It produced no bad effect on the abdominal viscera, and the patients recovered. M. Chomel has given, with success, 36 grains of the sulphate at a single dose. In Italy, Professor Mathæis‡ has treated with the sulphate of quinia thirty-one cases of tertian fever, simple or double, and effected their cure; but he was obliged to carry the dose from 15 to 35 grains, in two or three days. This physician also relates two instances of remittent, one of which was cured by the cinchona and the other by the sulphate of quinia. M. Rossi has treated with sulphate of quinia sixty-four patients, affected with intermittent fevers of various species and types; eight tertians, twenty-nine double tertians, two quartans, twenty-seven sub-continued, and eight remittent fevers, were cured. Fifty patients had no paroxysm after the first dose, or had only slight ones. The quantity of the sulphate given varied from 12 to 62 grains, but in twenty-four cases it did not exceed 24 grains. M. Torelli has also reported sixty-five cases which were cured, with the exception of one, in which the sulphate was not administered till the patient was in a hopeless state. Of these cases four were quotidian, twenty-two tertian, thirty-one double tertian, three quartan, two double quartan, two sub-continued, and one remittent fever. Forty-two patients had no paroxysm after the first dose. The quantity given to each individual varied from 12 to 18 grains.

\* *Nouv. Bib. Méd.*, Juilliet, 1824.

† *Revue Médicale*, Mars, 1824.

‡ *Gionale Arcadico di Roma*, Novem. 1822.



*Manner of employing the Cinchonic Alkalis.*

The preparations hitherto most in use have been the sulphates of quinia and cinchonia. Of the former, from 1 to 10 grains is given in twenty-four hours; where this dose has been much exceeded the success has not answered expectation, and unpleasant consequences have occasionally ensued, such as great agitation and very strong cerebral excitement. I have never found it necessary in any case to give more than 10 grains in the twenty-four hours, and have never seen this salt fail in its effect. In the hospitals with which I have for some years been connected, I have made experiments to determine the exact dose at which the sulphate of quinia ceases to be a powerful febrifuge. I have found that 2 grains in twenty-four hours are sufficient effectually to cut short a tertian, quartan, or quotidian fever. Several physicians have informed me that their success was not equal to mine, and desired to know the reason, which I should suppose resided in the sulphate employed by them being adulterated, which is frequently the case, and also perhaps in the fact of their patients remaining in the localities where they contracted the disease, whereas mine were transferred to an hospital in a healthy situation, which is alone sufficient in some cases to arrest the paroxysms. M. Alphonse Ménard,\* of Lunel, who appears to have had frequent opportunities of treating remittent and intermittent fevers, has published a memoir on the evils arising from large doses of the sulphate of quinia in the treatment of these diseases; and he assures us that he has generally found six grains sufficient to stop the progress of the malady. The observations of this physician, however, on the bad effects he attributes to the sulphate of quinia are not very conclusive, as other natural or accidental causes appear to have influenced the course of the disease. A very good thesis on the preparation of the cinchonic alkalis has been published by Dr. Ernest; it is entitled "De Medicamentis in

\* Revue Médicale, Nov. 1825.



febris intercurrentibus cortici Peruviano substitutis  
D. T. M. Auctor. Frid. Adam Ernest, Saxo-Boruss,  
1822."

### *Preparations of Quinia.*

M. Pelletier has prepared, according to my formula, a perfectly colourless and transparent syrup of quinia. It contains two grains of quinia in the ounce. I daily obtain from it the most satisfactory results; it appears to me to have a beneficial effect in the scrofulous affections of children.

### *Syrup of Quinia.*

Simple syrup . . . . .	2 pounds.
Sulphate of quinia . . . . .	64 grains.

Six table-spoonsful of this syrup are usually sufficient to arrest intermittent fevers. I have even seen a remittent yield to the same dose.

### *Wine of Quinia.*

Good Madeira . . . . .	1 litre.
Sulphate of quinia . . . . .	12 grains.

This preparation may be made with Malaga, or even with vin ordinaire.

### *Tincture of Quinia.*

Sulphate of quinia . . . . .	6 grains.
Alcohol at 34° . . . . .	1 ounce.

The sulphate of quinia is preferable to the pure alkali, in this case, because a tincture made with the alkali, not saturated with an acid, gives a precipitate when mixed with water. Wine of quinia may be extemporaneously prepared by adding two ounces of this tincture to a pint of wine.



*Preparations of Cinchonia.*

Cinchonia has also been employed as a febrifuge and tonic, particularly by Dr. Chomel; it possesses these properties however, in an inferior degree to quinia, and in some cases the febrifuge effect has entirely failed.

We observed, in a former edition of this work, that it was to be wished that physicians would make further observations on the virtues of this substance, which exists in almost all the cinchonas combined with quinia, and is found nearly isolated in that of Carthagenæ. Such observations have accordingly been instituted.

M. P. Marianini, of Mortara, in the Milanese, has published an interesting memoir on the use of cinchonia and its sulphate in intermittents. He considers the effect of this medicine to be as certain as that of the sulphate of quinia, over which it has the advantage of greater solubility in water and less bitterness. M. Marianini affirms that cinchonia, and even quinia, may be divested of its bitterness by repeated washing with alcohol, and that the presence of a free acid is necessary for the developement of this sensation by rendering the substance soluble.

In the first part of his memoir this author reports thirty-seven cases of intermittent and remittent fever, cured by sulphate of cinchonia. The five first were simple quotidians, the sixth a quotidian remittent, the remainder tertians. Eight cases of remittent follow, which were treated with sulphate of cinchonia; and seven of simple quartan, which were cured by it. In the second part of his work, M. Marianini details the results which he obtained with pure cinchonia; he cites sixteen examples of simple tertian, eight of tertian remittent, and fifteen of quartan fever. He usually administers cinchonia or its sulphate in some ounces of peppermint water; the first dose is always the largest; he gives as much as 30 grains of cinchonia at three doses in the course of a day, and sometimes commences with 20 grains.



*Syrup of Cinchonia.*

Simple syrup . . . . .	1 pound.
Sulphate of cinchonia . . . . .	48 grains.

This syrup may be employed in the same doses, and under the same circumstances, as the syrup of quinia.

*Wine of Cinchonia.*

Madeira . . . . .	1 litre.
Sulphate of cinchonia . . . . .	24 grains.

This may also be made with vin ordinaire.

*Tincture of Cinchonia.*

Sulphate of cinchonia . . . . .	12 grains.
Alcohol at 34° . . . . .	1 ounce.

A wine of cinchonia may be prepared by adding two ounces of this tincture to a pint of Madeira.

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## OF THE EMPLOYMENT OF SULPHATE OF QUINIA IN COMBINATION WITH OTHER MEDICINES.

*With Opium or Morphia.*

Many celebrated physicians have recommended the combination of opium with bark in the treatment of obstinate intermittents. Störk, Hoffman, Rivière, Sydenham, and Lind, frequently employed it with success. Sarcome made use of it when irritability of the stomach occasioned the rejection of the cinchona. Although the discovery of the sulphate of quinia has



in a great measure obviated these inconveniences, there are yet circumstances in which it is useful to unite the sulphate with opium, or still preferably with morphia. Intermittents, which had resisted the sulphate of quinia alone, have been known to yield to this combination.

M. Sédillot has published two important observations selected from many others, on the conjoint use of bark and opium in obstinate intermittents;\* he has also combined the quinia with opium; and has treated intermittent neuralgiæ with success on the same plan.

### *Mode of administration.*

M. Sédillot was formerly in the habit of giving an ounce of the bark with two or three grains of opium in the course of the day; he now substitutes for the bark fifteen or twenty grains of sulphate of quinia. He administers the remedy in divided doses in the intervals of the paroxysms, and continues it for eight days after their cessation.

M. Sédillot has never known the combination of bark or sulphate of quinia with opium fail in any case of whatever duration, type, or intensity, provided it was not complicated with organic lesion.

Instead of uniting the sulphate of quinia with opium, we would propose the following combination of the sulphates of quinia and morphia.

Sulphate of quinia . . . . .	2 to 6 grains.
Sulphate of morphia . . . . .	$\frac{1}{2}$ to 1 grain.

To be divided into two, three, or four doses.

It would be possible to combine the sulphuric acid directly with morphia and quinia, by observing the quantity of each base necessary to saturate the acid; the crystallization of these mixed sulphates would however be very difficult.

\* Journ. Gén. tom. xcvi. p. 9.



*Combination with Tartar Emetic.*

Other physicians have proposed to associate tartar emetic with the sulphate of quinia in the treatment of intermittents.

Dr. Dominique Gola\* cured on this plan four cases of intermittent fever, which had resisted the sulphate alone. He used the following :

Tartar emetic . . . . .	gr. iij.
Sulphate of quinia . . . . .	gr. x.

Mix thoroughly, and divide into six equal parts, of which one is to be taken every two hours during the intermission.

M. Gola says that the first dose produced sometimes vomiting of bitter matter, and sometimes alvine evacuations; occasionally, however, no evacuant effect was produced; but the fever did not cease the less readily.

In a few instances this combination may, no doubt, be useful, but the sulphate of quinia alone suffices in the majority of cases.

[The long experience of British practitioners of the powerful and certain effects of quinia renders altogether unnecessary any attempt to bring into a small space the results of its employment in almost every known disorder. I cannot help thinking, however, that the combinations of quinia with other remedies are not sufficiently considered in the medical practice of this country. We seldom hear of its administration in any other form than that of supersulphate in infusion of roses. Of its combination with stimulating, that is, small doses of opium in the exhaustion of typhoid fever, I can speak with certainty and with favour. Nor is it less to be relied on in the chronic bronchitic affections of middle-aged and elderly persons, more or less of decidedly antiphlogistic treatment having been premised. In such case the change from the purulent to the frothy mucous expectoration, and the rapid yet

\* *Annali Universali di Medicina.* Juillet et Août 1825.



easy diminution of the latter, together with the suppression of the cough, are palpably attributable to the tonic qualities of the quinia. The experience of my friend Dr. J. Whyatt Crane, at the St. George's and St. James's Dispensary, goes to show similar success in the same affection. In several cases of acute bronchitis, I have given it in combination with tartar emetic: twice it was eminently beneficial, being administered to individuals advanced in age; but in three or four other instances, though not hurtful, the combination did not prove so efficient as I believe the exhibition of tartar emetic alone, and subsequently of quinia would have done. The cases in question occurred in younger and more robust persons, which probably accounts for the want of success.

Dr. Copland once mentioned to me a curious consequence of the combination of quinia with aloes: he finds that the addition of a single grain of aloes to two or three of quinia, is sufficient to act freely upon the bowels. His observation of this has been repeated. It is a fact of some importance, particularly in those cases where the necessary employment of purgatives is yet rendered precarious by the excessive debility of the patient.

Since the last edition of this work I have been enabled to certify the accuracy of the above observation in several instances; the combination in question proving laxative when saline medicines had only produced griping and irritation.

In the 5th vol. of the Medical Gazette is a communication from Dr. Harty, in which he illustrates the effects of quinia in accelerating mercurial action. He found that both a smaller quantity of mercury, and a shorter space of time, sufficed to produce salivation, when combined with quinia. He even maintains that ptyalism may be produced in such a case by the use of quinia alone.

In the 10th vol. of the same Miscellany, Mr. Middlemore states that his practice has induced him to



give a preference to quinia over iodine in the treatment of strumous affections of the eyes.

There remains another alkaloid substance, found in 1833, in the yellow cinchona, by MM. Henry and Delondre, to which M. Magendie does not allude. This is QUINODINE. As a hydrate it is white, crystallizable in prismatic needles, and melts into a mass of resinous appearance, only at a much higher temperature than that required for the fusion of quinia. It is extremely bitter, especially when dissolved in alcohol, or an acid. Alcohol of the sp. gr. of 963 holds it, and on evaporation leaves it in crystals, with a little resinous matter, which is removed by washing with alcoholic water. These crystals effloresce, turn the syrup of violets green, and restore turnsol paper, reddened by an acid. They combine with various acids, and form pearly salts, crystallizable like those of quinia, and precipitable by soda. It resembles quinia in its form, small degree of volatility, its solubility in alcohol much diluted, and its saline combinations. It differs from quinia by its greater tendency to crystallize, and its being less fusible, its being soluble in sulphuric ether, and by the property it has in its resinous state of assuming in the air the form of crystals, when washed with alcoholic water.

Quinodine is found in the yellowish waters which float on quinia and cinchonia, after the distillation of the alcoholic tinctures, and the preparation of quinia. It is accompanied by a yellow substance, supposed to be an acid.

I am not aware whether the promise of the discoverers to publish the process for obtaining quinodine pure has ever been fulfilled.—*Tr.*]

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## VERATRIA.

We are again indebted for the discovery of this new alkali to the labours of MM. Pelletier and Caventou.



These indefatigable chemists having observed that all the individuals of the *veratrum* family possessed a very acrid taste, and exercised a similar action on the animal economy, were led to inquire whether some common principal did not pervade the whole of these plants. An analysis of the *veratrum sabadilla* confirmed their conjectures, and they separated from it an acrid principle which they also found in succession in the bulb of the *colchicum autumnale*, and in the *veratrum commune*; to this they gave the name of *veratria*.

#### *Preparation of Veratria.*

The seed of the *sabadilla* is treated several times with boiling alcohol. These tinctures, filtered while still nearly boiling, deposit on cooling flakes of a white waxy matter; the substance remaining in solution, reduced to the consistence of an extract, is again taken up by cold water and filtered; a small quantity of fatty matter remains upon the filter. The solution is then slowly evaporated, when an orange-yellow precipitate forms, exhibiting the characters of the colouring matter found in almost all ligneous vegetables. A solution of acetate of lead is poured into the liquor, which is still highly coloured, and immediately a new and very abundant yellow precipitate is formed, which is to be separated by filtering. The liquor, now nearly colourless, still contains, among other substances, the acetate of lead which has been added in excess. The lead is thrown down by means of a current of hydro-sulphuric acid; the liquor, being filtered, is concentrated by evaporation, treated with magnesia, and again filtered. The magnesian precipitate is treated with boiling alcohol, and the tinctures afford by evaporation an exceedingly acrid pulverulent substance, presenting all the properties of an alkali. This substance is at first yellowish, but by repeated solution in alcohol, and precipitation by the addition of water, it is obtained in the form of a very white and perfectly inodorous powder.



*Chemical properties of Veratria.*

Veratria is very sparingly soluble in cold water; boiling water takes up one-thousandth part of its weight, and becomes sensibly acrid. It is readily soluble in ether, and still more so in alcohol. It is insoluble in the alkalis, and soluble in all the vegetable acids. It saturates all the acids and forms with them uncrystallizable salts, which by evaporation assume the appearance of gum. The sulphate alone presents the rudiments of crystals when the acid is in excess. Nitric acid combines with veratria, but when added in excess, and especially if concentrated, it does not strike a red colour, as happens with morphia, brucia, and impure strychnia; it, however, effects an immediate change on the vegetable substance, and occasions the formation of a yellow detonating matter, analogous to the *bitter of Welther*. Veratria restores the blue tinge to turnsol paper reddened by acids. It melts at a temperature of  $50^{\circ}+0$ , and in this state has the appearance of wax; on cooling it concretes into an amber-coloured translucent mass. Subjected to destructive distillation, it affords water, a great deal of oil, &c. and leaves a large quantity of charcoal, which when incinerated leaves but a very small residue, which is slightly alkaline.

MM. Dumas and Pelletier have made three analyses of veratria, derived from the *sabadilla*, which do not materially differ.

Carbon	. . . . .	65.65
Azote	. . . . .	5.04
Hydrogen	. . . . .	8.54
Oxygen	. . . . .	19.60
		<hr/>
		99.93

Since that time, M. Couerbe has discovered that several other important principles are contained in the *sabadilla*, and he has severally named them *sabadilline*, *veratrin*, and the *gum resin* of *sabadilla*: besides which



there is a black, gluey matter, which combines all the other substances, and prevents the isolated manifestation of their several properties.

The following is M. Couerbe's mode of obtaining veratria. Boil the seeds of the *sabadilla* with alcohol, and prepare an extract by distillation; treat this extract with sulphuric acid, and filter after a few minutes' boiling. In this manner, the veratria, the *sabadilline*, the *veratrin*, the gum resin, and dark colouring matter are dissolved, and may be precipitated by potass. Add alcohol to the precipitate and distil, and the compound matter representing the veratria of MM. Pelletier and Caventou is obtained. In order to purify, it must be again treated with sulphuric acid, precipitated by potass, and dried. This is veratria in a pure state, and appears as a fine, white, and exceedingly acrid powder, alkaline, and capable of uniting with acids, but forming no crystallizable salts.

In order to separate the new substances discovered by M. Couerbe, this veratria is to be dissolved in water acidulated with sulphuric acid, and nitric acid added by drops, until a viscid precipitate (the black gluey matter) ceases. The liquid is poured off, and precipitated by potass or ammonia; the deposit is washed with cold water, and taken up by alcohol, which is evaporated, and the residue consists of all the principles above stated, minus the black matter. Boiling water dissolves the *sabadilline* and *gum resin*; the former crystallizes on cooling, and the second is obtained by evaporating the mother-fluids to dryness.

The water therefore still leaves two undissolved matters, pure veratria and *veratrin*. The former is dissolved and separated by ether, which leaves the *veratrin* undissolved.



## PURE VERATRIA.

Pure veratria is white, solid, and friable, melts at  $115^{\circ}$  C., is insoluble in water, very soluble in ether and in alcohol. M. Couerbe states that when *pure* it crystallizes on uniting with acids, the sulphate, for instance, forming long and thin needles.

According to the same authority, the composition of veratria is,

	At. comp.
Carbon . . . . .	71.247 = 34
Azote . . . . .	4.850 = 2
Hydrogen . . . . .	7.510 = 43
Oxygen . . . . .	16.394 = 6

and therefore materially different from that of Pelletier and Caventou.

## SABADILLINE.

This substance is in small crystals, or hexaedral prisms. It is white, excessively acrid, is not volatile, fuses at  $200^{\circ}$  C, and loses two atoms of water, by fusion. It is perfectly soluble in water and in alcohol, but utterly insoluble in ether. By most of these properties, therefore, it is distinguished from veratria. Its elementary composition, when anhydrous, is as follows:

	At. Comp.
Carbon . . . . .	64.65 = 20
Azote . . . . .	7.50 = 2
Hydrogen . . . . .	6.65 = 26
Oxygen . . . . .	21.10 = 5

The sulphate of sabadilline crystallizes in prismatic needles, is fusible, and when fused, loses four atoms of water.



*Gum-resin of the Veratrum Sabadilla.*

It is yellowish, uncrystallizable, slightly alkaline, and, when perfectly dry, very friable. It is found in the mother-water of sabadilline. Alcohol dissolves any portion of it; water also and the acids easily dissolve it; only a very minute quantity is soluble in ether. It fuses at  $165^{\circ}$ .

It therefore bears a strong resemblance to sabadilline, but differs from it in its appearance, which is not at all crystallized. Its composition is the same as hydrated sabadilline, minus an atom of water.

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VERATRIN.

Veratrin is brownish, insoluble in ether and in water, but soluble in alcohol. It fuses at  $185^{\circ}$  C. and is composed of 14 atoms carbon, 2 azote, 18 hydrogen, and 3 oxygen. Its action on the animal system is not yet ascertained. Strong acids decompose, and nitric acid changes it into oxalic.

*Action of Veratria on Animals.*

A very small quantity of acetate of veratria\* injected into the nostrils of a dog immediately excites violent sneezing, which lasts sometimes nearly half-an-hour. One or two grains introduced into the mouth produce an abundant salivation, which continues for some time. If the same quantities be injected into any part of the intestinal canal, on opening the abdomen to watch its effects, the intestine is observed alternately to contract and relax itself for a certain time: the portion of the mucous membrane with which the vetratria has come

\* In my experiments on animals, this preparation, being one of the most active, has alone been employed.



in contact is inflamed ; the irritation extends and produces vomiting and alvine evacuations. In a larger dose it causes great hurry of the circulation and respiration, soon followed by tetanus and death. If one or two grains be injected into the cavity of the pleura or tunica vaginalis, the effect is still more rapid, tetanus and death ensuing in less than ten minutes. The same results follow in a few seconds, if the like quantity be injected into the jugular vein. Dissection shows that even in this case the veratria has acted on the intestinal canal, since the mucous membrane is found highly injected. The lungs also afford signs of inflammation and engorgement.

*Action of Veratria on Man in Health or Disease.*

The effects of a large dose of veratria on man have not been observed ; there is no doubt they would be the same as those on animals. The taste of veratria is very acrid, but without bitterness ; when taken into the mouth, in however small a quantity, it excites a very abundant salivation. Although entirely inodorous, the powder, if smelled too near, excites violent sneezing, which may even become dangerous. Swallowed in the dose of a quarter of a grain, it immediately causes diarrhœa, and in a little larger dose, vomiting more or less violent. I have lately given it to the extent of two grains in twenty-four hours, without producing too great an effect on the bowels. The patient was an old man, who had been struck with apoplexy some time before ; this is an additional proof that the state of the nervous system has much influence on the operation of medicines : from having tested, though cautiously, the mixture which contained these two grains of veratria, I experienced for several hours an insupportable acrid sensation in the mouth and pharynx, which had not entirely subsided by the following day ; the patient experienced nothing of the kind.



*Cases to which Veratria is applicable.*

Veratria is principally serviceable in cases where it is desirable to effect a prompt evacuation of the bowels, and it has occasionally succeeded in expelling enormous accumulations of indurated fæces from the large intestine in old persons. In those pharmaceutical preparations of which hellebore and colchicum form the base, these substances ought to be replaced by veratria; such medicines would thus become more powerful, certain, and convenient in their operation, and Bacher's pills, the eau médicinale of Husson, and the tincture of colchicum, would cease to be the uncertain remedies which practitioners have too often found them. The following are some of the formulæ intended to replace those of which we speak.

*Pills of Veratria.*

Veratria . . . . . 1—2 grains.

Gum Arabic and syrup of gum sufficient to make 6 pills of each grain.

One of these pills may be administered at first, and if a purgative effect be not produced, three may be given in the course of a day. These pills may be advantageously substituted for those of Bacher.

*Tincture of Veratria.*

Veratria . . . . . 4 grains.

Alcohol . . . . . 1 ounce.

Dose from 10 to 25 drops, in a cup of water. Internally it may be used instead of tincture of colchicum, in dropsy and anasarca, and externally by friction in the same maladies and in gout.



*Solution of Veratria.*

Sulphate of veratria	. . .	1 grain.
Distilled water	. . .	2 ounces.

This is a substitute for the eau médicinale. Dose, a tea-spoonful in one or two ounces of eau sucrée.

I have frequently successfully treated tic douloureux of the face, by producing small blisters, made along the course of the nerves with a grain or two of veratria, repeating the operation every four or five days. I have done the same with like success in palsy of the face.

*Ointment of Veratria.*

Veratria	. . . . .	4 grains.
Lard	. . . . .	1 ounce.

This may be used externally in case of chronic rheumatism, anasarca, and gout.

*Action of Sabadilline on the Animal System.*

I have made a few experiments on this subject, but have seen nothing that should render sabadilline preferable to veratria in any circumstances.

[The observations of M. Magendie on the medicinal effects of veratria do not appear to have induced practitioners in this country to try them, or at least to publish the results of their trials, until Dr. Turnbull's *brochure* appeared in 1834. This gentleman has given us a series of cases of heart affections, neuralgia in varied forms, rheumatisms, paralysis, dropsy, gout, amaurosis, &c. in which the external application of veratria appears to have worked astonishing effects. So applied, the patient generally experiences a considerable degree of warmth and tingling in the part, which are indicative of its operation; and if it be applied for a sufficient time to put the constitution completely



under its influence, the feeling of heat and tingling extends over the whole surface of the body, and in some instances involuntary twitchings of the muscles of the mouth and eyelids are induced. Though the sensibility of the parts over which it is rubbed is increased to an extraordinary degree, the skin shows no mark of irritation, even after the friction has been continued for some length of time. It is a curious fact, that though veratria, administered internally, causes the most violent cathartic and emetic effects, its external use induces constipation, and no effects whatever on the stomach, but causes a copious diuresis. For the details of the cases brought forward by Dr. Turnbull, I must refer the reader to his publication. I may mention that the doses he advises far exceed those of Magendie, the ointment being composed of from 10 to 20 grains of veratria to the ounce of lard, of which the size of a large nut is to be rubbed in night and morning. 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<sup>m</sup>, 76, and at  $10^{\circ}$  sustains a column of mercury of 0<sup>m</sup>, 38. It is, however, easily congealed, and this takes place at  $50^{\circ}$  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

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

Or, of one volume of vaporous 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 mix-



ture 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 Scheele's 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 head-ache 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 harrassing 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

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

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



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 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 its employment by the professor 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

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

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



found benefit from this medicine in several cases of phthisis, one of which, he says, 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 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 drachm.
Distilled water . . . . .	1 pound.
Pure sugar . . . . .	1 ounce.

Dose, a table-spoonful night and morning. The dose may be increased to six, or even eight table-spoonsful 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 ounce.

\* Bibliotek for Læger et Nyc Hyæga.



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

*Cyanic Syrup.*

Simple syrup, well clarified	. . .	1 pound.
Medicinal prussic acid	. . . .	1 drachm.

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

*Mixture for Lotions.*

Medicinal hydrocyanic acid	. . .	1 to 2 drachms.
Lettuce water	. . . . .	1 pint.

The proportion of acid may be increased to four drachms.

Used as a lotion in tetters 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 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 drachm to 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 1834 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

\* 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.*



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 mode of 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. In those instances also of dyspepsia that depend on an inflamed condition of the great left sac of the stomach and its cardiac orifice, and are accompanied with hysterical symptoms, I have ever found prussic acid a powerful adjuvant to the demulcent medical and dietetic treatment which such cases require. I generally administer it in conjunction with mucilage of gum arabic.

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.*]

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#### 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 of iron. Well-prepared cyanuret of potassium is white and transparent; it may be fused by heat without change: the action of the air, however, and of carbonic acid in part decompose it. It may be preserved for any period of time, provided it be kept free from all humidity.

*Action of the Cyanuret of Potassium and Hydrocyanate of Potass on Man and the lower Animals.*

MM. Robiquet and Villermé made some experiments with this remedy in my presence. The tenth part of a grain killed a linnet in one minute. A guinea-pig was killed in two or three minutes by rather less than a grain.

A drop of solution containing only a hundredth part of a grain of cyanuret, caused a linnet to fall dead in half a minute. Half a drachm, containing five grains of cyanuret, put an end to a strong dog in a quarter of an hour. The symptoms of poisoning resembled those produced by hydrocyanic acid; no instances are recorded of its poisonous effects on man.



*Mode of Administration.*

Dissolve cyanuret of potassium in eight times its weight of distilled water, and it forms hydrocyanate of potass. The salt, mixed with water in this proportion, may be called "medicinal hydrocyanate of potass." This solution should always be extemporaneous, being liable to transformation into carbonate of ammonia.

It may be given in the same doses as medicinal prussic acid without danger, and may form a part of the same preparations as those into which prussic acid enters. It may even be freed from the action of the small quantity of alkali contained in the cyanuret, either by adding a few drops of some vegetable acid, or prescribing it in an acid syrup; the advantage would, moreover, be gained of setting the prussic acid at full liberty.

If instead of the hydrocyanate of potass the cyanuret is made to enter into a mixture, a quarter of a grain gradually increased to a grain will be the proper proportions, though the latter dose has been exceeded by some practitioners. The following are a few formulæ.

*Pectoral Mixture.*

Medicinal hydrocyanate of potass . .	1 drachm.
Distilled water . . . . .	1 pound.
Refined sugar . . . . .	1½ ounce.

A table-spoonful to be taken night and morning, and the dose may be divided so as to give five or six such quantities in the twenty-four hours.

*Pectoral Potion.*

Infusion of ground ivy . . . . .	2 ounces.
Medicinal hydrocyanate of potass .	15 drops.
Syrup of marshmallows . . . . .	1 ounce.

A tea-spoonful to be taken every three hours.



*Mixture of Cyanuret of Potassium.*

Lettuce water . . . . . 2 ounces.  
 Cyanuret of potassium . . .  $\frac{1}{2}$  a grain to 2 grains.  
 Syrup of marshmallows . . . 1 ounce.

A table-spoonful every two hours.

*Syrup of Hydrocyanate of Potass.*

Clarified simple syrup . . . 1 pound.  
 Medicinal hydrocyanate of potass 1 drachm.

This syrup may be added to ordinary pectoral mixtures, in lieu of other syrups.

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 CYANURET OF ZINC.

The cyanuret of zinc has been latterly extensively used in Germany as a substitute for prussic acid; and it has acquired the credit of possessing decided vermifuge properties. We shall confine ourselves to the mode of preparing it, in order that future experiments may determine its efficacy.

*Mode of Preparation.*

M. Pelletier precipitates the sulphate of zinc by hydrocyanate of potass, by which a triple hydrocyanate of zinc is formed, which being dried and calcined at a dull red heat, is soon converted into cyanuret of zinc, mixed, however, with some cyanuret of potassium. Berzelius, however, denies that any but the alkaligenous metals retain their cyanogen after calcination; all the others forming quadri or bi-carburets of the metals.

M. Henry obtains pure cyanuret of zinc by adding cautiously to a solution of sulphate of zinc a filtered and recent solution of cyanuret of potassium until a precipitate ceases to be formed. This precipitate washed and carefully dried is the white cyanuret of



zinc. Should the solution of cyanuret of zinc be alkaline, it should be proportionately saturated with a small quantity of acetic acid.

*Mode of Employment.*

It may be employed in the same doses as the cyanuret of potassium, beginning with a quarter of a grain and advancing gradually to a grain and a half, in a mixture to be given by spoonful; caution is however requisite in its administration.

In Hufeland's Journal for 1823, Dr. Henning is related to have derived great benefit from the cyanuret of zinc in the cases in which hydrocyanic acid is given. His success was particularly great in the vermination of children. In such cases he gave a grain of it mixed with powdered jalap. He has also employed it in diseases consequent on dentition. In neuralgic affections of the stomach, especially in spasm of that organ, he found it of the first benefit. In these instances he was in the habit of prescribing as follows:—

Cyanuret of zinc	. . . . .	6 grains
Calcined magnesia	. . . . .	4 „
Cannella powder	. . . . .	3 „

to be taken in one dose every four hours. Sometimes the cyanuret is mixed with sugar, and its action assisted by the periodical administration of a warm aromatic infusion. The same remedy has been used against cases of dyspepsia and colic, supervening on difficult menstruation. On the whole, Dr. Henning thinks the cyanuret of zinc preferable to the hydrocyanic acid itself.

[Dr. Copland, whose practical dicta may always be relied upon, tells us that he has found the cyanuret of zinc of the first benefit in the treatment of whooping-cough.—*Tr.*]

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CYANURET OF IODINE.

This new compound of iodine, azote, and carbon, was discovered by M. Serullas, (*Annales de Chimie et de*



Physique, 1824.) when repeating the experiments of Davy and Faraday, on the liquefaction of gases. He soon ascertained, however, that iodine and cyanogen united readily, without the aid of extraneous pressure.

*Chemical and Physical Properties.*

Purified cyanuret of iodine is very white, and presents itself in the form of very long and exceedingly minute needles. It has a pungent odour, irritates the eyes, inducing lachrymation, and has a strongly bitter caustic taste. It has a greater specific gravity than sulphuric acid, to the bottom of which it falls rapidly. It volatilizes without decomposition, at a heat much greater than that of boiling water. Thrown on burning charcoal, it gives off abundant violet-coloured vapours. It is more soluble in alcohol than water, and the colourless solutions have the odour and smell of the cyanuret itself: they do not redden turnsol nor turmeric tincture, nor by itself does it decompose water. With nitrate of silver it produces no precipitate.

A concentrated compound of potass decomposes the cyanuret of iodine, and iodate and cyanuret of potassium are formed. Nitric acid does not appear to exert any action on this cyanuret, nor does sulphuric acid attack it until after some time. Hydrochloric acid decomposes it; but the liquid sulphurous acid does so with remarkable rapidity, the acid being set at liberty. Dry sulphurous acid gas has no action whatever on the cyanuret of iodine, neither has chlorine.

*Mode of obtaining the Cyanuret of Iodine.*

In order to effect the combination of the acid and cyanogen, M. Serullas triturates accurately and rapidly in a glass mortar two parts of well-dried cyanuret of mercury and one part of equally dried iodine. The mixture is introduced into a phial, having a rather wide neck, and gradually heated until the cyanuret of mercury begins to be decomposed, of which the crepitation.



the disappearance of some violet-coloured vapours, and the commencing condensation of a white substance at the mouth of the phial, are the indications. It is then to be carried between bent tongs near to a large glass bell: this being placed on a sheet of paper, or a glass plate, one side of it is to be raised, in order to allow the introduction of the neck of the phial under it—the neck inclining downwards as if to be emptied. At this moment white vapours proceed rapidly from the phial, and condense on the glass plate in light cottony flakes. When no more are formed, heat must be applied for their further expulsion.

The same operation may be very well effected, by heating the mixture in a small glass retort leading to a receiver; but in this process there is great difficulty in withdrawing the product, and we are longer exposed to the deleterious emanations of the compound.

When iodine and cyanuret of mercury, in the proportions stated, are employed in the preparation of the cyanuret of iodine, the inconvenience of an excess of iodine is avoided; but it is not less necessary that the whole should be sublimed for the purpose of separating a quantity of ioduret of mercury that is mixed with it. The heat in this case should be carefully regulated. Serullas prefers the heat of a warm-bath, notwithstanding the extent to which the process is thereby drawn out.

With this view, impure cyanuret of iodine is introduced into the bottom of a somewhat large tube, in such a manner that none of it adheres to the sides. It is to be retained in the bath, which is kept at a boiling heat, until nothing but the red ioduret of mercury, which is not volatile at this temperature, remains at the bottom of the tube. This last should be inclined a little out of the bath, in order that the volatilized cyanuret of iodine may condense in this the coldest portion of the tube.

#### *Composition of Cyanuret of Iodine.*

To determine the proportions of the constituent



principles of this substance, various quantities of it have been decomposed by red-hot iron. The ioduret of iron thus formed, being treated with pure potass, produces the ioduret of potassium, which, according to its known composition, taking the mean of five experiments, gives for each gramme of cyanuret, 0.8066 of iodine; whence a gramme of cyanuret of iodine ought to contain, of

Iodine . . . . .	0.823	= 1 atom
Cyanogen . . . . .	0.172	= 1 „

It is to be remarked, however, says M. Serullas, that in each experiment the quantity of iodine was somewhat less than it should have been, upon the supposition that there was an atom of iodine, and one of cyanogen in the cyanuret. The difference, however, is not so great as to show that it is composed of one atom of iodine and two of cyanogen, for in that case the proportions would be,

Iodine . . . . .	0.7062	= 1 atom.
Cyanogen . . . . .	0.2938	= 2 atoms.

#### *Action of the Cyanuret of Iodine on Man.*

From its composition M. Serullas is of opinion that this cyanuret should have a most energetic action on the animal system, and would be found applicable in medicine. It does not, however, appear to be so deleterious as the nature of its elements might have led us to suppose. M. Serullas, and several individuals attached to his laboratory, both tasted this compound and were exposed to the inhalation of its vapours, during the preparation and securing of it in vessels; but they for the most part only experienced a general depression, and in all the instances a violent irritation of the eyes, which was, however, shortly dissipated.

M. Thenard sent me a good quantity of the cyanuret of iodine, but I have not yet made a sufficient number of observations to ascertain its *modus operandi*; and I have introduced it in this place only to point out the preparation, and stimulate to further experiments.



## HYDROCYANIC ETHER.

This preparation, which with the qualities does not possess the frightful activity of the prussic acid, has lately been discovered by M. Pelouse.

*Chemical Properties.*

It is a colourless fluid, having a penetrating alliaceous odour, of the density of 0.78, boiling at about  $82^{\circ}$ , very slightly soluble in water, but soluble to any extent in alcohol and sulphuric ether. When pure it does not precipitate a solution of nitrate of silver. It is very inflammable, and burns with a blue flame. It is scarcely at all affected by caustic potass.

*Mode of Preparing Hydrocyanic Ether.*

Equal parts of sulpho-vinate of baryta and of cyanuret of potassium are exposed to a gentle heat in a glass retort, to which a tabular matras is adapted. The product of the distillation is a colourless, or a very slightly yellow fluid, which separates into two parts, the lighter one being the hydrocyanic ether; not pure, however, but mixed with some water, alcohol, sulphuric ether, and hydrocyanic acid. It is purified by rapid shaking with four or five times its volume of water, subsequent exposure for some time to a heat from  $50^{\circ}$  to  $60^{\circ}$ ; again shaking with water, pouring off, and leaving it for twenty-four hours in contact with chloride of calcium: it is then distilled in a pure state. It is composed of

Carbon . . .	64.23
Hydrogen . . .	8.96
Azote . . .	26.81
	<hr/>
	100.00

Or, in atoms,  $C^4 H^8 + A^2 H^2$ . It corresponds to equal volumes of olefiant gas and prussic acid condensed into one volume.

*Physiological properties of Hydrocyanic Ether.*

Six drops in the gullet of a dog immediately caused



deep inspirations, falling on his side, and subsequently cerebral congestion, and a remarkable agitation of the paws. This continued for four minutes, then gradually diminished, and in half-an-hour had mostly disappeared. The injection of six drops into the jugular vein was quickly followed by death with phenomena as in that by prussic acid.

### *Medicinal Employment.*

A patient with convulsive cough was considerably relieved by taking six drops of prussic ether, combined in a mucilaginous vehicle; nor did he complain of the penetrating and disagreeable odour of the ether. But with several others at the Hotel Dieu the result was different; for though the benefit obtained was equal to that produced by prussic acid, I was under the necessity of abandoning its employment in consequence of the insurmountable disgust of the patients for the smell of the mixture.

The circumstances in which hydrocyanic ether is applicable are the same as those for the exhibition of prussic acid.

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## IODINE.

This is a simple substance, discovered in 1813 by M. Courtois in the mother-waters of the soda of seaweed; but the major part of its properties were elucidated by Gay-Lussac. It is met with in the greater number of fuci growing on the sea-coasts, and also, according to Fife, (*Ann. de Chim. et de Phys.* t. 12,) in sponges. M. Gaultier de Claubry, (*Ann. de Chim. et de Phys.* t. 93,) has ascertained that it exists in the shape of hydriodate of potass, in the mother-waters alluded to. Several mineral waters appear to owe their properties to it. M. Laur. Angelini, of Voghera, has discovered its presence, by means of starch, in the saline waters of that place. He also ascertained the



existence of iodine in the waters of Salles, in the Voraghese, which waters are considered efficacious in goitre and lymphatic congestions. Dr. Cantu, professor of chemistry in Turin, astonished at the effects of the sulphureous waters of Castel-Nuovo d'Asti, in the same diseases, at first was unsuccessful in his search for iodine in them; but subsequently, encouraged by the researches of M. Angelini, he succeeded in detecting the iodine, (*Memorie della reale Acad. delle Scien. di Torino*, t. 29.) Dr. Cantu is inclined to think that iodine exists in all sulphureous waters containing chlorurets. Various mineral waters, not of a sulphureous nature, and particularly those of Echailon, in Savoy, which yield one-twelfth their weight of sea-salt, and the great efficacy of which in goitre is well known, afford no trace whatever of iodine.

By a modification in the mode of employing starch as a test of iodine, M. Balard, of Montpellier, (*Ann. de Chim. et de Phys.* 1825,) succeeded in certifying the existence of iodine in divers marine mollusca, both naked and testaceous, as the *doris*, *venus*, oysters, &c. in several polypi and marine vegetables, the *gorgonia*, *zostera marina*, and eminently in the mother-waters of the saline products afforded by the Mediterranean.\* He was unable to detect in what state iodine exists in the sea-water, on account of the minute quantity, but suspects it is in the form of hydriodate. In this form it has also been detected in the waters of Pandour and Raggozzi.

Shortly before his death, Vauquelin found iodine in

\* M. Balard's process is as follows. After mixing the liquor containing the iodine with starch and sulphuric acid, a small quantity of aqueous solution of chlorine is gently poured into it. As this solution is lighter than the preceding, it does not mix with it, but at the point of contact a blue zone appears, and cannot be mistaken, however feeble the hue. By slightly shaking the vessel so as to mix a portion of the lower liquid with the supernatant chlorine fluid, the blue colour is developed in the parts where the chlorine is in contact. But if strong agitation be used, and the two liquors be completely mixed, the blue colour altogether disappears, should the chlorine have been in excess.



combination with silver, in a mineral which came from a mine in the neighbourhood of Mexico.

*Physical and Chemical Properties of Iodine.*

The name has been derived from the Greek word *ἰώδης*, violet-coloured, on account of the colour it has when in vapour. At the ordinary temperature, iodine is solid and in the shape of small greyish lamellæ, of slight tenacity, and resembling plumbago. It fuses at a heat of  $170^{\circ}$ , C., and volatilizes at  $175^{\circ}$ , giving off a beautiful violet vapour, which, if passed into a receiver, condenses anew into crystalline lamellæ.

Iodine is soluble in ether and spirits of wine, which dissolves more or less of it according to its point of rectification. At  $35^{\circ}$ , and a temperature of  $13^{\circ}$  C, it takes up 1-9th of its weight; at  $40^{\circ}$ , and the same temperature, it dissolves 1-6th. Water only dissolves 1-700th of its weight of iodine.

Iodine has the property of forming one acid with hydrogen, and another with oxygen. It does not, however, combine with oxygen in the gaseous form, but only in the nascent aëriform condition, forming thereby iodic acid. It has a strong affinity for hydrogen, which it abstracts from a great number of bodies, while it absorbs in the form of gas, if the temperature be elevated. With it (hydrogen) it forms hydriodic acid, composed only of iodine and hydrogen. This acid is known as a colourless gas, with a pungent taste and irritating odour: it reddens deeply the tincture of turnsol, and extinguishes burning bodies. It is rapidly absorbed by water, which dissolves a great quantity of it, and hence it forms white vapours in the atmosphere by uniting with its moisture.

Hydriodic acid may be obtained by adding water to the ioduret of phosphorus made from eight parts of iodine, and one of phosphorus, and distilling. The first part that passes is little else than water; the last, if separately collected, is concentrated hydriodic acid, and gives out thick white fumes. The phosphoric acid,



which is also formed during the process, remains in the retort, and may be obtained by a process which need not detain us in this place.

Hydriodic acid will unite with a great number of bases, with some of which it forms neutral salts: of these the most commonly used is the hydriodate of potass: hydriodate of soda has been also occasionally employed, and with apparently equal success.

#### *Preparation of Iodine.*

It is extracted, as before mentioned, from the mother-waters of sea-soda, in which it exists in the state of hydriodate of potass. These waters are obtained by burning the different fuci that grow on the coast of Normandy, passing water through the ashes, and concentrating the fluid.

To obtain the iodine, an excess of concentrated sulphuric acid is poured into these waters, and the liquid gradually raised to ebullition in a glass retort furnished with a receiver. The sulphuric acid unites with the base of the hydriodate, and with the hydrogen of the hydriodic acid, so that the whole products are sulphate of potass, water, sulphurous acid and iodine, which last rises in violet vapours, passes into the receiver in company with a small quantity of acid, in that state, and condenses there. In order to purify it, it should be washed, mixed with water containing a little potass, and again distilled.

#### *Preparation of the Hydriodates of Potass, simple and ioduretted.*

On pouring a solution of soda or potass, on metallic iodine, an iodate and hydriodate are formed, which may be separated from each other by means of alcohol, which only dissolves the latter of these salts, and the pure hydriodate may be obtained by evaporation. By strong calcination the iodate may be changed into ioduret.

The hydriodates of soda and potass may also be ob-



tained in the same manner as the other neutral hydriodates, that is, by the direct combination of the acid and the oxide.

These salts are deliquescent and consequently exceedingly soluble in water. Their solution is capable of dissolving still more iodine, and in this manner an ioduretted hydriodate is formed.

M. Baup of Vevay, (*Naturwiss. Anzeiger*, 1821,) and M. Caillot of Paris, (*Journal de Pharmacie*, 1822,) each describe the following process for obtaining hydriodate of potass, by means of the hydriodate of iron. One part of iodine and three or four parts of water are introduced into a matrass: gradually an excess of iron filings—say half a part—is added. Great heat is developed, the iodine disappears, and the liquid turns a deep red. During this action an ioduretted hydriodate is formed, which by a gentle heat and slight agitation while yet warm, is converted into simple hydriodate of iron. The termination of the operation is recognised by the almost entire decoloration of the fluid. The liquor is then filtered, diluted with several parts of water, and submitted to a sand bath, in a capsule or matrass, until near to the boiling point: the iron is then precipitated by carbonate or subcarbonate of potass. This part of the process requires some attention, lest an excess of potass be added, which, however, might be separated by repeated crystallizations, or saturation with iodic acid. After filtering, in order to separate the ferruginous deposit, and washing, the liquor is evaporated, commencing with the waters used in the washing. The salt may be crystallized by cooling or evaporation; in the latter case, the concentrated solution of hydriodate of potass should not be placed in a stove, because the salt would rise on the sides of the vessel, and eventually withdraw all the fluid, but on a gentle fire where the edges of the vessel, not being so hot as at the bottom, would in some degree condense the vapour, and prevent the ascent of the salt. Crystals are gradually deposited, and when they fill almost the whole space which the fluid occu-



pies, they are allowed to cool: the mother-waters are drawn off and evaporated, in order to form more of the salt; finally, the crystals are dried in a stove, or on the fire, where they undergo a slight decrepitation.

To obtain this salt in a perfectly pure state, repeated crystallizations should be practised, particularly if potass has been added in excess. Should the iron employed have been at all coppered, a few bubbles of sulphuretted hydrogen should be passed into the mother-waters, and these should be filtered before proceeding to further crystallizations.

The hydriodate of potass (ioduret of potassium) generally crystallizes in cubes; and by management it may be obtained in pyramids, more or less pointed. The crystals are almost always opaque, or milky white. By slowly cooling a solution not very concentrated, M. Baup has obtained it in crystallized long quadrangular prisms, as also in short prisms terminated by a four-sided pyramid.

The solution of ioduret of potassium at  $18^{\circ}$  C., according to Gay-Lussac, contains 143 parts of the ioduret in 100 of water. M. Baup finds that the same quantity of water at  $12^{\circ}.5$ , dissolves 136 parts, and at  $16^{\circ}$  of the same thermometer 141 parts.

Five and a half parts of alcohol of the specific gravity  $=0.85$  and at  $12^{\circ}.5$ , and from 39 to 40 parts of rectified alcohol at the same temperature, are required to dissolve one of ioduret of potassium: in both cases it is much more soluble in hot than in cold fluid.

#### *Ioduretted Hydriodate of Potass.*

M. Baup has ascertained that the ioduretted hydriodates are combinations, with fixed proportions; so that the solution of hydriodate of soda or potass, that is known to be capable of dissolving a further proportion of iodine, can, under all circumstances, combine with a quantity of iodine equal to that which it already contains, that is, nearly three fourths of its weight, or :: 76.5 : 100.



The ioduretted hydriodate of potass, commonly in solution in water, is the only preparation hitherto employed in medicine; I prefer, however, the simple hydriodate.

*Action of Iodine on Man and lower Animals.*

A short time subsequent to the publication of his learned work on iodine, M. Gay-Lussac sent me a quantity of it, that I might ascertain its effects on animals. I immediately instituted some experiments, in which I introduced the tincture of iodine into the veins, in the dose of a drachm, without any appreciable effects. I also gave it to several dogs to swallow, but beyond vomiting, it produced no marked effects.

Perceiving this inertness, I myself took a tea-spoonful of the tincture: nothing ensued upon it, except a disagreeable taste in the mouth, which continued for several hours. I have seen a child four years of age, who, in mistake, had taken the same quantity of the tincture prepared by M. Pelletier: the lips and tongue were stained yellow, but no ill consequences followed.

One of the most remarkable properties of iodine is, that when it has been continued for a long time a diminution in the size of the breasts and testicles takes place. I have never seen this effect, but I have been confidently assured that such frequently is the case in Switzerland.

*Cases for the Employment of the Preparations of Iodine.*

Dr. Coindet, of Geneva, was the first who employed iodine as a medicinal agent; he used it in the treatment of goitre with marked success. It has since been prescribed in the same cases both in France and Switzerland, by a great number of practitioners; and it appears from their observations that iodine is an efficacious remedy in a disease sometimes so remarkably intractable.

Though incipient goitres occurring in young per-



sons are the most likely to be dispersed by the remedy in question, instances nevertheless are recorded in which old, hard, and large goitres have been obliterated by it. But as in such cases a long course of iodine is necessary, which may act injuriously on the stomach, another mode of introduction, namely, by friction, has been resorted to. Cases are related by Mr. Rickwood, (London Med. and Phys. Journal, 1823,) of the cure of goitre by this substance after only temporary relief had been obtained from the use of burnt sponge. In one instance he succeeded in reducing the tumour in a woman seventy years old.

Iodine has been also successfully employed in the treatment of scrofula, as numerous authorities testify. M. Baup has cured long-standing scrofulous ulcers: and I have myself succeeded in dispersing very large glandular swellings with it.

Besides many cases of goitre cured by the tincture of iodine and the hydriodate of potass, MM. Hufeland and Osann mention that they have obtained some beneficial results from the same preparations in schirrhous, and carcinoma of the womb. (See Report of the Polyclinical Institution of Berlin, 1820-21 and 22.) Dr. Wagner says he was equally successful with it in a tumour of the lower jaw, which bore a cancerous appearance. Dr. Hennemann has also recorded a case, (Journal der practischen Heilkunde,) in which iodine exerted a remarkable influence on the last stage of the cancer of the womb. A cure was certainly not effected, for a communication between the vagina and the sac of the peritoneum existed: but the condition of the patient was considerably ameliorated.

M. Zinck, of Lausanne, relates two cases of white-swelling, which were cured by the preparations of iodine.

In Dr. Gairdner's monograph on iodine, a similar case of cure, communicated by Dr. Maunoir of Geneva, may be found. In this instance, the patient, a child, could not walk without crutches:—blisters,



leeches, and deobstruents of all kinds had been used in vain; the tumour was then rubbed night and morning with the size of a hazel-nut of iodine ointment, whilst small doses of tincture of iodine were administered. In the course of a few weeks the cure was completed.

M. Zinck has published two memoirs, (*Journal Complementary*, 1824,) on the abuses of iodine internally administered. In them he shows that the long-continued use of iodine tends to induce gastric inflammation; but he says this is mainly attributable to the patients, who, in impatience of a cure or prevention, swallow immense doses of the medicine. He afterwards makes mention of the rage for iodine which prevailed in Geneva—a rage that could only have been caused by its extraordinary efficacy in the several diseases in which it was employed. It was taken by the inhabitants without any medical superintendence. One apothecary of the city procured and sold as much as ten pounds of iodine in a single year.

In Dr. Gairdner's memoir, previously alluded to, some interesting records of the advantages to be derived from iodine in goitre, scrofula, and tubercular affections of the chest and abdomen, may be found. The serious consequences of the use of iodine, mentioned by Dr. Gairdner, are, however, exceedingly rare; it is only the most flagrant abuse of the remedy that could induce such results.

Dr. Bacon appears to have administered iodine with some success in the treatment of scrofulous phthisis and some other tubercular affections. Further inquiries are still requisite to establish its efficacy in these cases, and when phthisis is as yet incipient.

M. Defermon found the effects of the following mixture most satisfactory in a young phthisical female: the dose he prescribed was a tea-spoonful every hour.

Lettuce water . . . . .	4 ounces.
Solution of hydriodate of potass . . . . .	15 drops.
Medicinal prussic acid . . . . .	10 to 12 drops.
Syrup of marshmallows . . . . .	1 ounce.



He sometimes substituted an ounce of cyanic syrup for the prussic acid and marshmallow syrup.

Dr. Bacon, in his *Treatise on Tuberculous Diseases*, relates a case of encysted ovarian dropsy, in which the employment of iodine was followed with the most rapid and marked success. Dr. Gairdner quotes this case, and has commended it in similar ones; in several cases of ascites, however, he found the medicine to fail.

Coindet lauds iodine as a powerful emmenagogue, and this property has been confirmed by the observations of Professor Brera (*Saggio Clinico sull' Iodio*. Padua, 1822) and several others. My own experience also testifies to the fact; when using it in a suppression of the menses of a young lady, whose virtue I had no reason to suspect, an abortion took place at the end of three weeks!

Professor Brera has prescribed iodine in many more diseases than Dr. Coindet mentions. Besides goitres and menstrual suppressions which have been cured by it, he relates cases of glandular indurations, mesenteric disease, chronic dysentery, hæmoptysis consequent on suppressed menses, phthisis laryngea, leucorrhœa, and syphilitic congestions, as having been cured by it. Perhaps M. Brera too frequently associates other medicines with the iodine to render the efficacy of the former beyond doubt in the fore-mentioned cases; hence some caution in its administration in similar cases becomes requisite. Moreover, M. Brera is not the only one who has given iodine in mesenteric disease, Mr. Callaway having derived the best effects from it in scrofulous enlargement of the mesenteric glands.

Latterly iodine has been employed in the treatment of syphilitic buboes and gonorrhœa. M. Richon (*Archiv. Générales*, 1824) has found it advantageous in such cases at the military hospital of Strasburg. He generally gives 15 drops of the tincture on the morning of the first day, 20 to 25 the second day, and 30 the third day. He then begins to give in addition 15 drops in the evening, which he increases in like manner



to 30. If no gastric irritation ensues, the patient has a burning sensation in the gullet, which, however, soon passes off. Occasionally there is some colicky pain, head-ache, dryness and redness of the tongue, in which case the remedy must be suspended and again afterwards recommenced. M. Richon finds 30 drops morning and evening the most appropriate dose. His patients were all robust and non-excitables soldiers.

MM. Gimelle (*Revue Médicale*, t. 7) and Sablairolles (*Journ. Univers. des Sc. Méd.* 1825, and *Bulletin des Sc. Méd.* 1824) relate instances in confirmation of the efficacy of iodine in leucorrhœa, advanced by Coindet and Brera. The former has cured herpes with it, and I have treated some obstinate cases of the same kind with speedy and perfect success. M. Eusèbe de Salle has found the benefit derivable from hydriodate of potass in friction and iodine in pills, in the chronic liver complaints of those who have resided for a long time in tropical climates.

A veterinary surgeon, M. Roupp, attached to the dépôt of stallions at Abbeville, has used hydriodate of potass in the treatment of glanders. (*Journ. Gén. de Médecine*, 1824.) During a whole month he gave from 9 to 14 grains of it to a horse, and also used friction with the ointment of the same salt. This treatment did not however succeed; on the contrary, the fever seemed to be thereby increased. Perhaps the doses were too small, or the disorganization too far advanced to leave a hope of cure.

At the end of the year 1822, the confidence of the Genevese and Swiss practitioners in the virtues of iodine considerably diminished. They then began to find that serious consequences followed its employment, such as chronic inflammations of the stomach, rapid and great emaciation of the whole body, and particularly of the *mammæ*, &c. I have never seen such consequences, even after doses that might be esteemed extraordinary.

Perhaps the difference in weights of different coun-



tries may account for some of these consequences. Thus, in Geneva and France 48 grains of iodine are used to the ounce of alcohol in forming the tincture. But these grains are of the marco weight; whereas, in other parts of Switzerland and in Germany, the Nuremberg medicinal weights are used, and in England the troy weight. In both the latter the scruple contains 20 grains, whilst in the marco it contains 24 grains; making a difference of one-fifth of iodine in the ounce of tincture. (See Journal de Pharmacie, 1823.)

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## MODE OF ADMINISTERING IODINE.

### *Tincture of Iodine.*

Alcohol at 35° . . . . .	1 ounce.
Iodine . . . . .	48 grains.

This tincture should not be prepared at any great distance of time previous to its use, for crystals of iodine are soon deposited, and the iodine, moreover, is apt to engage some of the hydrogen of the alcohol, and be thus converted into an ioduretted hydriodic acid.

Tincture of iodine has been employed in the treatment of goitre with success, also in that of scrofula, but not so frequently as the two preparations which follow. It may be given to adults in the dose of 4 to 10 drops three times a day in half a glass of sugared water: this may be gradually increased to 20 drops, which contain about a grain of iodine.\* I have, how-

\* A drop of tincture of iodine only weighs two-thirds of a grain, whereas a drop of the solution of the hydriodate of potass weighs more than a grain, or even two grains if the hydriodate be ioduretted. These differences should be calculated in prescribing doses in drops.



ever, seen much larger doses given without inconvenience.\*

### *Iodated Waters.*

M. Lugol prepares these waters with the proportions of one-half, two-thirds, and one grain of iodine to a half bottle or a pound of salt water, represented in the following formulæ:†

	Sea Salt.	Tincture of Iodine.	Water.
	Grammes.	Grammes.	Pounds.
No. 1. $\frac{1}{2}$ a grain in a pound	66 . . . . .	50 . . . . .	100
No. 2. $\frac{2}{3}$ of a grain	65 . . . . .	75 . . . . .	100
No. 3. 18 min.	66 . . . . .	100 . . . . .	100

I have long used the iodated and ioduretted waters, but do not add the salt: one of my forms of use is this:

### *Ioduretted Water.*

Ioduret of Potassium	. . . . .	6 grains.
Iodine	. . . . .	1 grain.
Water	. . . . .	2 pounds.

This water may be the common beverage at meals.

### *Ioduretted Sulphuric Ether.*

Sulphuric ether	. . . . .	1 drachm.
Pure iodine	. . . . .	6 grains.

Thirty drops contain a grain of iodine. Patients can scarcely bear more than ten drops at one time.

### *Solution of Ioduret of Potassium.*

Ioduret of potassium	. . . . .	36 grains.
Distilled water	. . . . .	1 ounce.

\* I have given as much as 3 drachms of the tincture per diem for many successive days; the effects were actually *nil*.—*Tr.*

† These waters are of a beautiful orange colour, transparent, and will keep. Children readily take them, particularly if they be sugared; but the sugar should not be added long before drinking them, as a decomposition would take place.—*Tr.*



This solution is capable of dissolving more iodine, and thus forming an ioduretted hydriodate of potass.

If Coindet's solution is to be used, we have only to add 10 grains of pure iodine to the above solution.

These two preparations, which may be administered in the same manner as the tincture, are both used in goitre and scrofula; in the latter case some tonic is usually added. For some time I have been making chemical experiments in the hospitals and in private practice, with ioduretted solution of potass, and I have found that the dose of it may be augmented to two, three, or even four ounces per diem, without inconvenience. Debilitated, emaciated, and very nervous females, have taken this quantity for several weeks, without any appreciable derangement of the health. On the contrary, they have become stout in a most extraordinary manner; and the mammæ of some young girls have been rapidly developed during its employment.

In this dose I have seen two cancers in the incurable wards of the Salpêtrière Infirmary cured, as if by magic, in the course of a fortnight. The patients had been affected with this horrible disease for several years, and had been admittted as incurable; one of them is still there, and it is now five years since she was cured: her health remains good.

In the same hospital is a woman who had long had ulcerations of the tongue, and who is completely cured by the hydriodate of potass.

I have reduced in a few days scorbutic swellings of the gums, with half a drachm of the solution daily, in which case it probably acted as it does in goitre, that is, by contracting the extreme capillaries.\*

With similar views, I have employed large doses of the solution in hypertrophy of the ventricles of the heart.

\* It may be questioned whether this is not *always* the action of iodine. It goes by the name of a powerful absorbent; but many physiological arguments go to show that what are called absorbents are nothing more than agents that restrain deposition.—*Tr.*



The Infirmary of the Salpêtrière generally contains a great number of cases of hypertrophied ventricles, and upon them I have made numerous experiments of the efficacy of iodine, but without successful results in the first instance, probably owing to the obstacles of ossified arteries and valves. I have however learned something from them concerning the doses of the iodurets and ioduretted hydriodates. At first I gave them by drops, now I give them by drachms, and I have frequently exceeded 2 ounces in 20 hours, or a drachm of hydriodate of potass, and this without any unpleasant consequences.

In young subjects of cardiac hypertrophy, I have been eminently successful with large doses of ioduret of potassium, the symptoms generally disappearing in less than a month. The formulæ I have generally used are as follows :

*Atrophic Solution.*

Distilled lettuce water . . . . .	8 ounces.
————— peppermint . . . . .	2 drachms.
Ioduret of potassium . . . . .	4 do.
Syrup of marshmallow . . . . .	1 ounce.

Five drachms, increased, if necessary, to 10, morning and evening.

If the hypertrophy be accompanied with a strong impulse, heavy sound, and accumulated movement of the heart, I add from 1 to 2 drachms of tincture of digitalis to the above mixture, and then give half an ounce of it morning and evening.

*Ointment of the Hydriodate of Potass.*

Hydriodate of potass . . . . .	1 drachm.
Lard . . . . .	1½ ounce.

Frictions may be made with this ointment night and morning on goitre or enlarged scrofulous glands, in the quantity of half a drachm each time, increased, if necessary, at the end of a week, to a drachm or up-



wards, according to the age of the patient, and the extent of the tumour.

By these means the resolution of tumours which the saline solutions had failed to effect, is obtained. This ointment has been successfully employed in various cases of engorged testicle, that had resisted other remedies. Sometimes it only palliates, and at other times it is necessary to combine the internal use of iodine with it. In scrofula, for the most part, more benefit is derived from the use of the saline solutions.

When frictions are practised in the treatment of goitre, the action of the iodine is sometimes assisted by fomentations and bleeding with leeches. It sometimes happens that after the first frictions, the goitre, instead of becoming softer, is harder and somewhat painful; this local irritation is soon subdued by a few leeches, and the iodine then produces well-marked effects.

The activity of this ointment is augmented by adding 10 or 12 grains of pure iodine to it: it then forms what is called "ointment of the ioduretted hydriodate of potass."

M. Lugol is in the habit of using the following

*Ioduretted Hydriodate Ointments.*

	Ioduret of potassium. Grains.	Iodine. Grains.	Lard. Grains.
No. 1 . . . . .	64 . . . . .	8 . . . . .	1000
No. 2 . . . . .	160 . . . . .	22.4 . . . . .	1000
No. 3 . . . . .	160 . . . . .	25.6 . . . . .	1000

M. Lugol has employed for several years the ioduretted ointments and iodated waters in scrofulous disorders, tubercles, ophthalmiæ, ozena, ulcers, dysentery, gonorrhœa, white swellings, &c. with the utmost success.

I have commenced a series of experiments on the employment of ioduretted ioduret of potassium even in epilepsy, and with some advantageous results: the dose required is from half a drachm to a drachm daily. I commonly prescribe as follows.



*Antiepileptic Solution.*

Ioduret of potassium . . . . .	4 drachms.
Iodine . . . . .	2 grains.
Peppermint and orange-flower water, of each . . . . .	3 ounces.

Dose 5 drachms three times a day.

*Ioduret of Potassium in chronic rheumatisms and long-standing rheumatic affections.*

I have for some years used ioduret of potassium, either alone or in solution, with iodine in decoctions of sarsaparilla and dog's-grass, in the proportions of half a drachm to two drachms of the former, to a pint of the decoctions and one grain of iodine. They are called, at the Hôtel Dieu, *ioduretted dog's-grass* and *ioduretted sarsaparilla*. These are the formulæ:

*Ioduretted Sarsaparilla.*

Decoction of sarsaparilla . . . . .	2 pounds.
Ioduret of potassium . . . . .	1 drachm.
Syrup of orange-peel . . . . .	2 ounces.

The whole may be taken in twenty-four hours.

*Ioduretted Dog's-grass.*

Decoction of dog's grass . . . . .	2 pounds.
Ioduret of potassium . . . . .	$\frac{1}{2}$ drachm.
Peppermint syrup . . . . .	2 ounces.

To be taken as the last.

*Iodine in Scrofulous Ophthalmia.*

I have seldom seen these complaints, even when complicated with ulceration of the conjunctiva and the cornea, resist the wash following more than a month, if constitutional treatment be also attended to. I sometimes add morphia to the solution.



*Ioduretted Collyrium.*

Rose-water . . . . .	6 ounces.
Ioduret of potassium . . . . .	24 grains.
Iodine . . . . .	1 or 2 grains.

To be used four times a day.

[The therapeutical effects of iodine having been most universally acknowledged in the treatment of the varied forms of scrofulous disease, it may not be out of place to give a brief account of the practice and success of some who have paid particular attention to its use. In the first part of M. Lugol's admirable work, a list of twelve cases is given, which were treated with iodine; three relate to ulcerated tubercles, which were cured in three, seven, and twelve months: two of ophthalmia, one of which yielded to a treatment of forty-eight days, while the other was prolonged to the ninth month; one case of fistulous abscess, deeply situated in the cellular tissue, required nearly a year's care; four cases of that horrid form of scrofula denominated by the French "*dartre rongeante*," but which M. Lugol calls *estheomenic* (corrosive) scrofula; and one case of scrofulous caries—a form he has generally found most intractable, and a single cure of which he is not able to advance. From the whole of M. Lugol's first memoir it appears that he treated with iodine alone, in seventeen months, at the Hôpital St. Louis, one hundred and nine scrofulous patients, of which sixty-one were males and forty-eight females. That at the close of 1830, thirty-nine, (twenty-nine females and ten males,) were under treatment; that thirty, (seventeen males and thirteen females,) had quitted the hospital with marked improvement; that in four cases, (two males and two females,) the treatment was ineffectual; and finally, that thirty-six cases, (thirteen males and twenty-three females,) were discharged, completely cured.

M. Baudelocque (*Etudes sur la Maladie Scrophuleuse*, 1834,) states, that of sixty-seven scrofulous



children treated by iodine alone, fifteen were cured, and fourteen had so far improved as to place ultimate recovery out of doubt, and twenty on whom it had no influence at all. The scrofulous lesions in these sixty-seven amounted to one hundred and twelve, of which forty-three were entirely cured; and of the sixty-nine others many were evidently improved. He remarks, however, that his success is far from being equal to that vaunted by M. Lugol, and though he says, that "no remedy with which he is acquainted has effected an equal number of cures in six months," he nevertheless differs altogether from those "who suppose that iodine is a specific in scrofula, and will be in that disease what quinia is in intermittents and mercury in syphilis."—(Loc. cit. p. 462, et seq.)

The first practitioner in this country who experimented on iodine, was Dr. Copland; this was in 1819. Since that time he has tried its efficacy in a variety of disorders. Besides the more ordinary forms of scrofula, he has found the best results from it in that of hip-disease. Generally speaking, he has seen it efficacious in secondary syphilis, but it is not always to be trusted to: for in two cases, where the bones and joints had become affected, it failed altogether, though the iodine ointment applied to the nodes relieved the pain, and diminished their volume: in these cases he was subsequently under the necessity of having recourse to the corrosive sublimate. On the whole, he thinks, that in syphilis the place iodine should hold, is that of an adjuvant to the ordinary mercurial remedies. The formula in the text, which comprehends the decoction of sarsaparilla, and the ioduret of potassium, offers a very elegant manner of employing it in that character; the ioduret, however, may be increased much above the dose therein stated.

The same gentleman has been successful in the employment of iodine and several of its combinations, in chronic and subacute hydrocephalus in the stage of effusion. In two cases of ovarian dropsy, its effect was such as to produce what may be esteemed a ra-



dical cure ; ten years having now elapsed since the subjects of the disease were so treated, without any renewed accumulation of water.

Nor is this power which iodine possesses of inducing absorption confined to the fluid deposits of the body. The absorption of the mammæ and testicles has been hinted at in the text, and though M. Magendie mentions it briefly, and as if sceptical of the fact, it stands on too many and too good authorities to be controverted. The disappearance of bronchocele, under iodine treatment, is still more strongly certified. Dr. Seymour, in his "Illustrations of Diseased Ovaria, &c." states that he found the preparations of iodine most powerful in effecting a diminution of the morbid growth of that organ.

In the fifth volume of the Medical Gazette, Mr. Lyon strongly recommends the application of iodine washes to the ulcers of venereal buboes, the treatment being accompanied with the internal use of the remedy.

Lastly, Sir Charles Scudamore, in his work on the "Inhalation of Iodine and Conium in Pulmonary Disorders," affirms that he has cured cases of established phthisis by that mode of treatment. Anybody, however, who will take the trouble to read his cases will find that not one of pulmonary consumption is to be found among them. *Pour surcroît de malheur*, Dr. James Murray of Dublin, has very recently wrested from Sir C. Scudamore the claim of priority in this mode of using iodine. (See Lancet, March 1835, No. 604.)

In prescribing iodine, the effects on the condition of the cerebral circulation should be carefully looked to, as it is apt to induce fulness of the head if the doses be large and continued for a long time together. Many are inclined to think that M. Magendie's doses are too powerful : but, on the other hand, much larger quantities are frequently given without unpleasant consequences. The waters of M. Lugol form one of the best modes of ensuring its gradual, effectual, and innocuous action on the system.



In using the various ointments containing iodine, care should be had not to continue them, or render them so powerful as to irritate the skin, in which case their beneficial influence is marred.

The supersaturation of the system with iodine which most practitioners have observed, but in which our author does not appear to believe, may be known by more or fewer of the following symptoms. Frequent pulse, palpitations, a dry and frequent cough, sleeplessness, rapid emaciation, cardialgia, loss of strength, tremors, swelling of the legs, swelling and ulcerations of the tongue, gums, and inside of the cheeks, and fulness of the head.

There is one mode of administering iodine externally, of which M. Magendie appears to take no notice: I allude to iodine baths. The credit of their first employment M. Lugol takes to himself; and he grounds their utility both on their successful effects (of which he gives instances) and on their proving a substitute in cases where internal inflammations, idiosyncracies, or other circumstances, forbid its internal administration. After much experimenting, he was induced to give the following formulæ, as the strength of baths for different ages.

### *Baths for Children.*

Age.	Quarts of water.	Troy grains iodine.	Troy grains. hydriod. of potass.
4 to 7 . . .	36 . . . . .	30 to 36 . . . . .	50 to 72
7 to 11 . . .	75 . . . . .	48, 60, 72 . . . . .	96, 120, 144
11 to 14 . . .	125 . . . . .	72 to 96 . . . . .	144, 192

### *Baths for Adults.*

Degree.	Quarts of water.	Troy drachms iodine.	Troy drachms hydriodate of potass.
No. 1 . . . . .	200 . . . . .	2 to $2\frac{1}{2}$ . . . . .	4 to 5
— 2 . . . . .	243 . . . . .	2, $2\frac{1}{2}$ , 3 . . . . .	4, 5, 6
— 3 . . . . .	300 . . . . .	3, $3\frac{1}{2}$ . . . . .	6, 7.



Iodine is the active principle of these baths, for even three ounces of the hydriodate to each bath has no action whatever. On the other hand, simple iodine is not less soluble in a bath; and if previously diluted in alcohol, does not continue in a state of solution, when diluted with the bath. The most certain way, therefore, is previously to dissolve the iodine in the hydriodate of potass. The baths sometimes smart and redden the skin, especially over diseased parts. The surprising efficacy of so small a quantity of iodine is probably attributable to the heat and moisture promoting the absorption of the iodine.

Dr. Andrew Buchanan, of Glasgow, has lately (See Medical Gazette, July 2, 1836,) shown how iodine may be given in most heroic doses without producing any of the disagreeable effects, as pain and inflammation, on the digestive mucous membrane. The preparations he uses are the iodide of starch, hydriodic acid, and iodide of potassium. To make the former, he rubs one grain of iodine with a small quantity of water, and adds it gradually to a scruple of finely-powdered starch: an intensely blue mass is formed, which is subsequently dried at a heat insufficient to volatilize the iodine. Of this he has given as much as one ounce three times a day, which is equivalent to seventy-two grains of iodine daily, without exciting unpleasant symptoms.

The hydriodic acid he forms according to the process which obtains in the Glasgow Infirmary. It consists in dissolving separately three hundred and thirty grains of iodide of potassium and two hundred and sixty-four grains of tartaric acid, mixing and filtering the solutions. After which, as much water is added as will make the entire quantity of fluid fifty drachms, or six ounces two drachms. From doses of a few drops of this acid, Dr. Buchanan gradually proceeded to one drachm, and eventually to half an ounce, and even an ounce, three times a day. One drachm thus given is equivalent to fifteen grains of iodine, and half an ounce to two drachms daily: doses which could not be tolerated were the iodine in an uncombined state.



The iodide of potassium Dr. Buchanan has given in doses of two drachms and half an ounce twice in twenty-four hours. Magendie, it will be seen, only administers one drachm in divided doses in the course of the day.

These preparations the writer in question has prescribed in all cases where iodine is usually given. Besides the advantage which they have over iodine itself, in not irritating the first passages he also found that they passed more readily into the circulation, and were more completely commingled with the secretions than the uncombined base. Meantime, also, their therapeutical effects were equally striking.—*Tr.*]

## IODURETS OF BARIUM AND ARSENIC.

*Ioduret of Barium.*—Heat hydriodate of iron with an excess of carbonate of baryta, evaporate to dryness, and after re-dissolving in water, the ioduret is procured in silky or prismatic needles.

M. Biett has used it in a few cases of scrofulous congestions.

### *Ointment of Ioduret of Barium.*

Ioduret of barium	. . . . .	4 grains.
Lard	. . . . .	1 ounce.

*Ioduret of Arsenic* has also been employed by M. Biett at the Hôpital St. Louis. It is obtained either by heating in a glass retort a mixture of 16 parts of arsenic and 100 of iodine and subliming, by which the ioduret is formed, and may easily be decomposed by adding water in great quantity. Or by boiling 30 grammes of powdered arsenic and 100 of iodine in 1000 grammes of water, filtering when the liquor is colourless, and evaporating to dryness: it may be subsequently sublimed, if desired.



*Ointment of Ioduret of Arsenic.*

Ioduret of arsenic . . . . .	3 grains.
Lard . . . . .	1 ounce.

M. Biett has used this several times in cases of tubercular ulcers.

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IODATE OF STRYCHNIA.

Saturate a concentrated solution of powdered strychnia with iodic acid, on which the mixture swells, absorbs the water, and becomes thick: treat the mass with boiling alcohol, filter, and leave it to evaporate; the result is a beautiful crystallization of iodate of strychnia. It may also be got by the double decomposition of a salt of strychnia, and some soluble iodate—muriate of strychnia and iodate of soda for instance.

Iodate of strychnia is white, crystallized in beautiful prismatic needles, is slightly soluble in cold water, very soluble in hot water and in alcohol; thrown on hot charcoal it crackles and gives out iodine. Heated in a tube, it is decomposed with a slight detonation, and deposits carbonic acid and iodine.

*Action of Iodate of Strychnia on Animals.*

A single grain is sufficient to kill a large dog in a very short time with tetanic symptoms.

*Cases for Medicinal employment.*

I have given it with unexpected success in many cases of long-standing paraplegia which were deemed incurable, having resisted all other therapeutic means.

I have only given it in pills in the dose of one-eighth of a grain each. I give one of these night and morning, and gradually increase the dose until eight are taken in twenty-four hours: great care however must be taken in its administration.



## IODURET OF MERCURY.

The iodurets of mercury have lately been employed in syphilis, and I have found them exceedingly useful in affections of that character.

### *Preparation of the Proto-Ioduret of Mercury.*

Take 100 parts of crystallized proto-nitrate of mercury, and dissolve them in 400 parts of water. To the filtered solution add a solution of hydriodate of potass, until no more precipitate is formed. This precipitate is greenish yellow, and pulverulent. It is to be placed on a filter and well washed with water, until the latter gives no black precipitate on the addition of potass. It is then dried and preserved in a well-stopped bottle out of the sun's light.

This proto-ioduret is yellow and insoluble in water, on which it exerts no action whatever; it is volatile. According to Dr. Thompson, 162 parts of proto-ioduret contain 62 parts of iodine and 100 of mercury, or 250 of mercury and 156 of iodine.

### *Preparation of the Deuto-Ioduret.*

It is prepared from 70 parts of deuto-chloruret of mercury or corrosive sublimate and 100 parts of hydriodate of potass. Dissolve them separately in distilled water, filter the liquors, and unite them by small quantities. A red powder is soon precipitated, which is collected on a filtre and washed carefully with distilled water, until the water comes off without taste.

The precipitate is then dried, powdered, and kept in a bottle out of the light. This deuto-ioduret is exceedingly soluble in the hydriodate of potass, and in the mercurial salts, so that an excess of neither should be added; it is also soluble in acids and alcohol. It is very volatile, and contains 250 parts of mercury, and 312 of iodine.



In preparing the deuto-ioduret, hydriodic acid may be substituted for the hydriodate of potass.

*Mode of employing the Ioduret of Mercury.*

*Ointment of the Proto-Ioduret of Mercury.*

Proto-ioduret of mercury . . . 20 grains.  
Lard . . . . . 1½ ounce.

This has been much praised in the treatment of inveterate venereal ulcers, whose cicatrization it certainly accelerates.

*Ointment of the Deuto-Ioduret.*

Deuto-ioduret of mercury . . . 20 grains.  
Lard . . . . . 1½ ounce.

This ointment is more powerful than the preceding, but is used in the same circumstances: a very small quantity should be placed on the pledgets of lint applied to the ulcers.

*Alcoholic Solution of the Deuto-Ioduret of Mercury.*

Alcohol at 36° . . . . . 1½ ounce.  
Deuto-ioduret of mercury . . . 20 grains.

Twenty-six drops of this solution are about equal to one-eighth of a grain of deuto-ioduret of mercury. The dose is 10, 15, or 20 drops in a glass of *distilled* water, as common water easily decomposes it.

It is said to be a most successful remedy in scrofulous affections complicated with syphilis.

*Sulphuric Ether with the Deuto-Ioduret of Mercury.*

Sulphuric ether . . . . . 1½ ounce.  
Proto or deuto-ioduret of mercury . 20 grains.

This formula is more active than the preceding, and must therefore be given in smaller doses.



*Pills of Deuto-Ioduret of Mercury.*

Deuto-ioduret of mercury . . . 1 grain.  
 Extract of juniper . . . . 12 grains.  
 Liquorice powder . . . . q. s.

Divide into eight pills, two of which are to be taken morning and evening, and gradually increased to four at the same periods.

*Pills of the Proto-Ioduret of Mercury.*

Proto-ioduret of mercury . . . . 1 grain.  
 Extract of juniper . . . . 12 grains.  
 Liquorice powder . . . . q. s.

Divide into eight pills, and take as in the preceding formula.

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 IODURET OF SULPHUR.

Take of iodine four parts, sublimed sulphur one part, mix and heat gently in a bottle: the excess of iodine is separated, and the ioduret remains as a grey, needled mass which rapidly absorbs moisture and soon decomposes.

*Formula for Ointments of Ioduret of Sulphur.*

	No. 1.	No. 2.
Ioduret of sulphur . . .	5 parts.	8 parts.
Lard . . . . .	96 do.	144 do.

M. Biett has used ioduret of sulphur for several years in tubercular affections of the skin.

[Dr. Copland has employed this preparation for some time and in similar cases of chronic cutaneous diseases. He has also given it in inhalation, and found it beneficial in chronic bronchitis; but in true tubercular phthisis it has not succeeded.—*Tr.*]



## IODURET OF ZINC.

It may be a substitute for the ioduret of potassium. It is prepared either by decomposing a solution of sulphate of zinc by the ioduret of barium in solution, filtering, crystallizing, and evaporating to dryness, or by heating a mixture of 20 parts of zinc with 170 parts of iodine to sublimation in a phial. It is then a salt, in white, deliquescent needles, very soluble in water, and of a styptic disagreeable taste.

### *Ointment of Ioduret of Zinc.*

Dr. Ure (Dictionary of Chemistry) proposes to substitute this ointment for that of the hydriodate of potass; his formula is the following:—

Ioduret of zinc . . . . .	1 drachm.
Lard . . . . .	1 ounce.

The weight of a drachm to be used in friction once or twice a day.

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## BROMINE.

Bromine, discovered by M. Balard, has been found in saline mother-waters, in sea-water, and many springs, in aquatic animals and vegetables, and in a great number of marine substances.

It is obtained by passing a current of chlorine into the saline mother-waters and pouring a stratum of sulphuric ether on the surface of the liquor; the ether takes up the bromine. This solution shaken with potass gives a bromuret, which being collected, dried, mixed with peroxide of manganese, and treated with diluted sulphuric acid, gives out, on distillation, a vapour: this condensed is bromine.



*Physical and Chemical Properties of Bromine.*

Seen by refracted light and in a thin layer, it is a hyacinthine red fluid: by reflected light it is blackish red. It easily volatilizes in vapours, and has a suffocating odour resembling that of oxide of chlorine; it stains the skin yellow, is heavier than sulphuric acid, has a density of 2,966, freezes at a cold of eighteen or twenty degrees, and is undecomposable by heat and electricity. It has a strong analogy with chlorine and iodine, and stands between them, being forced from its combinations by the former, while it displaces iodine from its compounds.

It gives two acids, with oxygen and with hydrogen, or bromic and hydrobromic acids. The latter affords various salts with bases; these are hydrobromates or bromurets.

*Preparation of Bromurets.*

Most of these are obtained by the bromuret of iron in solution.

*Perbromuret of Iron.*—Heat under water a mixture of one part of bromine and one of iron filings; on the fluid becoming greenish, filter, evaporate to dryness, and the reddish residue taken up by water and evaporated, gives the perbromuret, which is a brick-red salt, very soluble, deliquescent, and has an excessively styptic taste.

*Bromuret of Calcium* is procured in the same manner as ioduret of calcium, substituting bromuret of iron in solution for ioduret of iron. It is composed of silky, white, and very deliquescent needles, and has a hot taste like that of chloruret of calcium.

*Bromuret of Magnesium.*—Heat the solution of bromuret of iron with an excess of caustic magnesia, filter, and evaporate. The salt is in prismatic needles, which are deliquescent and bitter.

*Bromuret of Barium* is obtained in the same manner as ioduret of barium, and is in rhomboidal prisms, is



less deliquescent than the preceding salts, and has a nauseous taste.

*Deuto-Bromuret of Mercury* is procured by the direct combination of bromine with mercury, and by sublimation. *Proto-Bromuret of Mercury* is very volatile, exceedingly soluble, and crystallizes in silky, pearly needles.

The *Bromurets of Potassium and Sodium* are got, by decomposing bromuret of iron by the carbonates of potass and soda, filtering and evaporating.

*Medicinal employment of Bromine.*

I have made many successful trials, founded on the analogy between the properties of iodine and bromine. I gave bromine in cases where iodine does not appear to be sufficiently active, or where patients have become accustomed to the latter. In the hospital I employ it in scrofula, in amenorrhœa, and hypertrophy of the cardiac ventricles. The formulæ are :

*Mixture of Hydrobromate of Potass.*

Distilled lettuce-water . . . . .	3 ounces.
Hydrobromate of potass . . . . .	12 grains.
Syrup of marshmallow . . . . .	1 ounce.

To be taken in twenty-four hours, in doses of a table-spoonful.

*Bromuret of Iron Pills.*

Powdered bromuret of iron . . . . .	12 grains.
Conserve of roses . . . . .	18 grains.
Gum Arabic . . . . .	12 grains.

Divide into twenty pills, and take two morning and evening.

*Bromine Ointment.*

Lard . . . . .	1 ounce.
Hydrobromate of potass and soda . . . . .	34 grains.

Mix well, and use it in friction on scrofulous swellings, in quantities of half a drachm or a drachm.



*Ointment of the Bromuretted Hydrobromate of Potass.*

Refined lard . . . . .	1 ounce.
Hydrobromate of potass . . . .	24 grains.
Liquid bromine . . . . .	6 to 12 drops.

To be used in friction.

Further researches will doubtless establish the great therapeutical properties of bromine.

## CHLORINE.

Guyton Morveau was the first to use chlorine as a disinfecting agent, and as such it has been and is in frequent use; but it is never used pure in medicine except in asphyxia from sulphuretted hydrogen gas. Chlorine in mixture with aqueous vapour is employed in the treatment of pulmonary consumption and other affections of the chest. At the temperature of  $20^{\circ}$  and under a pressure of 0.75m. water dissolves once and a half its own volume of chlorine.

*To prepare the aqueous solution of Chlorine.*

Mix one part of peroxide of manganese with five or six parts of a solution of muriatic acid in water, place them in a matrass, to the neck of which a bent tube is affixed that passes into Wolf's apparatus of three or four bottles: the saturated water of the two last alone is to be used. Sixty *grammes* of oxide of manganese produce nearly twenty *litres* of chlorine.

It may be also made from one part and a half of common salt, one part of per-oxide of manganese, two parts of concentrated sulphuric acid, and two parts of water—to which mixture heat is applied until no more chlorine is disengaged.

Chlorine water should be carefully preserved in small stopped bottles covered with black paper, and not



containing more than one or two ounces at the most, for if more is in them the last portions of the fluid give out all the gas, and thus diminish the amount of the whole: the black paper is to prevent the decomposition by the sun's rays.

M. Gannal proposes that each ward-keeper of hospitals should be provided with a bottle of chlorine water, and sprinkle it from time to time between the beds, and that some of it should be added to the water used in washing the spitting-pots, chamber utensils, &c. &c. The walls, too, should be painted, rather than whitewashed, in order to allow of their being washed once a month with chlorine water. The expense of such processes for the Hôtel Dieu, (containing twelve hundred beds,) for instance, would be under three francs (half-a-crown English.)

*Cases for the medicinal employment of Chlorine and Chlorine Solution.*

Braithwaite and Knapp used chlorine in scarlet fever and some cutaneous disorders; Clogel in inveterate itch, and Nysten in chronic diarrhœa and dysentery; and since M. Gannal's memoirs on the subject, chlorine with aqueous vapour has been repeatedly used in phthisis, asthma, chronic pulmonary catarrh, and other chest diseases. It has also been recently employed in the treatment of chronic diseases of the liver in the form of chlorine and hydrochloric acid baths; and some are of opinion that chlorine and the chlorurets in water would be applied as a preventive of syphilis and hydrophobia. Inhalation of chlorine in cases of asphyxia by sulphuretted hydrogen has also been recommended.

*Inhalation of Chlorine in Pulmonary Complaints.*

M. Gannal makes use of an apparatus composed of a vessel with four bulbs, one of which ends in a tube somewhat flattened at the extremity. About four ounces of water, at the temperature of 30°, are poured into the vessel, and 5 drops of liquid chlorine added.



The patient then inhales by the flattened tube and expires by the nostrils.

Each inhalation should last four or five minutes, and should be repeated eight times in the day, with intervals of an hour, managed so that there shall also be an hour between the inhalation preceding and succeeding each meal.

The water should be renewed at each inhalation, and should be made from 5 drops the first day, 6 drops the second, increasing by a drop every day, until it reaches 25 drops; which last dose may be persisted in for a month at least; but should irritation of the windpipe, spitting of blood, or any other accident, take place, the 5 drops must be returned to.

If after a month the disease remains unchanged, the inhalations should be continued, but the dose of gas must be varied at each inhalation; the first, for instance, being 25 drops, the second 10 drops, the third 20, the fourth 25, the fifth 30, and so on.

The good effects are, for the most part, slowly developed, unless the catarrh be simple and recent; a chronic catarrh, or phthisis, requires about three months.

M. Cottereau has also invented an apparatus for inhalation, which insures the very gradual evolution of the chlorine.\*

#### *Chlorine Baths.*

Dr. Palloni employed warm baths, with hydrochloric acid, in the petechial and putrid fevers of Italy in 1817. Drs. Wallace, (Researches respecting the Medical Powers of Chlorine Gas, particularly in Diseases of the Liver, 1825,) Julius, (Magazin der Aestandichen Literatur, 1826,) and Bernhard, (De Utilitat. Ac. Nitric. et Mur. &c. &c. Leipsic, 1825,) have published many observations, to show their utility in chronic disorders of the liver.

\* M. Magendie gives a long account of this apparatus, which altogether appears too complicated for so simple an operation as that of inhalation.—*Tr.*



The apparatus for their administration resembles that for vapour baths, and is so arranged that the patient does not breathe the gas, and the latter can be directed to any particular point, as the region of the liver.

The following are the proportions of materials for the evolution of chlorine for one bath :

Per-oxide of manganese . . .	$\frac{1}{2}$ to 1 ounce.
Common salt . . . . .	$1 \frac{1}{2}$ ounce
Sulphuric acid . . . . .	1 ounce.

The temperature may be from  $32^{\circ}$  to  $36^{\circ}$  Reaumur. The quantity of the materials may be gradually trebled.

These baths cause an itching of the skin, and induce sweating; occasionally the skin turns red, and is covered with small pustules. It also becomes softer and more sensitive. Sometimes, during the bath, the itching is excessive, and the patient complains of prickly sensations like the bite of insects. After the bath he has an acid taste in the mouth; the saliva reddens turnsol paper, and sometimes the gums and teeth are irritated.

For chlorine baths nitromuriatic baths may be advantageously substituted. Dr. Bernhard makes them by the addition of an ounce and a half of nitromuriatic acid to a common warm bath. Besides their efficacy in the cure of hepatic complaints, he speaks highly of their utility in ascites, dropsy of the chest, herpetic affections, secondary syphilis, and divers menstrual derangements.

[An anonymous author in the *Journal de Chimie Médicale* for December 1834, after passing in review the chemical and physical properties of chlorine, of mucus and of pus, the chemical action of chlorine on mucus and pus, that of chlorine on the living surfaces, and its local action on a morbid surface, draws the following conclusions.

1. That mucus, in its natural state, contains only a small quantity of salts, to allow of its lubricating parts without irritating them.



2. That good-conditioned pus, only containing a small quantity of salts, appears also to be not more irritating than mucus, and that in such case the employment of chlorine, and of the acid which it generates, being inactive on these matters, is only a modifier of the morbid surfaces.

3. That as the alterations which time, diseases, or heat, induce in these matters, may probably require the employment of chlorine, and of the chloride of an oxide, it is difficult to prevent its causing a super-excitement from over dose.

4. That in all cases the action of mucus, of pus, and of chlorine, &c., is commensurate with the state of the parts, with the nature of the diseases, and the susceptibility of the individual.

5. That chlorine, which is much more irritating than good-conditioned pus or mucus, prevents the decomposition of those putrescible matters, and modifies them if ill-conditioned; that in uniting with soda and ammonia, free or combined with acids less powerful than the hydrochloric, and in decomposing hydrosulphuric acid, chlorine loses its activity, at the same time that it neutralizes the hurtful effects of those substances, but that whatever of it is in excess, uncombined or changed into non-saturated hydrochloric acid, is an irritant that will more than counterbalance the good obtained, unless it modifies the local irritation.

6. That the chlorides of the oxides, when used for the chlorine they disengage, naturally present the same advantages and disadvantages as the gas itself.

Further, also, the author concludes that chlorine in small doses is useful in modifying the nature of the expectoration, rendering it less fetid, less viscid, and less irritating, and giving the bronchi the energy they needed, and changing the nature of their irritation; but its action does not extend beyond the morbid surface unless it be absorbed. It is useless in acute bronchitis, though it sometimes aids in the cure of the chronic bronchitis; and though it may be useful in smoothing the progress of pulmonary consumption, by



making the expectoration less annoying, yet both in it and bronchitis the utmost caution is requisite, lest its quantity being more than is required to counteract the expectoration and irritation, should excite the other parts of the air canal and induce cough. In like manner chlorine disinfects the disorganized parts in gangrene of the lungs, but if it reaches the non-spacelated parts it acts as a violent irritant. He concludes by urging the necessity for great caution in its employment.

That these views are, at least in part, correct, may be seen from the fact, that chlorine introduced into healthy bronchi, causes the most violent irritation there, whereas it may be inhaled in union with aqueous vapour for some time together, in cases of bronchitis with purulent expectoration.

The last case mentioned by the anonymous author, namely, gangrene of the lungs, is certainly one of the best for the inhalation of chlorine. Dr. Crane of the St. George's Dispensary published an instance of its successful employment in pulmonary gangrene, which may be found in the 2nd vol. of the Medical Gazette for 1833. The French editors of the Archives G n rales, in transferring the case to their pages, doubted whether it was one of the disease in question. I repeatedly saw the patient in company with Dr. Crane, and am convinced that these doubts are unfounded, and that it was a *bon  fide* case of gangrene. The man completely recovered, and though his pulmonary organs remain, as might be expected, weak and sensitive to changes of temperature, he is still without cough, and able to pursue his avocations.

It is curious that Laennec should so positively state that pulmonary gangrene is incurable.—*Tr.*]

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## CHLORURETS OF LIME AND SODA.

The inconveniences of chlorine gas, as a disinfectant, had always been felt when it came to be applied in rooms containing many individuals. Too little of it left



the miasm untouched, whilst too much induced suffocative respiration. Some other mode of disinfecting was therefore desirable, and was found.

In the year 1812, M. Mazuyer, professor in the Medical Faculty of Strasburg, made known the superior advantages of the chloruret of lime over chlorine, on account of its greater disinfecting power. At that time he employed habitually and successfully the solution of the chloruret for the disinfection of typhus hospitals and anatomical dissecting-rooms. Still the facts adduced by M. Mazuyer failed to attract attention, and the remedy remained comparatively unnoticed.

Nine years subsequent to this time the Society for the Encouragement of National Industry proposed the question of the purification of catgut manufactories; the prize was gained by M. Labarraque, who, in his memoir, demonstrated by numerous experiments that the chloruret of soda was one of the most powerful agents in the instantaneous removal of the disgusting odour arising from the macerating intestines. He also extended the use of this disinfectant to all putrifying animal matters; and many distinguished physicians have since applied them in medicine.

The experience of several years having established the efficaciousness of the chloruret of lime for the purposes proposed, the Académie des Sciences, in 1825, awarded the Monthyon prize of three thousand francs to M. Labarraque; and having moreover ascertained that M. Mazuyer had been in the habit of using the same means to the same end, ten years before, they voted to that gentleman a sum of two thousand francs.

The reader will find in M. Chevalier's work, (*L'Art de préparer les Chlorures de Chaux, de Soude, et de Potasse*. Paris, 1829,) all that relates to the applications of those substances in the arts.

*Mode of preparing the Chlorurets of Soda and Lime.*

*Chloruret of Soda.*—Dissolve 5 pounds of pure carbonate of soda in 20 livres of distilled water, so that



the fluid marks 12 degrees of Baumé's aërometer. Place the liquor in a vessel, one quarter of which should remain empty. Upon a sand-bath place a four-pint glass balloon, having a long neck and a wide mouth, and introduce into it 576 grammes of hydrochlorate of soda and 448 of peroxide of manganese: lute a large curved tube to the mouth of the balloon, and one in S, for the introduction of diluted acid; the first tube being placed in a vessel containing water, serves to mark the gas, and from this vessel a large bent tube proceeds to that which contains the saline solution.

The apparatus thus arranged, and the luting dry, pour into the S tube the cold diluted acid prepared by mixing 576 grammes of concentrated sulphuric acid with 448 grammes of water. Heat is then applied to the sand-bath until no more chlorine is disengaged. The process finished, the strength of the product is then to be examined; for this purpose take a portion of the chloruret, introduce it into the bertholimeter,\* and pour upon it a solution of the sulphate of indigo made in the following manner: powdered Bengal indigo, 1 part; sulphuric acid, 6 parts: combine them by heat, and add 993 parts of distilled water. The chloruret ought to decompose 18 parts of this sulphate; and should it not do so, additional chlorine must be passed into the saline solution.

*Chloruret of Lime.*—Slake quick-lime with a small quantity of water: mix the powder with a 20th of its weight of hydrochlorate of soda, and place the whole in long earthenware vessels into which the chlorine passes. This gas is obtained from the same mixture as that for preparing the chloruret of soda. Several sets of apparatus may be placed aside of each other, care being taken that the chlorine passes slowly into each one, in order that the combinations may be effected successively. The hydrated lime being sufficiently charged with chlorine begins to get moist, by which it may be known that the operation is about to

\* *Chlorometer* is the synonym of this term, and speaks for its own meaning.—*Tr.*



terminate. In order to try its point of saturation, take one part of the chloruret, and dilute it with 130 parts of water: this solution should decolorize four and a half parts of sulphate of indigo.

The hydrochlorate of soda is added to the lime, for the purpose of facilitating the absorption of the chlorine.

In large establishments, such as hospitals, barracks, prisons, &c., where daily disinfection is necessary, the chloruret may be more economically made by this process: Mix 40 litres of water, a pound of sea-salt, and five pounds of fresh-slaked lime: immerse in this fluid to within a few inches of the bottom a tube by which chlorine, disengaged from a mixture of half the proportions before stated for the chloruret of soda, may be conducted. This chloruret will still be more than sufficiently powerful to disinfect wards and putrefied animal matters, and it may therefore be mixed with a sufficient quantity of water, and used as will be directed.

#### *Mode of employing the Chloruret of Lime.*

M. Labarraque gives the following directions for the chlorurets:

When a putrefied corpse is to be examined, previously pour 24 litres of water into a bucket, and to this water add a demi-kilogramme of chloruret of lime: then mix them well together.

Let a sheet be completely soaked in the chloruret water in the bucket, and cover the whole corpse with it—the putrid odour will soon cease. If blood or any other fluid has dropped from the body, pour one or two glasses of the chloruretted water on it, and the bad odour ceases.

If the fœtor prevails in passages, staircases, &c., sprinkle a few glasses of the water over them.

The sheet which is wrapped round the corpse should be frequently moistened with the fluid in the bucket,



in order to prevent the reproduction of the putrid smell.

Instances are related of bodies that had been interred three months, and afterwards exhumed, the whole of the fetid odour from which was destroyed by the chloruretted waters, so as to render an anatomical inspection practicable.

The chloruret of lime may also be advantageously used in the disinfection of water-closets, urinaries, ships, stables, work-shops, hospital-wards, &c. In such cases, it is only necessary to dilute the chloruret with 60 times its weight of water, and to sprinkle this solution on the boards, walls, floors, and other surfaces of the building. For this purpose, a broom or watering-pot may be used: a few minutes will complete the disinfecting process.

In sick wards, the solution is to be poured into deep plates placed at various distances under the beds; in which case the infectious odour cannot spread, being destroyed, as it forms, by the continual evolution of chlorine.

It cannot be denied, however, that the odour of chlorine eventually, after long use of it, becomes more insupportable than the foulness it was intended to destroy. This was the case at the Hôtel Dieu at the time of the cholera. The fear of contagion caused the chlorine vapour to be most profusely employed, until it became intolerable. Subsequently, the disease was ascertained to be in no way contagious, and we were glad to dispense with the chlorine, even in the *post mortem* room.

#### *Cases for the employment of the Chloruret of Soda.*

It is the chloruret of soda that is chiefly employed on man, and it has been completely successful in all cases where there is general or partial infection of the system. Thus, carbuncle, hospital gangrene, ill-conditioned venereal ulcers, sloughing wounds, &c., have all been found to tend rapidly to cicatrization by



the continued employment of the chloruret with 10 or 15 parts of water. In the numerous patients suffering from cancerous ulceration of the breast and womb that are to be found at the Salpêtrière Infirmary, I am in the habit of washing the parts with the chloruret of lime solution. By this means, not only has the fetid smell of the pus and other discharges been repressed, but the sufferings of the patients have been considerably alleviated, sleep frequently following the application of the lotion. It has also been greatly beneficial, in M. Alibert's hands, in the treatment of corrosive tetter, (*herpes exedens*;) and MM. Roche and Cloquet have found it of the first use in bad gangrenous ulcers; in many cases of which M. Jules Cloquet directs the sphacelated limb to be bathed in a solution of the chloruret in 10 or 15 parts of water, at the same time that he administers 25 or 30 drops in a pint of barley-water.

M. Roche has cured porrigo favosa with the solution of this chloruret; and has used the same remedy as a gargle with great success in diphtheritic sore throat, (angine couenneuse;) and I can answer, from my own experience, for the same fact.

M. Sanson has succeeded in cleansing ulcerations of the mouth with caries of the palatine bones with it, and by this means suspended for some time the ravages of the disease.

M. Lagneau uses the chloruret as a wash in spongy and ulcerated gums that exhale an offensive odour.

M. Lisfranc uses it to a great extent in burns and common ulcerations; for this purpose he employs a solution of chloruret of lime marking three degrees of Gay-Lussac's chlorometer.

M. Bouley has employed it with success in veterinary surgery, in the treatment of the carbuncular affections that are so frequently met with in horses.



*Antipsoric Solution of Chloruret of Lime.*

M. Derheims proposes the following solution for the cure of the itch.

Chloruret of lime . . . . 3 ounces.  
Distilled water . . . . 1 pound.

Dissolve and filter.

The thighs, legs, and arms to be washed two or three times in the day : the cure is effected in six or eight days.

*Preparations of the Chlorurets to sweeten the breath.*

M. Chevallier gives the following formulæ :

*Spirituous Solution of Chloruret of Lime.*

Dry chloruret of lime . . . 3 drachms.  
Distilled water . . . . 2 ounce.  
Alcohol at 36° . . . . 2 ounces.

Triturate well the chloruret in a glass mortar, and add a portion of the water ; leave it to settle, pour off the clear liquid, add more water to the residue, triturate, leave it to settle again, and so on three times. Filter all the decanted fluid, add the given quantity of alcohol and a few drops of some essential oil.

A small quantity in a glass of water will free the mouth from any disagreeable odour—that of tobacco for instance.

*Dr. Angelot's Formula.*

Chloruret of lime . . . 16 to 30 grains.  
Mucilage of gum . . . 1 ounce.  
Orange-peel syrup . . . 4 drachms.

The author of this formula uses it in ulcerations of the gums.



*Chloruret of Lime Lozenges to sweeten the breath.*

Chloruret of lime . . . . .	7 drachms.
Vanilla sugar . . . . .	3 drachms.
Gum Arabic . . . . .	5 drachms.

Divide into lozenges of 15 to 18 grains each, two or three of which are sufficient for the purpose. They are of a grey colour: if white lozenges are desired, this formula will suffice:

Dry chloruret of lime . . . . .	24 grains.
Powdered sugar . . . . .	1 ounce.
Tragacanth powder . . . . .	2 grains.

Add water gradually to the chloruret, and leave it to settle: decant, filter, and add sufficient water to dissolve the chloruret. Use this solution to bring the mixture to the consistence of a paste, which is then to be divided into lozenges of 18 or 20 grains each. Scent them with some essential oil. One or two to be taken.

M. Deschamps gives the following formula for the same purpose as the above.

Dry chloruret of lime . . . . .	2 drachms.
Sugar . . . . .	8 ounces.
Starch . . . . .	1 ounce.
Tragacanth powder . . . . .	1 drachm.
Carminc . . . . .	3 grains.

The starch prevents the lozenges from having a yellow tinge. They are each to weigh three grains, and five or six may be taken in two hours.

[For internal administration, Dr. Reid of Dublin, (Transactions of the Dublin Col. of Physicians, vol. v. 1827,) has used chloruret of lime with advantage in typhus and dysentery. His formula is,

Solution of chloruret of lime . . . . .	1 drachm.
Mucilage . . . . .	2 drachms.
Orange-peel syrup . . . . .	10 drachms.

which may be taken every third or fourth hour: or the



following injection may be administered in company with, or in lieu of the mixture :

Barley water . . . . . 10 ounces.  
Solution of chloruret of lime . . 4 drachms.

This may be given each morning and evening during the continuance of the typhoid and putrid secretions.

Apparently ignorant of these experiments made by Dr. Reid in 1826, M. Chomel was induced, in 1831, at the suggestion of one of his pupils, to try the effects of the chloride of soda in typhoid fever. His practice extending over the period from the summer of 1831 to March 1834, inclusive, shows a difference in the success of treatment that should lead to further observations of this remedy; his usual treatment giving a mortality of one in three, whereas in those instances where the chloride was employed the fatal cases were only one in six. He dissolved one grain to a grain and a half in each ounce of sweetened gum-water, and of this the patients drank as much as they could. Mucilaginous clysters, containing the same proportion, were ordered night and morning. And the body itself, as well as the poultices applied to the abdomen, were well sprinkled with the chloride of soda.

A lotion composed of 12 ounces of water, with one ounce of solution of chloruret of lime, is applicable for ablution or sponging the body in fevers, and may likewise be used to gangrenous ulcers, both consequent on fevers or other tedious diseases, and idiopathic.

A powder which is efficacious in destroying the yellow colour of the teeth, is made by mixing four grains of chloruret of lime powder with two drachms of powdered gum or red coral.

The chlorurets of calcium and sodium have been extensively and successfully used by M. Lisfranc in the treatment of burns. He says, they act in the first degree of burns by their astringent and sedative effects, for patients after a few hours' use of the chlorurets suffer much less, and often not at all; their reaction on the system is therefore considerably dimi-



nished. In the second degree of burns, when as yet no eschar, but only a solution of continuity exists, the chlorurets induce a plastic exudation from the surface, which becomes organized, and forms a false membrane, proceeding from the circumference to the centre, and eventually fills the wound. Nor are these preparations without the same effect on a more advanced stage of burns, when the eschars are come away, and the granulations are well developed. At the same time that there is much less contraction of the cicatrix, after the treatment with the chlorurets, it is more solid than under any other treatment. If, however, the inflammation be violent, and of a phlegmonous nature, the chlorurets generally augment its intensity, while, on the contrary, if it be slight, they diminish its force, and thus prolong the elimination of the eschars. The chlorurets are more especially applicable to burns of the first and second degree. They are more injurious than otherwise, if used as antiseptics, whenever the gangrene depends upon an excess of inflammation, and when the latter, notwithstanding the death of a certain extent of tissue, persists to a high degree.

The mode of dressing burns with the chlorurets is as follows: the whole surface of the burn is first covered with a compress perforated in many places: above this a mass of charpie at least two inches thick, and moistened with the chloruret, is placed; and the whole is retained by a bandage. During winter, when the surface of the burn is very extensive, and the patient lies in a state of excessive stupor, the perforated compress should be warmed before it is applied; and according to the temperature of the atmosphere, the apparatus is to be moistened six or eight times a day. The dressing should be renewed every twenty-four hours.

M. Ricord does not consider that the chloruret lozenges are at all effectual in moderating the salivation, and spongy condition of the gums, consequent on the free use of mercury.—*Tr.*]



## MANNITE.

This substance has been called *sugar of manna*, but its only point of resemblance to sugar is its saccharine taste. It is usually procured from manna, but appears to exist, though in small quantity, in the juice of onions, beetroot, celery, and many other plants.

To obtain it the manna of commerce (in tears) is treated with boiling alcohol, filtered, and left to crystallize: on cooling, the mannite precipitates in small and beautifully-white needles.

Manna in tears is composed almost altogether of mannite combined with a small quantity of yellowish extractive matter, and some traces of cane sugar; whilst common manna contains but little mannite, and a great proportion of extractive.

Mannite is white, soluble in water in almost any proportions, so as to form a syrup, and fuses at  $105^{\circ}$  into a colourless liquid, which, on cooling, crystallizes: by excessive heat it burns like sugar. It has been analyzed by Gay-Lussac and Thenard, Proust, de Saussure, Henry, and Liebig: the latter makes it consist of—

	At. Comp.
Carbon . . . . .	458.622 = 6
Hydrogen . . . . .	87.357 = 14
Oxygen . . . . .	600.000 = 6

*Medicinal employment of Mannite.*

It may be substituted for manna, as it possesses its laxative powers without having its disagreeable smell. The dose is 2 drachms for children: occasionally I have carried it as far as half an ounce, but found the purgative effects too great. Such a dose, however, will suit adults.

*Syrup of Mannite*

May be made as other syrups are, and will be found



useful for gently relaxing the bowels of infants at the breast, and as an addition to pectoral infusions in pulmonary catarrhs that are passing into the chronic stage.

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### SOLANIA.

This alkali was discovered by M. Desfosses, of Besançon, in two plants of the family of Solanæ, the morel, (*solanum nigrum*,) and the bitter-sweet, (*solanum dulcamara*.) It exists in both these plants, but whilst the leaves of the last one contain it in some quantity, none is found in those of the morel.

Several able chemists have treated the plants in question according to M. Desfosses' directions, but have only obtained a small quantity of phosphate of lime and vegetable matter, without any alkali whatever. It behoves M. Desfosses to offer some explanation of this anomaly.

#### *Preparation of Solania.*

Solania is found in greatest abundance in the berries of morel, where it exists in the form of a malate. In order to obtain it, the filtered juice of the berries is treated with ammonia, which causes a greyish precipitate. This deposit, collected on a filter, washed and treated with boiling alcohol, yields, on evaporation, the salifiable base in a pure condition, if the berries have been perfectly ripe; but if used when green, the solania remains combined with a quantity of chlorophylle that is not easily separated.

#### *Properties of Solania.*

When pure, it presents itself in the form of a white, opaque, and sometimes pearly powder. It has no smell, has a slightly bitter and nauseous taste, and this bitterness is developed by solution in acids, par-



ticularly the acetic. Its salts are uncrystallizable, and a solution of them is transformed by evaporation into a gummy, transparent, easily pulverizable mass.

Solania is insoluble in cold water; hot water only takes up 1-8000th part. Alcohol dissolves a small portion of it.

Its alkaline properties are but feebly manifested by its action on turmeric: it however restores turnsol that has been reddened by acids. With acids it unites in the cold; and if the combination is properly attended to, will form perfectly neutral solutions. Like all the vegetable alkalis, a very small quantity of acid suffices to saturate it.

#### *Action of Solania on Animals.*

Two or four grains swallowed by a dog or cat, excite violent vomiting, soon followed by a drowsiness that persists for several hours.

A young cat supported 8 grains without fatal results; after violent retchings it fell into a deep sleep, which lasted nearly 36 hours. Solania, extracted from the *solanum ferox*, was sent to me by M. Pelletier, with which I made experiments on two puppy dogs: it produced profuse salivation in one of the animals, but no drowsiness.

#### *Action of Solania on Man.*

On swallowing a small quantity of solania, a strong feeling of irritation in the throat is experienced. In the mouth it imparts a nauseating, slightly bitter taste, which becomes exceedingly so if the substance be dissolved in a small quantity of acetic acid.

The acetate is the only salt of solania that has hitherto been tried on man. In the dose of a quarter of a grain it produces nausea, but no tendency to sleep ensues.

From what has been said, it would appear that solania, like opium, is capable of producing vomiting



and sleep; but its emetic powers seem to be more prominent than those of opium, whilst its narcotic properties are much feebler.

*Cases for its Administration.*

Solania has not yet been tried in disease, but it may be employed in all cases where the extract of the morel or the bitter-sweet is indicated.

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DELPHINIA.

This alkali was discovered in 1819, in the seeds of the stavesacre, (*delphinium staphisagria*), by MM. Feneulle and Lassaigne, who named it so from an idea that the acrid property of this vegetable family was owing to this principle: an opinion which they have not succeeded in confirming by analyses of other delphinian plants.

*Preparation of Delphinia.*

Boil in a little distilled water a quantity of the seeds deprived of their covering, and reduced to a fine paste.

Strain the decoction through linen, and then filter it. Add pure magnesia, and keep it boiling for several minutes, at the end of which, filter again; wash the residue, and submit it to the action of rectified alcohol. By evaporating the spirituous tincture, delphinia, as a white powder exhibiting a few crystalline points, is obtained.

This is the most simple process; but if it be desired to procure it in large quantities, and without the trouble of cleaning the seeds, the following process is preferable.

The seeds not cleaned, but well bruised, are treated with dilute sulphuric acid. A precipitation is effected by ammonia and the delphinia, still containing some



colouring matter, is taken up by alcohol. To purify it, drive off the alcohol by distillation, dissolve the residue in hydrochloric acid, and boil with magnesia. The deposit is taken up by spirits of wine, which yields delphinia in a perfectly pure condition.

M. Couerbe proposes to obtain pure delphinia by the same process that he employs in getting veratria from the seeds of the plant.—See *Veratria*, page 68.

### *Properties of Delphinia.*

When in a state of purity it is a white powder, crystalline when moist, but soon becoming opaque by exposure to the air. It has no smell, and its taste is first intensely bitter, and then acrid.

Water dissolves a very small proportion of it, only recognisable by the slight bitterness of the fluid. Alcohol and ether dissolve it readily; the spirituous solution imparts a strong green colour to the syrup of violets, and restores the blue colour of turnsol paper reddened by acids.

With sulphuric, nitric, hydrochloric, oxalic, and acetic acids, delphinia forms exceedingly soluble neutral salts, having an extremely bitter and acrid taste. Alkalis precipitate it in the form of a white jelly.

According to M. Couerbe's analysis, delphinia consists of

	At Comp.
Carbon . . . . .	76.69 = 27
Azote . . . . .	5.93 = 2
Hydrogen . . . . .	8.89 = 38
Oxygen . . . . .	7.49 = 2

The number representing the atomic weight of this substance is 2597.

### *Cases for its Employment.*

Delphinia has not yet been tried as a medicine; but if stavesacre possesses any medicinal agency, it may be presumed to exist in the alkali obtained from it. Its



administration might therefore be attempted in circumstances where the plant itself is indicated; in which case the salts, being more soluble, are to be preferred.

[Stavesacre has generally been used in ointment to destroy vermin in the hair; or the seeds are macerated in vinegar, and the liquor used for the same purpose. Delphinia would probably answer the same end more effectually.

Dr. Turnbull has employed delphinia both internally and externally. Its medicinal operation is precisely the same as that of veratria, and it is therefore applicable in the same cases.—*Tr.*]

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### GENTIANA.\*

The discovery of this principle is connected with a circumstance in some degree singular.

M. Henry and M. Caventou were both engaged at the same time, and without any mutual knowledge, in the analysis of gentian. The results on both sides were so perfectly identical, and seemed to have so much the appearance of previous concert, that they resolved to publish them in one memoir.†

\* M. Caventou has extracted from the root of the tree bearing the cassia fistula, a bitter principle that may be of useful application in intermittent fevers. This principle has the property of forming combinations with nitric, muriatic and sulphuric acids, that are very slightly soluble in water; whilst, on the contrary, its combinations with potass, soda, ammonia, and even magnesia, lime, baryta, &c. are exceedingly soluble.

† This fact is remarkable for two reasons: first, as it proves how the processes of vegetable analysis have been perfected within the last few years; and next, as it shows the changes which the progress of science has effected among its cultivators. A century since, the consequences of such a coincidence would have had any but an agreeable character.



*Preparation of Gentiana.*

Treat powdered gentian with cold ether, which in forty-eight hours gives a greenish yellow tincture; this filtered, poured into an open vessel, and exposed to heat, passes on cooling—if the liquor be sufficiently concentrated—into a yellow crystalline mass, having a very decided smell and flavour of gentian. This mass is then to be treated with alcohol until it ceases to impart a lemon colour. The washings are collected and exposed to heat, upon which the yellow crystalline substance reappears, and towards the end of the evaporation collects into a mass of an extremely bitter taste. On being again taken up by weak alcohol, it is dissolved, with the exception of a portion of oily matter. This last alcoholic solution contains, besides the bitter principle of gentian, an acid, and the odorous principle of the root.

By evaporating the spirituous fluid to dryness, washing the matter obtained by water, adding a small quantity of calcined and well-washed magnesia, and boiling and evaporating in a sand-bath, the greater part of the odorous principle is driven off, the acid matter is neutralized by the magnesia, and the yellow bitter principle remains, partly free, partly combined with the magnesia, to which it gives a fine yellow colour. Subsequently, on boiling this magnesia with ether, the major part of the bitter principle is carried off, and on evaporation, is obtained in an isolated condition. If it is desired to separate almost all the bitter principle that remains combined with the magnesia, and which the ether was unable to take up, it must be treated with a sufficient quantity of oxalic acid to produce acidity of the fluid. The oxalic acid combines with the magnesia, and sets free the bitter principle which is then taken up in the manner already mentioned.



*Properties of Gentiana.*

Gentiana is yellow, inodorous, and has the aromatic bitterness of gentian to a great degree, and this may be increased by solution in an acid. It is highly soluble in ether and alcohol, and by spontaneous evaporation separates in the form of very minute yellow crystalline needles. It is much less soluble in cold water, though it still renders it very bitter: boiling water dissolves a greater quantity of it.

Diluted alkalis deepen its colour by many shades, and dissolve somewhat more of it than water. Acids diminish its yellow colour in a very marked manner. The solutions in sulphuric and phosphoric acids are almost colourless, and with weaker acids, as the acetic, they are only yellowish. Concentrated sulphuric acid chars it and destroys its bitterness.

Exposed in a glass tube to the heat of boiling mercury, gentiana sublimes in the form of small yellow crystalline needles, and is in part decomposed. It does not sensibly alter turnsol either when blue or reddened by acids.

*Action of Gentiana on lower Animals and on Man.*

Some experiments made by myself show that this substance is no way poisonous. Several grains injected into the veins produced no apparent effect. I have myself taken two grains dissolved in alcohol without experiencing anything beyond an extremely bitter taste in the mouth, and a slight sensation of heat in the stomach.

*Administration of Gentiana.*

The tincture seems to be the most eligible form for administration. It may be made as follows:

Alcohol at 24°	. . . . .	1 ounce.
Gentiana	. . . . .	5 grains.



This may be substituted for the compound tincture of gentian in all cases.

*Syrup of Gentiana.*

Simple syrup	. . . . .	1 pound.
Gentiana	. . . . .	16 grains.

This is one of the best bitters we can employ in the treatment of scrofulous affections. I continue to use it with the best effect.

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LUPULINE.

The existence of this substance in the hop was discovered by Mr. Ives of New York. It has since been described in France by M. Planche, and more recently by MM. Chevalier and Payen, under the name of the "yellow matter of hop."

It has the form of small, yellowish, and brilliant grains, which cover the base of the strobiles of the hop. It is of a golden yellow colour, pulverulent, and of an aromatic odour.

By analysis it is found to consist chiefly of resin, a small quantity of volatile oil, and a bitter principle; to which last the name of lupuline seems more especially and properly to belong. It has an exceeding bitter taste, and is soluble in water, alcohol, and ether, to all which it imparts its bitterness.

*Action on Man and the lower Animals.*

Dr. Ives regards it as aromatic, tonic, and narcotic. I cannot certify to this; I have at various times tried lupuline in substance, and its various preparations, on animals, without having occasion to remark that it was narcotic, though such a property is one of the most easy to ascertain in similar experiments.



*Medicinal employment of Lupuline.**Powder of Lupuline.*

Lupuline . . . . .	1 part.
Powdered white sugar . . . . .	2 parts.

First bruise the lupuline in an earthenware mortar, and add the sugar gradually : then mix them well.

*Pills of Lupuline.*

Take a quantity of lupuline, beat it into a mass, and divide it into pills.

Nothing is required to aid the formation of a mass, the lupuline itself readily forming one.

*Tincture of Lupuline.*

Lupuline bruised . . . . .	1 ounce.
Alcohol at 36° . . . . .	2 ounces.

Digest for six days in a close vessel, strain, press it strongly, filter and add a sufficient quantity of alcohol at 36°, to make up three ounces of tincture.

*Extract of Lupuline.*

This may either be prepared from the aqueous infusion, and is then bitter and aromatic ; or from the decoction, when it is equally bitter, less aromatic, and contains some resinous matter.

*Syrup of Lupuline.*

Spirituous tincture of lupuline . . . . .	1 part.
Simple syrup . . . . .	7 parts.

When the tincture is mixed with the simple syrup, the latter separates in a state of extrême division, and gives the lupuline syrup the appearance of orgeat. The mixture should therefore be well shaken each time that it is taken.



The doses of this preparation are not yet fixed in a precise manner; but as lupuline has no poisonous qualities, the practitioner may readily fix it for himself.

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### OIL OF CROTON TIGLIUM.

This oil is extracted from the seeds of the *croton tiglium*, a shrub belonging to the family of *euphorbiaceæ*, which grows in the East Indies. It appears from M. Caventou's recent researches, that the croton plant is the same which produces the seeds known in commerce as the Indian purging-nut, (*pignon d'Inde*,) and analyzed by Pelletier and Caventou, in 1818, under the name of *jatropha curcas*. Moreover, M. Caventou's chemical experiments show that the oil procured from the purging-nuts is the same as the croton oil imported from London. In fact, they have the same odour, the same colour, the same taste, the same mode of responding to chemical reagents, and the same violent therapeutical action, as shown by MM. Recamier's, Bally's, and Kapeler's experiments in the hospitals.

It is cultivated in Malabar, Ceylon, and the Moluccas, on account of its medicinal properties. The croton oil was introduced into Europe more than two centuries ago, (in 1630,) and was used internally by some physicians with success. In 1632 Artus Gyselius lauded this oil in dropsies. In the *Herbarium Amboinense* of Rumphius, published at Amsterdam, in 1750, by Burmann, we find a description of the croton; whose seeds, says the author, furnish by expression an oil, a drop of which, taken in Canary wine, was then a common purgative. The medicine in question had, however, fallen into disuse in Europe, when Mr. Conwell, of the East India Company's service at Madras, drew attention to the oil—which is in general use in India—and introduced it into British practice.



*Mode of Preparation.*

The mode of obtaining croton oil pursued in the Indies is not known; it would appear, however, from M. Caventou's experiments, that it is by expression or by boiling. After digesting 100 parts of the bruised kernels in sulphuric ether, placing the whole on a filter carefully covered during the process of filtering, and washing the residue with a sufficient quantity of ether, Dr. Nimmo, of Glasgow, found that 40 parts remained and 60 had been dissolved. By this process he obtained from 300 grains of the seeds (from which 108 grains of envelope must be reduced, leaving 192 grains of kernels) two drachms of an oil that had the taste and medicinal properties of ordinary croton oil.

A spirituous solution of croton may also be obtained by adding alcohol either to the seeds or to the oil itself; but Mr. Conwell does not state the proportions for this purpose: that which he made, however, would appear to have been much less active than the oil, since he gave it in the dose of half a drachm. According to Dr. Nimmo, the activity of croton oil is attributable to an acrid resinous principle, soluble in ether, alcohol, and the fixed and volatile oils. His experiments, also, show that 100 parts of the croton kernels contain of

Acrid principle . . . . .	27
Fixed oil . . . . .	33
Farinaceous matter . . . . .	40
	<hr/>
	100

One hundred parts of the croton oil contain of

Acrid principle . . . . .	45
Fixed oil . . . . .	55
	<hr/>
	100

Vauquelin and Pelletier have made some attempts to isolate the active principle of croton oil, but unsuccessfully.



M. Caventou has obtained the oil of the croton tiglium by acting with alcohol at  $38^{\circ}$  on the kernel of the purging-nut reduced to a paste. He allows this to macerate for 48 hours, and filters: then adds a second, and sometimes a third, proportion of alcohol to the paste, which he afterwards submits to strong pressure. He collects the different spirituous macerations in an alembic, and distils them, in order to withdraw the alcohol, which serves for another operation. The oil remaining in the alembic is filtered through blotting-paper, and kept in a glass stopped bottle.

The quantity of oil obtained from the seeds is at the rate of fifty per cent.

From the researches of M. Caventou it would appear that the jatrophic acid is not the principle in which the drastic properties of croton oil reside.

#### *Action of Croton Oil on the Animal System.*

The taste of this oil is excessively acrid and pungent with something like that of common castor oil. A drop being placed on the tongue, a disagreeable sensation of heat, extending to the back of the mouth, is shortly felt, and continues for several minutes. A spoonful or two of cold water removes this: but it is nevertheless an objection to the administration of croton oil by itself. Mr. Conwell sent some of it to me, and I made experiments with it on animals. I found it purgative in the dose of half a drop or a drop; and that in large doses it is powerfully drastic, inducing inflammation of the intestinal canal, accompanied with frequent vomiting, and incessant purgation.

When injected into the veins, it produces, according to the dose, either simple purging or inflammation of the digestive tube, or even the death of the animal.

Proceeding on a knowledge of these effects, I did not hesitate to employ croton oil as a medicine; I gave it to several patients male and female, in the Hôtel Dieu with perfectly satisfactory results. One or two drops, mixed with half an ounce of syrup, purged



gently, but copiously, about fifteen patients under my care, for various affections. Several pupils of the hospital tried its purgative property on themselves, after seeing its effects in these cases, and were not disappointed. I use it very frequently, and very successfully, at the Salpêtrière Infirmary. Nor have I found it less advantageous in my private practice.

Mr. Conwell says that in some persons the oil causes nausea and vomiting; this I have not observed. When vomiting ensues, the purgative effect is not thereby obviated. The same gentleman states, that the odour of croton oil, inhaled from a bottle containing sixteen ounces of it, was sufficient to purge a young girl: and that an adult having made the same experiment, suffered only from nausea.

Croton oil acts very rapidly—frequently in half an hour. Besides the alvine evacuations, the secretion of the urine seems to be considerably augmented.

Doctors Recamier, Kapeler, and Bally made many experiments with the croton oil, obtained by M. Caventou from the Indian purging-nut, and always found that one or two drops were sufficient to produce 12, 15, or even 20 motions. They remarked, however, that it was liable to excite vomiting, in the same manner as that procured from England.

#### *Cases for the Administration of Croton Oil.*

It may be employed as a common purgative when no signs of gastric or enteric irritation are present; in old persons, in the same circumstances as veratria. But croton oil is more especially to be preferred after the common purgatives have been successfully used in apoplexy and dropsy: and when mechanical or other objections exist to the employment of a milder purgative, and particularly when a rapid effect is desired to be produced.

Dr. Ainslie, of Madras, published there, in 1813, a work on the materia medica, in which he recommends the external application of croton oil in rheumatic



affections. I have frequently used it in similar circumstances, especially when the acute stage of the rheumatism has been prolonged into a chronic condition.

Dr. Kinglake quotes several cases of obstinate constipation which he cured by a single drop of croton oil, given in the shape of a pill. One case of painters' colic, more particularly, was recovered in this manner. In this latter disease I have myself given it successfully in the dose of one or two drops in twenty-four hours.

#### *Mode of Administration.*

One, two, or three drops are generally given in half an ounce of mucilage, or some syrup.

Mr. Conwell recommends the following formula.

Alcoholic solution . . . . .	$\frac{1}{2}$ drachm.
Simple syrup . . . . .	3 drachms.
Mucilage . . . . .	3 drachms.

It has been already stated that Mr. Conwell makes no mention of the proportion of the oil in the alcoholic solution, so that it may be better to confine the administration to the oil. The solution is, however, probably a saturated one.

Mr. Conwell has also used the oil in friction of four drops around the umbilicus with a purgative effect: a slight eruption is consequent on the friction.

#### *Croton Oil Soap.*

As the therapeutical administration of croton oil in drops presents obstacles to exactitude in prescribing, M. Caventou has prepared a soap with a sodaic base that has been successfully employed by Dr. Bally.

Triturate two parts of oil, and one part of caustic soda together in the cold. When the mixture has acquired consistence, it is run into pasteboard moulds,



and after some days the soap is taken out in slices which are to be kept in a well-stopped bottle.

*Administration of Croton Soap.*

Dr. Bally gives it in the dose of two or three grains diffused in a little water, mixed with sugar, or made into pills. The purgative effect is similar to that of croton oil.

M. Gondret has since also used this soap with considerable success.

[The endermic employment of croton oil is a mode now frequent among British practitioners. So applied, it proves a most rapid and efficacious counter-irritant in inflammations of the pectoral and abdominal viscera. The best form for the purpose is that of ointments in the proportions of eight to ten drops of the oil to half an ounce of simple cerate, to which may, if necessary, be added a scruple or half a drachm of tartar emetic.

From some cause or other, the croton oil met with in this country is of most uncertain strength and operation.—*Tr.*]

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PIPERINE.

This substance was discovered in black pepper (*Journ. de Physique*, 1820,) by M. Oerstadt, who regarded it as a vegetable alkali.

M. Pelletier has since analyzed the grain of the pepper, and proved that piperine is by no means a vegetable alkali, but has considerable resemblance to the resins, though altogether it is a matter *sui generis*. (*Examen chimique du Poivre*, in 8vo.)

Piperine has been employed in Italy as a febrifuge. I have not been able to confirm by my own experience the existence of the properties attributed to it by Dr. Dominique Meli, (*Annali Universali di Medicina*, T.



27 and 28.) I shall therefore confine myself to stating his process for obtaining piperine, and the doses in which it is given.

### *Preparation of Piperine.*

Digest two pounds of bruised pepper-seeds in three pounds of alcohol, at  $36^{\circ}$  at a gentle heat. The heat must afterwards be raised to ebullition, subsequently to which the liquid is to be allowed to cool and settle, then decanted, and the operation repeated with fresh alcohol. Both alcoholic fluids are to be mixed, and two pounds of distilled water, with three ounces of hydrochloric acid, added to them. Upon this the fluid becomes turbid, and a dark grey precipitate, chiefly composed of fatty matter, is formed. This being separated, fine crystals of piperine are collected on the filter and the sides of the containing vessel. By adding water until the liquid no longer becomes turbid fresh quantities of piperine are obtained.

M. Pelletier approves of this process, though he prefers to obtain the crystalline matter by the following method. After exhausting the pepper by alcohol, and evaporating the tinctures, a fatty and resinous matter is obtained, which is acted on by boiling water, until the water comes away colourless. This fatty matter thus purified is dissolved in hot alcohol, and after leaving the solution for several days, a quantity of crystals form, that may be purified by repeated solutions in alcohol and ether, and several crystallizations. The crystals are piperine.

The crystalline matter of pepper is exhibited in the form of four-sided prisms, two of which, parallel to each other, are evidently broader; the prism itself is terminated by an inclined surface. This substance is totally insoluble in cold water; boiling water dissolves a small quantity of it, which precipitates on cooling. It is exceedingly soluble in alcohol, less so in ether, and rather in hot than cold.

M. Pelletier finds that piperine has a strong analogy



with the resin of cubeb pepper, which Vauquelin formerly compared to capaiba balsam: the piperine of cubeb, however, has no crystalline property.

MM. Gobel and Henry have analyzed piperine, and make no mention of the azote which certainly exists in it in the proportion of four per cent. In 1830, M. Pelletier analyzed it, and found that 100 parts contain,

	Atoms.
Carbon . . . . .	70.41 = 20
Hydrogen . . . . .	6.80 = 24
Azote . . . . .	4.51 = 1
Oxygen . . . . .	18.45 = 4

Since that time M. Liebeg has ascertained that M. Pelletier's analysis is perfectly correct.

*Cases in which Piperine may be administered.*

According to Dr. Dominic Meli, piperine possesses the same febrifuge qualities as the cinchonic alkalis. At the hospital of Ravenna he has treated a great number of fevers with it, and even goes so far as to assert that its action is more certain and speedy than that of sulphate of quinia. Piperine should be given in smaller doses than the sulphate of quinia. Intermittent fevers are the only diseases in which it has been hitherto employed. It may also be used in gonorrhœa, in the place of cubeb pepper.

Dr. Meli says, that the acrid oil of pepper possesses the same febrifuge properties as piperine, but in a less degree. This is no doubt owing to the retention by it of a certain portion of the crystalline matter.

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UREA.

This substance, which is the immediate principle of the urine of mammals, was discovered by Rouelle



Cadet, and most of its properties were investigated by Fourcroy and Vauquelin.

*Physical and Chemical Properties.*

The purest urea that can be obtained is exhibited in the form of elongated, brilliant, pearly scales; it is colourless, transparent, of a cool and sharp taste, and has an odour similar to that of urine. Exposed to a heat of  $120^{\circ}$ , it fuses without being decomposed; and at a few degrees higher, it melts, is decomposed, and carbonate of ammonia without any intermixture of hydrocyanate is sublimed. By a regulated increase of heat a residue is obtained, consisting entirely of cyanuric acid; this by a further heat is resolved into its elements.

Thrown upon burning charcoal, urea immediately gives out white vapours, which have a strong ammoniacal odour. Exposed to the atmosphere, it absorbs no moisture; it is, however, very soluble in water and alcohol.

A concentrated aqueous solution of urea is not decomposed by heat or cold; but a diluted one boiled or left to itself, is gradually transformed into carbonate of ammonia. Nitric and nitrous acids and chlorine are the only substances that decompose urea at an ordinary temperature.

Infusion of galls and the alkalis produce no precipitate with it; but if the solution be slightly treated with an alkali, or alkaline substances, the urea is converted into ammonia and carbonic acid.

According to Prout, urea consists of,

	Atoms.
Azote . . . . .	46.65 = 2
Carbon . . . . .	19.97 = 1
Hydrogen . . . . .	6.63 = 4
Oxygen . . . . .	26.63 = 1



*Process for obtaining Urea.*

According to M. Thenard, the following is the best mode of obtaining urea: Urine evaporated to the consistence of a syrup, is to be treated with its own volume of nitric acid at  $24^{\circ}$ : the mixture is to be shaken and immersed in an ice-bath, to solidify the crystals of super-nitrate of urea: these are washed with water at 0, drained and pressed between sheets of blotting paper. When they are thus separated from foreign matters, they are to be dissolved in water to which subcarbonate of potass is added, whereby the nitric acid is taken up, and the urea set at liberty. This new liquor is evaporated at a gentle heat, nearly to dryness: the residue is treated with pure alcohol, which only dissolves the urea, the solution is concentrated, and the urea crystallizes.

*Action of Urea on the Animal System.*

As urea has never been found in any fluid of the body, except the urine, and in the blood when animals are deprived of their kidneys, M. Segalas was desirous to ascertain whether, when nephrotomy had been performed, the subjects of the experiments would sink in consequence of the accumulation of urea, or by the retention of the other elements of the urine. He therefore injected into the veins of several dogs, gradually augmented quantities of urea, and found that the animals survived it, and not a trace of urea was detected in the blood. He found, however, that the injection of urea stimulated the urinary function in an extraordinary degree. Since that time the diuretic action of urea on man has been confirmed by M. Segalas himself, and M. Fouquier, though it may be doubted whether the former has not exaggerated that action.

M. Segalas has given urea in diabetes, but without success. The composition of the morbid urine was not changed by it, but it may still be given as a diu-



retic in the place of others that have ceased to influence the urinary secretion.

*Mode of Administration.*

Urea has been given internally in solution in sugared water. It has been used in the dose of a drachm ; but it will be better to begin with twenty-five or thirty grains only.

[It is extraordinary to find such an acute physiologist as M. Magendie anticipating that urea should be of use in disorders when it is wanting in the urine. This is a consequence of his doctrine, that all the varied secretions of the body are ready formed in the blood, and are merely, as it were, strained through the several organs from or in which they are deposited. The fallacy of such views has been admirably exposed by my very learned friend, Dr. Fletcher, of Edinburgh, who, in speaking of these doctrines of secretion in general, thus apostrophizes in particular the M. Segalas of our text:—" M. Segalas goes even further than this, and condemns cow's milk in scrofula, not only because it contains albumen, but because cows, as shown by M. Huzard, are very liable to tubercular accretions ! By what process, or series of processes, these are to pass *en masse* out of the body of the cow with her milk, and again into the body of the drinker thereof, does not immediately appear." He then goes on to show how this doctrine might be further applied, and the folly of such application. " But granting that the secreting vessels are thus easily influenced with respect to the nature of the organized matters which they deposit, we need be at no loss at any time for a new pleura or peritoneum, a new nervous system, or a new set of muscles, as occasion may require ; since, without trying to manufacture them in a laboratory, as some persons have presumed that we shall in no long time be competent to do, they may easily be got by feeding on isinglass or carpenter's glue, on the white of eggs, or on the clot of the



blood of bulls or of goats. M. Bonhomme's suggestion of taking crude phosphate of lime in rickets, for the purpose of setting new bones, was a mere bagatelle to what may be done in this way." (See London Medical and Surgical Journal, Feb. 21, 1835.)

No wonder that M. Segalas "employed urea in diabetes, but without success!"—*Tr.*]

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### OIL OF THE EUPHORBIA LATYRIS.\*

The euphorbia latyris, or spurge, is an indigenous annual of the family of Euphorbiaceæ, and like all that family, contains an irritating juice. Its seeds have latterly been recommended as a substitute for ipecacuanha.

#### *Process for obtaining the Oil.*

When the seeds are very ripe they are to be dried, and the black ones separated, because they turn rancid; the oil is then obtained by simple pressure; fourteen ounces of the seeds give six ounces of very pure oil.

#### *Physical Properties of Spurge Oil.*

It very much resembles castor oil, and has even the same colour: it is not quite so dense, has no smell, is

\* *Giornale di Farmacia chimica*, 1824. Dr. Carlo Calderini has obtained an oil from the seeds of the *euphorbia latyris*, or *casaputia minor*, which may be used as a substitute for that of the *croton tiglium*. Its purgative qualities have, however, been long known. Gilibert mentions it as a violent drastic; and Perylhius says that an oven heated with this plant renders the bread baked in it purgative. Sangiorgo, in his *Histoire des Plantes médicamenteuses*, speaks of the plant in these terms: *Purgante vi infamis quod ad abigendum fætum adhibeatur. Præstat autem et hæc, et totâ gente abstinuisse cum causitæ sint, et nimis indomabiles.*



not acrid, and has no unpleasant taste : it is perfectly limpid.

By keeping, particularly in warm weather, it becomes turbid and rancid, and has then a pungent taste. It burns with a bright white flame, without smoke. It is insoluble in alcohol, even when highly rectified. With the alkalis it forms a soap.

#### *Action on the Animal System.*

The action of this oil is purgative, its effect certain and speedy. It may be considered, says the Italian author, as a very mild purgative : it causes no vomiting, no colic, no tenesmus : it may even be administered in dysentery, when the intestinal irritation is great, with as much benefit as tamarind-pulp.

Dr. Bally maintains that this oil induces vomiting almost as much as the croton oil.

#### *Cases in which it has been administered.*

It has been used as a purgative in quotidian gastric fever ; in dysentery, when the signs of enteric irritation were well marked, and sense of anxiety in the primæ viæ distressing ; in the anasarca that supervenes on intermittent fevers ; and, indeed, in all cases where slight purgation with a small dose of medicine is desirable.

#### *Mode of administration.*

The dose to adults varies from four to eight drops. Three drops mixed in chocolate have been given to children of two or three years of age.

In very excitable persons an excellent effect is produced by an emulsion composed with eight drops of the oil, and rendered palatable by some aromatic water and syrup of orange-peel.

The same dose may be administered in a glass of sugar and water.



[According to experiments made by M. Martin Solon at the Hôtel Beaujon, with the oil of euphorbia latyris, it appears : first, that the oil prepared by expression, by alcohol or ether, is of easy employment ; 2, that none of these preparations have any sensible operation on adults in the dose of 2 to 8 drops ; 3, that in the dose from 16 to 24 drops, the two first have decided emeto-cathartic properties, and the third one in the same dose is only purgative ; 4, in the dose of 2 scruples to a drachm, the emeto-cathartic effects become more decided in the two former oils, even sometimes to cause syncope ; the oil prepared by ether is equally purgative with that obtained by expression, purges somewhat more than the oil obtained by alcohol, and does not cause syncope, and must be raised to a drachm and a half in dose to produce vomiting also ; 5, that the maximum dose of any of them is 3 drachms ; 6, that they are applicable in jaundice, gastric disorders, lead colic, vermination, &c.—*Tr.*]

### THRIDACH,\* OR LACTUCARIUM.

The *lactucarium* of Dr. Duncan, and the thridach of Dr. François, are nothing more than the white, viscid juice of the garden lettuce, (*lactuca sativa hortensis*,) procured without the aid of heat at the flowering time of the plant. It has been employed in Britain for many years, and its properties are described in most of the British pharmacopœias and dispensatories.

#### *Physical and Chemical Properties.*

The juice in question, obtained by incision, is bitter, and soon concretes and turns brown ; it becomes hard and brittle like gum, but readily returns to a pasty

\* Οπίδαξ ; lettuce.



consistence if exposed to the open air. Preserved in a well-stopped bottle, it gives out a slight and transitory ammoniacal smell. Evaporated at a gentle heat, it retains the peculiar odour of the plant, and has a strong flavour.

When dried, it attracts the moisture of the atmosphere, being in this distinguished from the extract of lettuce prepared by the ordinary process with heat, which continues to be dry in the open air. Dissolved in distilled water and filtered, the solution is clear and brownish yellow. It reddens turnsol paper, and by ammonia yields a white flocculent precipitate, which appears to be in great part composed of phosphate of lime. Infusion of gall-nuts also makes a copious precipitate; the same is effected by the oxalate of ammonia, the nitrate of baryta and of silver, and by a large proportion of alcohol: chloruret of platina has no effect.

MM. Caventou and Boullay endeavoured to ascertain whether any principle analogous to morphia existed in lactucarium, but found none such.

#### *Mode of Preparation.*

In the Memoirs of the Caledonian Horticultural Society, Dr. Duncan has described the different modes of obtaining lettuce juice, by him called lactucarium. He recommends it to be collected on cotton, sponge, or brushes, as it flows from the stem of the plant. Mr. Probart, of London, has given a process for obtaining it in large quantities. He takes the stalk and young shoots at the flowering time and macerates them in water for twenty-four hours: he then boils them for two hours, and allows the decoction to pass through a sieve without any pressure: he then evaporates, as far as it can be done with safety, and pours the remainder of the concentrated decoction on plates. Mr. Probart calls this the concentrated extract of lettuce, and he says it has the same properties as the thridach, but requires to be given in larger doses.



M. Caventou prepares thridach by bruising the stalks of the plant at the flowering period, and pressing them to extract the juice, which is then evaporated to a due consistence at a temperature not exceeding  $30^{\circ}$  to  $35^{\circ}$ . This, of course, differs from the extract of Mr. Probart.

*Action on the Animal Economy.*

Dr. François says this medicine is a sedative, diminishing the circulation and the heat of the body—characters that distinguish it from opium.

He states that immediately after it is taken, a strange sensation, resembling cold, but not disagreeable, is felt at the stomach. The latter soon becomes accustomed to its action, and it is therefore necessary to increase the dose rapidly, to refrain from it for a day or two, and then return to the original dose, which, for an adult, is generally two grains. If this does not induce sleep, it causes perfect quietude and absence of restlessness: nor is it accompanied or followed by narcotism, constipation, suspension of several functions, itching, and other inconvenient attendants on opium and its preparations.

By accurate inspection Dr. François found that in individuals under the influence of lactucarium, the pulse was on an average reduced from 67 to 60 beats in the minute: in many the reduction was 10 or 12 beats in that period, and in a few instances much more. The medium diminution of temperature he found to be one degree of the centigrade thermometer, and in one or two instances as much as a degree and a half.

*Cases for the Administration of Thridach.*

In August, 1824, eleven patients were chosen from different wards of the Pitié, some of whom were affected with rheumatic attacks, others convalescent from acute disorders, and all afflicted with sleeplessness. Dr. François gave M. Caventou's extract to all of them,



and ten were benefited by it. From the 25th of September to the 24th of October, 36 patients from the same hospital were subjected to the effects of the same remedy. The cases were rheumatism, acute and chronic, quotidian fever, gastro-enteritis, organic affections of the stomach, chronic peritonitis, chronic irritation of the bladder, pulmonary consumption, hypertrophy of the heart, and abscesses in the arm; others were convalescents exhausted for want of sleep. They all derived decided and permanent benefit from the use of the thridach: pain was lulled and sleep procured. In none of these patients was the contracted pupil, so remarkable after the employment of opium, observed.

Dr. François also mentions that he has known individuals affected with nocturnal emissions, cured by the continued use of the thridach for six weeks or two months. The dose was 2, 4, 6, and 8 grains in 24 hours, divided into two, three, or four doses. I have frequently exceeded this dose without perceiving any disagreeable effect.

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### SALTS OF GOLD.

About the year 1810 M. Chrestien, of Montpellier, called the attention of the medical world to the preparations of gold, and published in his *Méthode Iatroleptique*, the formulæ of the salts he employed. Since that time several physicians have experimented with this remedy, and have not succeeded as M. Chrestien did; though, on the other hand, many have been equally happy in the results; so that the salts of gold may now be mentioned as efficacious remedies in syphilitic complaints. Nor can I conceive how M. Chrestien should have so far misunderstood my opinion, as to think that I held these medicines in no esteem.

Besides M. Chrestien, Dr. Legrand (*De l'or, de son emploi dans le traitement de la syphilis récente et invétérée, &c. &c.* Paris, 1828) has published a long se-



ries of observations, confirming the benefit to be derived in syphilitic and scrofulous disorders from auriferous salts.

Four preparations of gold are now principally employed in medicine, namely, the chloruret or muriate of gold, the chloruret or muriate of gold and soda, the oxide of gold, and the oxide formed by tin, or the *purple powder of Cassius*. Finely divided gold has also been employed.

*Mode of preparing the Chloruret or Muriate of Gold.*

Take one part of fine beaten gold, cut it into small pieces, and introduce it into a white glass phial: then pour upon it three parts of *aqua regia*, (composed of one part of nitric and two parts of hydrochloric acid,) and heat the whole in a very small sand bath. The solution of the gold is soon effected, and the liquor is then to be evaporated until the smell of chlorine is perceived; a thing easily ascertained, for at a certain stage of the process, nitric acid alone is disengaged, immediately after which commences the decomposition of a part of the chloruret that is formed. The containing vessel is then to be allowed to cool, when the chloruret soon passes to a crystalline mass of beautiful yellow needles. In this state the chloruret of gold is as pure as is requisite. Not containing an excess of hydrochloric acid, it is not deliquescent, for which reason it may be kept in a vessel stopped with paper only, without danger of its undergoing any change.

*Physical and Chemical Properties.*

Chloruret of gold is always very acid, but does not owe this property to any foreign acid. Its taste is styptic and exceedingly disagreeable. It is only deliquescent when it has an excess of hydrochloric acid. It dissolves easily in water, to which it communicates a fine yellow colour. It produces with animal and vegetable matters a purple violet hue, and stains the



epidermis. Exposed to a moderate heat, it passes to the state of proto-chloruret: with a stronger heat, and in a closed vessel, it gives out chlorine without water, leaving for residue nothing but metallic gold. As regards its composition, two parts of gold ought to furnish at least three parts of chloruret.

*Mode of preparing Chloruret of Gold and Sodium, or  
Muriate of Gold and Soda.*

Dr. Chrestien seldom uses the pure chloruret of gold in medicine, but combines it with chloruret of sodium, so as to form a double salt or muriate of gold and soda. We are indebted to MM. Figuier and Javal for all that is known concerning this double salt, either of soda or potass.

M. Figuier's mode of preparing the chloruret of gold and sodium is to dissolve four parts of gold in aqua regia, evaporate the solution to dryness, pour 32 parts of water on the product, and one part of chloruret of sodium, and concentrate the fluid to half its weight or 16 parts; on cooling, crystals are obtained composed of 69.3 chloruret of gold, 14.1 chloruret of sodium, and 16.6 water.

M. Javal has made similar observations on the chloruret of gold and potassium.

*Physical Properties of Chloruret of Gold and Sodium.*

These double salts have a beautiful yellow colour, and exhibit the form of quadrangular elongated prisms. They attract moisture, but less forcibly than the acid chloruret.

*Mode of preparing the Oxide of Gold.*

The oxide of gold used by M. Chrestien, is prepared by means of carbonate of potass. The following is a method which gives a more exact and more



economical product than the process of the Parisian Codex.

Introduce any quantity of chloruret of gold into a white glass phial, and pour upon it six or seven times its weight of boiling water, in order to dissolve the chloruret; then add gradually crystallized baryta until the liquor has lost its acidity, which may be ascertained by immersing a slip of blue turnsol paper in it, which will not change colour. Boil the liquor for a short time, and leave it to cool, in order to filter it: wash the precipitate several times with warm water; collect all the washings, and evaporate them nearly to dryness; let this saline mass cool, and dissolve it in water, by which means a fresh quantity of oxide is obtained, which may be added to the preceding. The evaporation may be repeated. These liquors contain only very small quantities of gold, which may be separated by common and well-known means; this, however, is scarcely necessary.

The oxide of gold remaining on the filter is then to be washed with boiling water until the washings no longer form a precipitate with nitrate of silver, upon which it is to be washed once or twice with water, acidulated with nitric acid; by this means the small portion of carbonate of baryta that may have formed during the process, will be withdrawn. A few washings with pure water are to be practised, and we are informed of their being free from baryta, by the absence of all precipitation, on the addition of sulphuric acid. Thus purified, the oxide of gold is to be dried in the manner previously described.

By this process, which was perfectly successful in M. Caventou's hands, a quantity of chloruret of gold, containing three grammes of the metal, yielded at least three grammes of oxide. Not more than half this quantity is obtained when subcarbonate of potass is used, because the chloruret of potassium that is formed, and the excess of alkali, retain a great quantity of oxide of gold in solution, as was the case in MM. Pelletier and Javal's experiments.



*Properties of Oxide of Gold.*

The oxide of gold in the state of hydrate is yellow, but dry it is violet approaching to black. Whatever precautions have been used in the drying of it, it is never altogether soluble in hydrochloric acid: a residue is always left, which is small indeed, and formed in consequence of a portion of oxide passing to the metallic state during the process of drying.

Sulphuric and nitric acids, dilute or concentrated, exert no action on the oxide of gold. This property may serve to isolate it from other oxides of the same colour, that have been intentionally mixed with it, such as the oxide of copper, the deutoxide of iron, &c.

*Preparation of Oxide of Gold, by Tin; or the Purple Powder of Cassius.*

Dissolve chloruret of gold in 16 times its weight of cold distilled water: prepare a weak solution of protohydro-chlorate of tin acidulated with hydrochloric acid. Add the latter solution of the former, by small portions, until no more precipitate forms. Filter the liquor, and wash the precipitate with boiling water, until the washings yield no deposit on the addition of nitrate of silver. The precipitate dried at the temperature of boiling water, is the purple powder of Cassius, which appears to be a combination of deutoxide of tin and metallic gold.

*Action of the Salts of Gold on the Animal System.*

According to M. Orfila, three-quarters of a grain of muriate of gold, dissolved in a drachm of distilled water, and introduced into the jugular vein of a large strong dog, produced difficult and stertorous respiration, suffocative symptoms, and slight vomiting, all which grew worse, until they ended in death. In another ex-



periment, half a grain of the deuto-muriate dissolved in two drachms and a half of distilled water was injected into the jugular vein of a small dog: the symptoms here supervened with frightful rapidity, and in four minutes the animal was dead. The third experiment was on a strong dog, and two grains of the salt were dissolved in a drachm and a half of distilled water: in this instance the animal died in three minutes.

On opening the bodies of these animals the poison was found to have more particularly acted on the respiratory and circulating organs, and eminently on the blood itself. The lungs were livid, gorged with blood, did not crepitate, were wrinkled, of an unnatural colour, and scarcely floated on water. The heart was violet-coloured, the left cavities being filled with black blood, the right ventricle contracted. So rapid had been the action of the salt on the blood, that on opening the crural artery, a few moments after death, a reddish-brown blood quickly becoming black, flowed from it. The mucous membrane of the alimentary canal was not affected.

M. Orfila has also introduced chloruret of gold directly into the stomach of several animals, in order to ascertain its immediate effects on that organ. By an opening made in the œsophagus three grains of chloruret were introduced into the stomach of a small dog; the animal languished for two days, and perished on the third. Another dog was made to swallow a solution of ten grains of muriate of gold in an ounce of distilled water; the animal vomited thrice, and foamed at the mouth: two days after he was able to eat; on the fourth day he refused food, and died on the night of the seventh. In the first animal the mucous membrane of the stomach was found to be inflamed red, and ulcerated: in the second it was also ulcerated, and in a state of suppuration. In both animals the muriate had acted in a manner resembling that of corrosive substances.

M. Chrestien states, that the muriate of gold is much more active than corrosive sublimate, but does



not irritate the gums to the same extent: given in the dose of a tenth of a grain per diem, it occasioned in one instance a smart fever. The frequency of the pulse is considerably increased, and a general excitation prevails. This excitation, which he deems essential to the success of the remedy, if properly managed, never involves any palpable disturbance of the functions. The mouth, tongue, appetite, and stools continue to be natural: the urine and transpiration are generally increased. If the dose be pushed too far, however, there is risk of producing a general erythism, and inflammation of some organ. The fever caused by this is accompanied with an unusual and unvarying heat of the skin.

M. Cullerier has seen patients that were unable to bear the muriate of gold in any manner. In these instances he finds it produce gastric irritation, redness of the throat, dryness of the tongue, colicky pains, and purging.

According to the same authority, the general effects of hydrochlorate of gold and soda are, a sense of internal heat, head-ache, dryness of the mouth and throat, anxiety, gastric irritation, constipation, or else diarrhoea, and acceleration of the circulation. I was once consulted by a patient, to whom muriate of gold had been imprudently administered, though he had only taken the tenth of a grain in a cup of milk for eight consecutive days. At the end of that time he was seized with a most intense gastritis, accompanied with numerous nervous symptoms, such as cramps and acute pains in the limbs, tremors, and sleeplessness. This irritation allayed, there still remained extreme heat of the skin, want of sleep, and fatiguing erections. Notwithstanding a most severe diet, this state of excitement was continued for three years, and the patient was unable to take wine even when considerably diluted.



*Cases for the Employment of the Preparations of Gold.*

The preparations of gold had been used in medicine previous to the date of M. Chrestien's use of them: they had even been recommended in the treatment of syphilitic affections, by Gabriel Fallopi, so far back as the sixteenth century. But besides disorders of that character, M. Chrestien says, that he has used the remedies in question with success in the majority of the diseases of the lymphatic system, in scrofula, goitre, different herpetic disorders, scirrhus, and even tubercular phthisis. Lalouette, in his *Traité des Scrophules*, also strongly advises the employment of the salts of gold. Many physicians who have repeated M. Chrestien's experiments have failed to obtain such successful results; though others, as Gozzi, Niel, Destouches, Risuens, &c. have found them effectual. M. Duportal has also related two cases of cure effected by this means; one of an ulcer of the face resembling cancer, and that had resisted the more ordinary remedies. (Ann. de Physique et de Chimie, t. 78.)

M. Cullerier did not consider muriate of gold as a specific in syphilis, though he cured many cases with it. His nephew has administered the muriate of gold and soda to a certain number of the patients of the Hôpital des Vénériens: the age, sex, and constitution of these patients were various, as were also the symptoms treated, being those of recent syphilis, ulcers, buboes, pustules, excrescences; or of ancient date, as ulcerated throat, palate, nose, &c., exostoses, and periostoses, cutaneous pustules, and pains of the bones.

In the first cases of the first series the effects of the salts were equally rapid with those of mercury; in others the benefits were less palpable; and in some instances no advantage whatever was obtained, in which case mercury became necessary.

In the secondary disease he obtained the same quantum of success; the symptoms were ameliorated in one or two cases: only one was entirely cured, and in others it was administered in vain.



*Mode of Administration.*

M. Chrestien has united the compounds of gold with soluble extracts of plants ; with sugar, to form lozenges ; with syrups and with cerates, to be rubbed into the soles of the feet. MM. Duportal and Pelletier disapprove of these mixtures, inasmuch as the vegetable and animal matters, dissolved or not, decompose the acid solution of gold and reduce it to the metallic state. So likewise M. Proust states that there are few vegetable juices, acids, gums, sugars, or extracts, which do not possess the property of deoxidising gold : these substances should therefore be avoided. The best mode of using the salts of gold is that of friction on the gums ; and of the salts, the hydrochlorate of gold and soda is to be preferred. It has been employed at the Hôpital des Vénériens in powder, reduced by fifteen, twelve, ten, eight, and even four times its weight of some vehicle. Starch or lycopodium powder washed with alcohol, appears to preserve the auriferous salts the best. With other powders, as liquorice, marshmallow, &c. their decomposition is certain to take place more or less speedily.

*Frictions with the Muriate of Gold and Soda.*

M. Chrestien recommends the following formula :—

Crystallized muriate of gold and soda . . .	1 grain.
Powder of iris root washed with alcohol, to withdraw its soluble parts . . . . .	2 grains.

Lycopodium powder is generally preferable to that of iris.

Divide the first grain into 15 parts, and then into 14, and so on gradually until an eighth is the strength of each powder. One of these is to be rubbed into the tongue or gums once a day : it is rarely necessary to employ more than 4 grains thus divided for the cure



of primitive venereal symptoms, as chancres, buboes, &c. : even three are often sufficient.

M. Girardot, of Warsaw, says that he has cured military men without any interruption on their part of their duties. He maintains, that 30 to 40 grains of the salt is required in cold climates to produce benefit. On the other hand, in a very hot latitude, as that of the Mauritius, large doses are tolerated and are requisite. M. Chrestien observes, that in Poland and the Mauritius 30 grains do no more than 5 or 6 at Montpellier. In these large doses an eighth of a grain is the commencing dose, and is rapidly increased to half a grain at each friction. Such doses are more particularly requisite when syphilis is complicated with scrofula : in such case, even in France, they may be carried beyond 4 grains.

### *Pills of the Oxide of Gold.*

Extract of the bark of mezereon root . . 2 drachms.  
Oxide of gold by potass . . . . 6 grains.

Mix carefully, and divide into 60 pills. The six grains of oxide may be replaced by one grain of the triple muriate.

M. Chrestien recommends these pills in scrofula and lymphatic congestions. He commences with one per diem, and gradually rises to eight.

Should the state of the tongue and mouth prevent frictions on them, Dr. Niel advises another mode of application. A small blistered surface is established on the side of the throat, and is dressed morning and evening with an ointment, composed of a grain of lard and a grain of gold divided by mercury. At the same time, a grain of the oxide of gold is given internally in the course of the day. After a week, half a grain of the divided gold and of the oxide are added to the doses. In a fortnight the divided gold is replaced by an ointment, containing the tenth of a grain of muriate of gold and soda, which may be increased as far as the



sixth of a grain. During this period the internal treatment with gold is still continued.

Should the irritation from friction with the muriate of gold on the tongue be excessive, the following cerate may be applied to blistered surfaces on each side of the neck:—

Gold divided with mercury . . . . .	1 drachm.
Lard . . . . .	1 ounce.

And when the blisters are becoming dry, for this oxide may be substituted an ointment composed of 10 grains of muriate of gold and soda and half an ounce of lard. In the course of four months such treatment seldom fails to be eminently successful in secondary syphilis.

Dr. Simoneau, of Florence, attended a patient who, at the same time that he had a seton in the back part of the neck, was afflicted with deep syphilitic ulcers of the mouth. Dr. S. immediately commenced to dress the seton with muriate of gold and soda, with the best effects upon the ulcerations.

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## SALTS OF PLATINA.

The processes for obtaining the salts of platina are precisely the same as those employed for the salts of gold. The elder Cullerier made some experiments with the hydrochlorate of platina and soda: the results resembled those consequent on the hydrochlorate of gold and soda.

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## GRENADIA, AND BARK OF THE POMEGRANATE ROOT.

The decoction of the bark of pomegranate root has been much lauded and employed in the treatment of



tape-worm, ever since M. Merat published in France the treatise of M. Gomes on the subject. (Journ. Complémentaire, t. 16.) In that memoir sixteen cases are related, in which the decoction was eminently successful in expelling teniæ. Subsequent facts have established the usefulness of the remedy.

Among the French physicians M. Bourgeoise has published several facts on the subject in the *Bibliothèque Médicale* for 1824. His successful cases amount to thirty-four in number: he never administered the decoction until the patients had passed some portions of tenia or some cucurbitenæ, and was always most careful in the choice of the article to be used—a precaution on which he lays particular stress; the bark taken from a graft ought never to be employed, being always bad.

*Chemical Composition of the Bark of Pomegranate Root.*

M. Latour, of Troyes, has given the best analysis of this bark. He finds it to contain wax, chlorophylle, resin, gallic acid, tannin, a crystalline matter (*grenadia*), fatty matter.

*Grenadia.*

This substance is procured in silky amianthine crystals of pure white. It burns without residue, and gives no ammoniacal products; it is fusible, and with care sublimes. Grenadia is neither alkaline nor acid; is very slightly soluble in cold and easily so in boiling alcohol: is insoluble in ether, but soluble in water to any extent. Nitric acid transforms it to oxalic.

Grenadia is exceedingly sweet, but differs from saccharine matter by not fermenting, by its volatility, and mode of crystallization. M. Latour makes it consist of

Carbon . . . . .	38.16
Hydrogen . . . . .	6.86
Oxygen . . . . .	53.85
Azote . . . . .	1.13



M. Couerbe, however, denies that it contains any azote.

The preparation of grenadia is effected by exhausting the bark by ether and boiling alcohol successively, and thus forming a soft extract, on treating which with water the grenadia is easily dissolved and purified by repeated crystallization from alcohol.

*Mode of administering the Bark.*

The evening before the decoction is to be taken it is usual to give an ounce and a half or two ounces of castor oil with an equal quantity of syrup of lemons; spare diet and diluents are also premised until the following decoction is administered.

Recent or dried bark of the root of the	
<i>punica granatum</i> , bruised . . . . .	2 ounces.
Water . . . . .	2 pounds.

Macerate in the cold for twenty-four hours; then boil by a slow fire until it is reduced to one pound, and strain.

This quantity of decoction is to be taken in three doses, one of which is given every half or three quarters of an hour.

For the most part in an hour, at latest in two hours after the third dose the whole worm is passed, twisted upon itself, and firmly knotted in many points.

Sometimes the two first doses are rejected by vomiting, but the third must nevertheless be persevered in. It has been affirmed, that such doses of the bark are apt to produce serious consequences, but M. Bourgeoise never saw anything to induce him to lessen the quantity; indeed, he has given much larger doses. If the whole tenia has not been ejected, it will be necessary to continue the vermifuge decoction for several days in the same manner.



I am not aware that grenadia has yet been tried medicinally.

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### FATTY PRINCIPLE OF THE BUDS OF THE MALE FERN. (ASPIDIUM FILIX MAS.)

M. Peschier, apothecary of Geneva, and brother of the physician of the same name, read a paper to the Helvetic Society of the Natural Sciences, on the fatty principle of the buds of the male fern. He obtains it by digesting the buds in ether. (See *Bibliothèque Universelle*, t. 30.) Dr. Peschier says, that he has employed this ethereal tincture against tenia with uniform success. This preparation has an oily consistence, and is given in the form of pills in combination with some extract; each of these pills should contain a drop of the fatty matter. Eight of them are sometimes sufficient, but in other cases it has been found necessary to augment the dose to 30 drops divided into small doses; such a quantity, however, should be extended over several days. Dr. Peschier asserts, that this medicine thus administered does not fatigue the patients, and that it destroys the worm, which may be brought away by any mild purgative.

I have made use of this oil for some years, and have found it most effectual in expelling tenia: the dose should be very gradually increased, lest exhausting purging should ensue.

M. Caventou digested the root of the fern with sulphuric ether, and obtained by spontaneous evaporation a fatty viscid matter, of a brown colour, sickly odour, and acrid taste. A scruple of this matter in emulsion with milk of almonds and a little gum produced no vermifuge effects. I should, however, recommend further trials of it.



## PHOSPHORUS.

The internal and local applications of phosphorus in medicine occupied M. Sedillot's attention for many years. In the second volume of the *Littérature Médicale Etrangère*, which he published in 1799, and in the *Journal Général de Médecine*, the first sixty volumes of which he edited, as many memoirs on this remedy may be found as would give its complete history. Of these the following is a brief summary.

Sedillot's first notions on the subject were obtained from a thesis in Haller's collection, entitled, *De Phosphori loco medicamenti, aliquot casibus singularibus conformatâ, Auctore J. G. Mentz, 1751*. Previous to this date very little is stated by authors concerning phosphorus. The first case quoted by Mentz was one in which, after a malignant petechial fever, an obstinate diarrhœa, with intense anxiety of the præcordia, delirium, and general prostration of the powers, had supervened. Two grains of phosphorus made into a bolus with confection of opium, were administered, and immediately produced quietude, sleep, and gentle perspiration. At night and the following morning an addition of one grain was made to the dose. The transpiration was then copious, and had a sulphurous smell; and in a short time all the functions were re-established. The second case was one of extreme prostration after bilious fever. In this six grains of phosphorus in conserve of roses were given in two doses in the course of the day. An entire night's sleep and an abundant perspiration worked a cure. In the third case there was delirium and general debility, consequent on a malignant catarrhal fever: the same doses, as in the last case, produced similar effects.

Morgenstern, (*Schulzii Prælect. in dispensat. Brandenb.* 1753,) and Hatman, (*Dissert. sistens spicileg. ad phosphor. urinæ usum internum pertinens,*) have also lauded this powerful remedy.



In an inaugural dissertation at Göttingen in 1791, Wolf records twelve cases, extracted from his father's journal, on the use of phosphorus. The results were almost wonderful. According to him the dose is as much as 2 or 3 grains, dissolved in a few drops of ether; but it will be afterwards shown that there is some error here regarding the dose.

In the London Medical Review for 1799, cases are related which show that phosphorus is one of the most potent of the alexiteric and alexipharmic remedies, and that it has been employed with success in instances where vital action was nearly extinguished; but that too much caution cannot be had in its administration.

In the Bibliothèque Britannique, Conradi, a physician at Northeim, is stated to have used phosphorus in the after-stages of malignant fevers, when the symptoms betokened the near approach of death. In seven such cases, in which it was used, four were happily cured; and though in three others the patients did not recover, they, nevertheless, were considerably relieved by the remedy.

Mandel mentions the efficacy of phosphorus in atonic epilepsy; but the cases he cites are not conclusive.

Hufeland has observed the good effects of phosphorus in a case of obstinate gout with concretions, in which the medicine caused profuse sweats; in a case of slow poisoning by lead and arsenic; and in one of marasmus which threatened the life of the patient.

Amid all this successful practice Weickard has recorded cases and experiments that should warn practitioners against the rash administration of this remedy. He cites three instances of death caused by its employment, both internally, in large doses of 3, 4, 5, and 6 grains, and externally in frictions, combined with some fatty substance. On inspection after death gangrenous patches were seen in the stomach. The same was observed in a dog that had been made the subject of some experiments.

In the first volume of the *Memoirs of the Société Médicale d'Emulation*, Alphonse Leroy relates an ex-



periment on himself, which had nearly proved fatal. Having seen that the Germans gave as much as 12 grains in the course of the day, he took three grains mixed with confection of opium. He repented of the act when he recollected that there is sufficient air in the stomach to produce inflammation of such a substance as phosphorus, and thus cause a perforation of that organ. For two hours he was in a critical situation, and took repeated quantities of very cold water, until the uneasiness passed off. His urine became very red. On the following morning his muscular power was doubled, and he experienced a most intolerable venereal irritation. This last phenomenon was exhibited as follows, in the laboratory of Bertrand Pelletier. A drake and several ducks having drank from a basin containing a solution of phosphorus and copper, died; but the male bird had such an irresistible propensity to tread the females, that he died the first. For the rest, M. Leroy has been very successful with this remedy, and considers it one of the most powerful in medicine. Other French practitioners have also employed and testified to the remarkable effects of phosphorus.

In 1802 the father of M. Gaultier de Claubry published four cases, illustrative of the beneficial effects of phosphorized ether in paralysis and atony, with infiltration. And Mr. Gumprecht has inserted in the London Medical Repository for 1815, two instances of the efficacy of phosphorus in paralysis.

In that year also appeared the work of Daniel Lobstein, the aim of which was to point out the diseases in which phosphorus and its various preparations might be used, and to fix the doses and best mode of administering them. After some chemical disquisitions on phosphorus, he cites cases of his own, and from other authors. Though a man of great information and sense, he nevertheless appears to incline to the marvellous; for according to him, the remedy would seem to have effected actual resurrections. He states that the diseases in which it has been administered with the



greatest success, are ataxic and adynamic fevers, (nervous and typhoid,) obstinate intermittents, rheumatic and gouty affections, amenorrhœa, chlorosis, &c.

M. Lobstein has long seen great benefit arise from the internal use of phosphoric acid in the dose of 20 or 30 drops in a glass of sugared water, taken every three hours, in pulmonary consumption, provided no inflammatory complication was present. A draught of milk should be taken after each dose.

The recent discoveries of M. Couerbe of the presence of phosphorus in the brain matter, adds to the therapeutical interest that may be attached to this medicine.\*

Dr. Hacke, of Stralsund, has employed this medicine in a case of ulcerated womb; the quantity and fetid odour of the discharge were both very shortly checked.

Bertrand Pelletier relates the case of a man who had been immoderately given to venery, and had all the symptoms of dorsal phthisis, being exhausted to the last degree. He was treated with a mixture composed of phosphoric acid and honey, and in a very short time recovered his strength and plunged into his former course. Alphonse Leroy has known individuals who were in the habit of using, from time to time, a lemonade composed of phosphoric acid, sugar, and orange-flower water, which they considered as a means of preserving their health and strength, and even of prolonging their lives. He often gave this lemonade in malignant fevers, and preferred it to the sulphuric lemonade.

M. Sedillot has seen astonishingly rapid cures of the worst scrofula, with caries, effected by phosphoric acid. In atonic palsy, debility, and chronic rheumatism, oc-

\* I do not see the *sequitur* in this sentence: physiological considerations may, however, render it very clear to M. Magendie. M. Couerbe's discovery was that the brains of intellectual men contain more phosphorus than those of idiots. Surely it cannot be meant that individuals may be made more intelligent by the ingestion of phosphorus! See my annotations after the article 'Urea.'—Tr.



curing in weakly habits, he has always seen benefit derived from frictions with phosphorized ointment, repeated each night and morning. Care must be taken, however, even in such cases, not to extend its administration too far, for in the contrary event a general painful, and often intractable erythism is apt to be suddenly excited.

*Preparation of Phosphorus, and manner of employing it.*

No preparation of phosphorus in a solid form can be trusted; for either there is an entire combustion, and then the effect is uncertain, or the combustion is incomplete, and then the doses cannot be calculated upon; or, lastly, combustion does not take place at all, and then the remedy becomes dangerous. Under this category may be placed all the English and German preparations, which hold the phosphorus suspended in linctus, emulsions, confections, the luminous pills of Kunckel, the phosphorized powder of Leroy, &c.

Bertrand Pelletier, astonished that Conradi should be able to dissolve as much as four grains of phosphorus in a drachm of ether, while Hufeland was unable to get more than eight grains dissolved in an ounce of the same fluid, made repeated trials, which ended by obtaining the same results as Hufeland; but in order that there should be some uniformity in the quantities in solution, and to be administered, he reduced to six grains the proportion of phosphorus contained in each ounce of ether.

His process consists in placing six grains of phosphorus, cut into small pieces, into an ounce of sulphuric ether, rectified to 65° of Cartier's aërometer, and occasionally shaking the mixture for three or four days.

The dose of this preparation is 10 or 15 drops in a glass, in some mild drink or in a mixture, so given, as that the whole quantity taken in the space of three or four days, shall be from 120 to 150 drops: this is generally sufficient to effect a cure.



This fluid may also be used for frictions when these are considered necessary.

M. Lobstein adds the essential oil of cloves to M. Pelletier's preparation; but Sedillot remarks that this, whether with or without addition, is not preferable, for the phosphorus in it is still luminous. The same may be said of a solution of phosphorus in any essential oil.

On this point M. J. Pelletier thus expresses himself (*Journ. Gén. de Méd.* T. 59.) "All the phosphorized preparations in which the phosphorus is not in a complete state of division, are dangerous. Among such may be classed the preparations in which the phosphorus is only dissolved in a volatile substance, such as ether and the essential oils, inasmuch as in these instances, the exposure to air and heat, by volatilizing the solvent, sets the phosphorus at liberty, which is then liable to inflame by any degree of heat or friction. But the fatty and fixed oils are not liable to this objection, and this for the contrary reason: moreover, should they be absorbed the phosphorus is absorbed with them, being in a state of actual solution. I am not aware of Lescot's method for dividing or dissolving phosphorus; I only know, as Morelot says, that he makes use of a compound of hydrogen, oxygen, and carbon, not to say a non-azotized animal or vegetable substance. Meantime, I doubt not the excellence of the plan, and only desire that it should be published."

M. Sedillot communicated Lescot's plan to me some years ago, having previously disclosed it to his son, resident at Dijon, and to M. Caventou; it is as follows:

*Scented Phosphorized Oil.*

Phosphorus . . . . .	1 ounce.
Olive, or sweet almond oil . . . . .	1 pound.

Cut the phosphorus into very small pieces, introduce them into a well-stopped bottle and add the oil. Leave them together for a fortnight at the ordinary temperature in a dark place; then decant and scent it



with oil of bergamot. Keep it for use in a bottle with a ground glass stopper, and in the dark. It is, I think, advisable not to prepare so much at once.

Twenty-five or thirty drops of this oil may be given internally every twenty-four hours, in mixtures, emulsions, or mucilaginous drinks, for four or five days consecutively.

For external use an ointment may be made by adding a fit proportion of the above to refined lard, and this may be used in friction, morning and evening, from four to ten days together. This ointment not unfrequently becomes luminous during the friction unless it be used in the dark.

I have entered into these details because the imprudent and indiscriminate use of phosphorus is likely to lead to the most serious if not fatal consequences.

#### *On the Employment of Phosphoric Acid.*

Phosphoric acid has also been the subject of many observations and experiments. Dr. Lentin read to the Royal Society of Göttingen, a memoir, *De acido phosphori cariei ossium domitore*, in which he observes, that as phosphoric acid is the essential constituent of bone, existing in it as long as it is solid, and in the residuum, when it undergoes decomposition, it might be usefully employed in caries of the bones. For this purpose he applies compresses moistened with the acid diluted with eight parts of distilled water, over ulcers under which the bone was carious. He resumed this dressing twice a day, and when the ulcer ceased to be fetid he used injections of it, and covered the whole with a pledget steeped in myrrh and mastic. The effects of this treatment were, that the ulcers lost their bad odour, the ichorous sanies gradually changed into the character of good pus, and the exfoliation of the portions of carious bone was rendered easy.

[In the epidemic cholera some instances occurred in which phosphorus was employed with occasional success. These instances I cannot at present refer to



in the Journals where they were published; but I remember perfectly to have seen such in several German periodicals, and one or two in our English Journals. Thus, in the 10th Volume of the Medical Gazette, Mr. Barry states, that in one case of Asiatic cholera, he had practical evidence of the good result from a careful use of phosphorus. In the space of four hours he gave one grain of the medicine in divided doses of a quarter of a grain each. He does not, however, state that his patient recovered. He further on adds that, as its action is principally exerted on the urinary organs, and in renewing in an extraordinary degree impaired nervous power, it would be well that it should have a regulated and steady trial. The method of preparing it by Mr. Barry is, to shake a piece of phosphorus in a phial of warm water, by which it is, like oil, separated into minute globules, which, on the addition of cold water, become solid: these globules are then to be reduced to powder with white sugar. Treacle will be a convenient vehicle for its exhibition. The withdrawal from air and light recommended by M. Magendie, is, however, absolutely necessary, in whatever form it may be kept or administered.—*Tr.*]

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#### BI-CARBONATES OF SODA AND POTASS.

There is no doubt that the gastric fluid poured from the surface of the stomach during digestion, is of an acid nature. The experiments of Prout, Childers, Prevost and Leroyer, Tiedemann and Gmelin, go to prove that this acidity is owing to the presence of hydrochloric acid. Moreover, Prevost and Leroyer, Tiedemann and Gmelin, Leuret and Lassaigne, ascertained that the presence of soda in the other fluids, that assist in digestion, saturated the free acid, and that this saturation was essential to the complete



solution of the food. M. Darcet, (*Sur la préparation et l'usage des pastilles digestives contenant du bi-carbonate de soude. Ann. de Chim. et de Phys. 1828,*) showed by experiments on himself, that the bi-carbonate of soda in small doses, rendered digestion more easy; and in another memoir he showed that the beneficial properties possessed by the waters of Vichy in promoting the flow of urine and other secretions, in difficult digestion, chronic affections of the stomach, calculous disorders, &c. were owing to the bi-carbonate of soda, of which it contains more than of other salts. For the same purposes soda in an effervescing state, or soda water, is advantageously employed. Mascagni is said to have long ago recommended the bi-carbonate of potass in the treatment of calculous affections; and Dr. Farnesi endeavoured to call attention to the fact, in a paper read to the Lombardo-Venetian Institute in 1813. Previous to M. Darcet's Memoir, however, these alkaline salts were but little employed.

*Mode of preparing Alkaline Lozenges.*

Place powdered bi-carbonate of soda and sugar in a well-dried bottle: shake the bottle in order to mix them thoroughly; then take a portion of the powder and mix it well on a marble slab with mucilage of gum tragacanth and oil of mint; the mass thus obtained is to be divided into lozenges, which, when dried on a stone or in the open air, should each weigh about one gramme.

*Darcet's Formula.*

Dry and finely powdered bi-carbonate of soda	. . . 5 grammes.
Finely powdered white sugar	. . . . . 95 "
Mucilage of gum tragacanth prepared with water	. . . q. s.
Essential oil of mint	. . . . . 2 or 3 drops.

As these lozenges attract slightly the moisture of the atmosphere, they should be kept in a well-stopped bottle, or in a very dry locality. Any other essential oil may be used in place of the mint: balsam of Tolu is well adapted for this purpose.



*Medicinal Use of Alkaline Lozenges.*

Each lozenge weighing a gramme, contains about a grain and a half of the bi-carbonate. M. Darcet, speaking from his own experience, says that three of them are sufficient to amend a peccant digestion, and that for that purpose they are more efficacious than the waters of Vichy. He regards the action of the soda as purely chemical, the latter saturating the excess of acid in the primæ viæ. The lozenges should be taken immediately on finding the stomach disordered; if taken before a meal the digestion will be considerably facilitated. For this last reason they should be given to gouty and calculous subjects before their meals. But in cases of gravel, and even of gout with chalk-stones, together with the lozenges, alkaline, gaseous waters, as of Vichy and others, should be recommended. Such waters may be replaced by half a drachm to two drachms of bi-carbonate of soda; at the same time a vegetable diet containing no azotized food should be enjoined.

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DIGITALINE.

M. Auguste Leroyer, of Geneva, has communicated some observations on the active principle of the *digitalis purpurea*, which he succeeded in isolating, and with which he made several experiments on animals. I shall announce the results of M. Leroyer's researches, in order that other experiments may be made to ascertain whether it is possible to extract from the foxglove an active principle that shall be unvaried in character—a consummation of some importance in medicine.

*Mode of Preparation.*

M. Leroyer takes one pound of common fox-glove, and first treats it with cold ether, and then with the



same fluid heated in a close stove, in order that the temperature may be raised to a considerable degree. The tinctures obtained in this manner were, after being filtered, of a greenish yellow colour and bitter taste; the residue from their evaporation has a resinous appearance, is intolerably bitter, and causes a sensation of numbness of the tongue like that produced by chewing aconite. This residue being taken up by water divided into two parts, one in solution, the other a precipitate having the characters of chlorophyll, the solution in question reddened turnsol paper. Hydrate of the protoxide of lead was then added to neutralize the free acid thus indicated. The salt of lead thus formed was soluble, and could not therefore be separated from the bitter principle; nor were several earths that were tried more efficient for the purpose; another plan was therefore had recourse to. After evaporating to dryness the portion treated with lead, it was again dissolved in highly rectified ether, by which process the bitter principle of digitalis disengaged from those matters with which it was united, is obtained. By evaporation the solution yields a brown heavy substance, that restores, though slowly, the blue of reddened turnsol paper. This character as well as its bitterness, approaches it to the alkalis, though on the other hand its extreme deliquescence separates it from them. This deliquescence prevents its distinct and permanent crystallization; M. Leroyer, however, thinks that it does crystallize regularly when in favourable circumstances. Dr. Prevost placed a drop of the alcoholic solution of digitaline on a piece of glass and cautiously evaporated it by means of a spirit-of-wine lamp; with a microscope of a magnifying power of 200, he then saw numerous and well defined crystals of various forms. He further states that the basic form of them all appeared to be a straight prism with rhomboidal base.

It is clear, however, that M. Leroyer has not hitherto obtained the pure principle; further inquiries are therefore requisite.



*Action of Digitaline on the Animal System.*

M. Leroyer made the following experiments.—He dissolved a grain of digitaline in the abdomen of a middle-sized rabbit, and in a few minutes observed the respiration become slower, the pulse, which had previously been rapid, fell to 60, and was regular; all the vital phenomena were gradually extinguished, and the animal died without agitation or agony, as if passing into sleep.

Half a grain of digitaline dissolved in two drachms of warm water, was injected into the vein of a cat: the animal died in a quarter of an hour, with the same symptoms as those above-mentioned. During the last few minutes of life, the respiration fell to six or eight, and the pulse, from being feeble and irregular, disappeared altogether.

A middle-sized dog was killed in fifty minutes by the injection into the jugular vein of half an ounce of water, holding a grain and a half of digitaline in solution.

The arterial blood of animals killed by digitaline, was of a decided venous colour, and had a very feeble tendency to coagulate; examined with the microscope, the red globules, particularly in the blood of the cat, appeared to have lost somewhat of their usual figure, but were not decomposed. Other observations have been made on small animals, from the moment of administering the poison to that of death. As they approached the latter event, the blood appeared more and more inclined to remain fluid, but the globules in nowise altered in form. It would appear that the deleterious principle, being in solution in the blood, acts directly on the nervous system.

Nevertheless, an attentive examination of the brain and its appendages, have not enabled MM. Leroyer and Prevost to discover on what particular parts the digitaline acts. The cerebral sinusses were gorged



with blood, but the cerebral substance itself did not appear to have suffered any change.

It is desirable that the chemical and physiological experiments of M. Leroyer on this substance should be repeated.

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### SALICINE.

Willow-bark having been frequently employed against intermittent fevers, M. Leroux, a pharmacist of Vitry-le-Français, succeeded in extracting from it a substance in which probably reside its febrifuge properties. He obtained it by the following process:—

Boil three pounds of the willow-bark (*salix helix*,) in 15 pounds of water, holding four ounces of subcarbonate of potass in solution; strain and add to the cold decoction two pounds of fluid subacetate of lead; filter, add sulphuric acid and precipitate the whole lead by sulphuretted hydrogen gas; saturate the excess of acid by chalk; filter again, evaporate and neutralize it by diluted sulphuric acid; withdraw the colouring matter by charcoal, and filter it hot: crystallize twice if the salt is coloured after the first crystallization, and dry in the shade. This process gives about an ounce of salicine. M. Leroux obtains five per cent. of the weight of the bark. It exists in the bark of many species of *salix*, as the common willow, *Salix monandra*, *S. incana*, *S. fissa*, &c.

Salicine thus obtained is in small, silky groups of pearly-white crystals, is exceedingly soluble in water and alcohol, insoluble in ether, is extremely bitter, and smells like willow-bark.

MM. Leroux and Gay-Lussac ascertained that salicine is not a vegetable alkali, for though very soluble in water it has no alkaline reaction, has little, if any, neutralizing power, and moreover contains no azote,



whereas azote is largely developed in vegetable alkaline bases.

*Medicinal Properties of Salicine.*

It is a powerful febrifuge, as I have verified, in numerous cases of intermittent fevers, and other periodical affections, at the Hôtel Dieu. I have frequently found it succeed when the sulphate of quinia has failed, and *vice versâ*.

*Mode of administering Salicine.*—I most generally give twelve grains in twenty-four hours, and rarely exceed this, though it may be done without any inconvenience; having lately had the proof in a case where I gave from twenty-four to thirty grains. This, however, will very seldom be expedient.

[The first chemists who analyzed the bark of the willow, discovered in it no alkaline principle similar to quinia, or cinchonia, and it gradually fell into disrepute. Fontana, however, maintained the existence of a certain febrifuge principle, to which he gave the name of salicine. His opinion has since been corroborated by Buchner, Rigatelli, and, as seen in the text, by Leroux, who was the first to employ it in France. Numerous trials were made of it in various quarters, and its praises were sounded in no ordinary tone. Some trials, however, made at La Charité, by M. Pelletier, showed that salicine, though very bitter, seemed to be far less active than the principle of the cinchonas.]

Dr. Richelot (Archives Générales de Médecine, September, 1833,) mentions the trials made by many of its supporters, the results of which appear to be altogether negative, while other experiments tended to show that it was possessed of no obvious febrifuge power. The doses given in these experiments varied from six to twenty-four grains. With the view of settling the question, M. Andral instituted several experiments, the particulars of which are recorded in M. Richelot's memoir. Ten patients of different sexes,



whose ages varied from seventeen to thirty-eight, were selected for the purpose, and after considering the results of these, as well as of all that has been mentioned by others, M. Richelot comes to the following conclusion: 1. Salicine appears really to possess febrifuge qualities, but in so small a degree that we ought not to hesitate a moment in preferring the sulphate of quinia. 2. Salicine may be employed in any case where irritation or inflammation exists, contra-indicating the employment of the sulphate of quinia, in hectic fevers with periodical paroxysms and abundant diarrhœa, or where sulphate of quinia cannot be had. 3. It is not only unnecessary but injudicious to employ it at the beginning in high doses. Six or eight grains administered between the paroxysms, on the same principles as quinia, produce as good or even better effects than higher doses; though, if necessary, the doses may be increased.—*Tr.*]

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## LACTIC ACID.

### *Process for procuring Lactic Acid.*

It is extracted both from milk and from the juice of beet-root. If from the latter, it should be left in a stove of a fixed temperature, between 25° and 30°. After a few days, viscous fermentation takes place, and hydrogen mixed with carburetted hydrogen is abundantly evolved. The fermentation ended, and the liquid restored to its former fluidity—which generally occupies two months—it is evaporated to a syrupy consistence: crystals of mannite then appear, and with them a sugar, having the properties of grape-sugar. The product of the evaporation is treated with alcohol, which dissolves the lactic acid, leaving a quantity of precipitated matters. The alcoholic ex-



tract is taken up by water, wherefrom a fresh deposit is made; the fluid is then saturated with carbonate of zinc, and a copious precipitation again takes place. Concentrated, the lactate of zinc crystallizes, is collected and heated with water, to which some animal charcoal previously washed with hydrochloric acid is added: the whole is then filtered, and the lactate of zinc, perfectly white, crystallizes: these crystals are again washed with boiling alcohol, in which they are insoluble. By successive treatment with baryta and sulphuric acid the lactic acid is separated and concentrated in vacuo. Finally on shaking it with sulphuric ether, which dissolves it, a flaky matter is separated. (See Ann. de Chimie et de Physique, April, 1833.)

By a precisely similar process, milk affords lactic acid. M. Carriol has also discovered it in the aqueous solution of the strychnos nux vomica.

#### *Physical and Chemical Properties of Lactic Acid.*

Concentrated in vacuo until it loses no more water, lactic acid is a colourless fluid of a syrupy consistence, and a density, at the temperature of  $20^{\circ},5$ , equal to 1,215. It is inodorous, and excessively acid to the taste. It absorbs moisture from the atmosphere. Water and alcohol dissolve any quantity of it. It has the property of rapidly dissolving phosphate of lime, particularly that of the bones, a property worthy the attention of medical men.

#### *Mode of administering Lactic Acid.*

As lactic acid is the solvent of food in the stomach, I thought that it might be advantageously used in dyspepsia or simple debility of the digestive organs; and I have not been disappointed.

I give it in the form of lemonade or lozenges.



*Lactic Lemonade.*

Liquid lactic acid . . . . .	1 to 4 drachms.
Simple water . . . . .	2 pints.
——— syrup . . . . .	2 ounces.

*Lozenges of Lactic Acid.*

Pure lactic acid . . . . .	2 drachms.
Powdered sugar . . . . .	1 ounce.
Tragacanth gum . . . . .	q. s.
Volatile oil of vanilla . . . . .	4 drops.

The lozenges should weigh half a drachm each, and be kept in a well-stopped glass. Six of them may be taken in twenty-four hours.

From the facility with which lactic acid dissolves calcareous phosphate, it might be feasible to try it in cases of white or phosphate of lime gravel. I have not yet had an opportunity of doing so.

I have commenced a series of clinical experiments with the lactates of soda, potass, &c. but the results are not yet ripe for publication.

## VOLATILE OIL OF BLACK MUSTARD-SEED.

To procure this oil, not less than 10 kilogrammes of the best black mustard-powder should be used. Mix it with from 50 to 55 kilogrammes of water, and place them in an alembic, which is connected with a double-balled receiver: then distil. The volatile oil condenses at the bottom of the receiver in the form of brownish flakes. When six litres of water have passed over, change the receiver, as after that no volatile oil is deposited. Pour off the superabundant distilled water, and rarefy the oil, by a naked fire in a small alembic. In this manner it is obtained almost colourless.



*Medicinal employment of Volatile Oil of Black Mustard-seed.*

Diluted with its own weight of alcohol, at 40°, it is an excellent rubefacient, its action being almost instantaneous. If the friction be continued for a few minutes the surface rises into blisters.

Used alone, it is an advantageous substitute for the ammoniacal ointment. Its only drawback is the strong, penetrating and disagreeable smell, which, however, is more tolerable than that of strong ammonia.



## ADDITIONAL ARTICLES,

BY THE TRANSLATOR.

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### CREOSOTE.

The name of this new remedy is derived from the Greek *κρέας*, flesh, and *σώζω*, to preserve. It was discovered in 1832 by M. Reichenbach de Blansko in pyroligneous acid, in the first instance, and subsequently in the different kinds of tar.

In the process which led to the discovery of creosote, M. Reichenbach found that his fingers were deprived of their epidermis, and he conjectured from this vehement action on organic matter that this substance might be the mummifying principle of pyroligneous acid, and might also serve an important therapeutical purpose in the living body. This expectation has since been realized.

#### *Physical Properties of Creosote.*

Creosote is an oily, colourless, transparent liquid, of a penetrating odour, resembling that of smoke, or smoked meat, and of a burning and exceedingly caustic taste. It has a specific gravity of 1,037.

#### *Chemical Properties.*

It boils at 203°, Centigrade, and is not congealed by a cold of—27° C.; it burns with a strongly fuliginous



flame. With water at  $20^{\circ}$ , it forms two combinations, one a solution of one part in 80, and the other of 10 parts in 100. This aqueous solution does not change turnsol, nor is it neutralized by acids or alkalis. Nitric acid causes red vapours. A small portion of concentrated sulphuric acid turns it red, but a larger quantity blackens it, the acid itself being also decomposed. Acetic acid seems to be its specific solvent, for it holds any quantity of it. All the acids, even the carbonic, separate creosote from its combinations with potass and soda, without otherwise affecting it. It dissolves a great number of salts, some with, and some without heat. Alcohol, ether, carburetted sulphur, and acetic ether combine with it in any proportion. It decomposes or dissolves resins, resinous colouring matters, and other similar substances.

Shaken with white of egg, coagulation immediately takes place. Fresh meat, soaked for an hour in a solution of creosote, and then dried, may be exposed to the sun, without fear of putrefaction; in a week it becomes hard, has the smell of smoked meat, and becomes reddish brown. Fish may be preserved in the same manner. Birds poisoned with creosote, remain nearly two months without emitting any putrid odour.

These effects on animal matter closely resemble those of pyroligneous acid and tar water, and demonstrate almost to a certainty that creosote is the preservative principle of those fluids. This, however, has been further shown by the extraction of creosote from both of them. I shall confine myself to the preparation of creosote from tar, as it is procured more abundantly, and by an easier process from that substance.

#### *Preparation of Creosote.*

In the dry distillation of tar from wood the fluid collected in the receivers contains an empyreumatic acid water, which is rejected, and oil of tar, which is placed in glass retorts and rectified. In these two distillations the oil of tar is at first light, but as the heat



is increased, its gravity augments. At one period of the process the oil sinks to the bottom, and a fluid which is poor in creosote, and consists mostly of *eupione*, and other substances that interfere with the purity of the creosote, floats above it: this is poured off, and the pale yellow tar-oil is heated. Carbonate of potass is added, until the carbonic acid is no longer disengaged on shaking: the mixture is decanted, in order to separate the acetate of potass, and the oil is again distilled in a glass retort, and all the first products that float on the water are rejected. The oil is then dissolved in a solution of caustic potass of the specific gravity 1,12; heat is thereby developed, and a portion of the materials composed of *eupione*, &c. not being dissolved, floats on the surface, and is removed. The alkaline solution is poured into an open capsule, and regularly heated to boiling. It rapidly absorbs the oxygen of the atmosphere, whereby a peculiar oxidizable principle in it is decomposed, and the mixture then turns brown. After cooling in the open air, diluted sulphuric acid is added until the oil is set at liberty. It is then distilled with water, holding a little caustic potass, and the whole is kept boiling until the quantity of oil which passes from the retort becomes diminished; at this point the distillation should cease. The oil and water in the receiver are again distilled with potass, and the same treatment with sulphuric acid repeated, as in the former instance. A third distillation is then made, and a little phosphoric instead of sulphuric acid is added, in order to take up some ammonia retained in the oil.

The oil is then for the third time dissolved in caustic potass, and if the preceding processes have been carefully managed, they combine without leaving any residue of *eupione*, and the mixture, on exposure to the air, does not turn brown, but takes on a slightly reddish tint. As long, however, as any *eupione* remains, and the mixture turns brown, the solution in potass should be repeated. In this state the creosote



is not entirely pure, but it may be used for medicinal purposes.

It may be obtained perfectly pure by distilling it with water alone, then rectifying the product of the distillation repeatedly until no water passes over when the heat is raised to  $203^{\circ}$  C. The last product is creosote unalloyed by eupione, picamare, water, or other matters.

M. Reichenbach endeavoured to simplify this tedious process; but he found that the product was always unfit for internal use, while its action on the surface was much impaired. So procured, its emetic effects were most violent; a single drop applied to the tongue caused, in the space of a minute, excessive nausea with tremors, succeeded by vomiting, and great prostration of the powers. These effects he attributes to the presence of eupione, and he therefore recommends the process above-described to be followed on all occasions.

The following, however, is a more simple process for obtaining creosote, and is given by Antonio Giordano in the *Annali Universali de Medicina* for April 1835.

Distil wood tar from the willow, at an elevated temperature from a tinned copper retort, until the residue has the consistence of a soft pitch. Re-distil the liquor passed over till its residue resembles the former. The liquor neutralized by sub-carbonate of potass or lime-water, is re-distilled till all the oil of creosote has passed over. The oil is dissolved in caustic potass, from which, after simmering a little in a porcelain vessel, and cooling it, the eupione which floats is easily separated. The same operation is repeated with the eupione, to remove all the oil that is united to it. The saponaceous liquor treated with diluted sulphuric acid, is distilled into water, from which the creosote is separated, and the water saturated with creosote is kept for external use, or re-distilled for a concentrated acetic acid of a pungent and most agreeable odour.



*Physiological Action of Creosote.*

Applied on the tongue in a concentrated form creosote causes violent pain, though no redness or tumefaction is present: a strong taste of smoke extends to the throat. Poured on the skin, it produces a burning sensation with rubefaction and erosion.

Flies, spiders, and small fishes die in the course of two minutes, when immersed in a solution of twelve drops of creosote, in two ounces of water.

Two drachms given in half an ounce of water to a puppy-dog induced the following symptoms: complete prostration of muscular power, drooping of the head, fixation of the eyes, vertigo, apparent stupefaction of all the senses; the respiration, from being laboured, was at the end of three minutes almost entirely stopped by an abundant secretion of viscid, filamentous mucus; to which was added vomiting of whitish milky fluid, with spasmodic contraction of the abdominal muscles. These symptoms got gradually worse for two hours, the respiration becoming more laborious, and at longer intervals, the limbs being seized with tremors, then with convulsive contractions, and the whole ending in death.

On opening the body of the animal all the tissues of the body, except the liver, exhaled a strong odour of creosote. The mucous digestive membrane gave signs of inflammation throughout its whole extent; the matters contained in the stomach coagulated white of egg, and heated, gave out the powerful tar smell of creosote. In the heart and the immediate great vessels the blood appeared to be much more firmly coagulated than usual. The lungs were gorged over the greater part of their extent with reddish-brown blood; the more ruddy parts of them floated in water readily: the darker portions scarcely swam at all. No sign of congestion about the brain appeared.

On injecting equal parts of creosote and water into the carotid artery of a dog, the same symptoms were produced, but death ensued more speedily.



If concentrated or diluted creosote be added to blood, the latter thickens and becomes reddish-brown, with small spots of white, probably coagulated albumen: on further exposure to the air the blood passes to a yellowish-red colour.

The signs of poisoning with creosote therefore are the redness of the gastro-intestinal mucous membrane, the peculiar thickness and colour of the blood, the property possessed by the matters in the stomach of coagulating albumen, and more especially the peculiar odour exhaled by all the tissues of the body.

Plants watered with a solution of creosote, fade and die in the course of a few days.

### *Medicinal Employment.*

Bishop Berkeley's enthusiasm in favour of tar-water is well known to all readers. His assertion that it is an antidote to the contagion of small-pox, that all who drink it escape epidemic diseases, that it clears the voice, restores broken constitutions, rouses the spirits, and effects a thousand other wonderful consequences, will, however, be taken with the requisite quantity of salt by all those who have observed the power of new remedies in other hands than those of the inventor.

The Bishop of Cloyne is not, however, the first who recommended tar-water for its therapeutical properties. Aretæus, Cælius Aurelianus and Galen, severally mention it in some of its medicinal applications; the latter says of it, "Astmaticos et purulentes adjuvat, abstergerendi vim habet, glutinendis vulneribus aptior."

Not less vaunted have been the virtues of the Neapolitan remedy, the *Aqua Balsamica Arteriale* or *Acqua Binelli*, the latter name being taken from that of its promulgator. Binelli attributes to it the property of stopping internal and external hemorrhages, even of large arteries when cut transversely, the cleansing and healing of all kinds of wounds, the renewal of uterine



evacuations when suppressed, the moderating of them when excessive, &c.

I have recalled these remedies to the reader's mind, because in passing through the cases for the application of creosote, it will appear that any extraordinary effect produced by those remedies is attributable to the presence in them of the substance forming the subject of this article. In fact, though the *Acqua Binelli* is to this day sold in Italy at a high price, (2s. 8d. an ounce,) and as a mysterious compound, its chemical and physical properties disclose it to be merely water containing a little volatile oil or naphtha, and probably prepared by the distillation of water from some kind of tar.

M. Reichenbach's first essays of his newly-discovered remedy were made on slight burns, infantile excoriations and wounds. Subsequently he was induced to try it in extensive burns, by hot iron and boiling fluids: in itch and various kinds of tetter: in gangrene consequent on extensive compound fracture of the leg: in caries of the phalanges of the fingers and toes: in tooth-ache, though it fails to put a stop to the caries of the tooth: in open, fungous whitlow; in scrofulous ulcers of the throat, leg, and joints of the fingers: in ulcerated white-swelling of the knee of two years standing: in chancres and other syphilitic ulcers: in wounds from cutting and piercing instruments, caustic alkalis, &c., in which cases the wounds did not cure by suppuration, but by actual desiccation caused by the creosote. In all these instances he has found the remedy most effectual and astonishingly rapid in its operation. Thus in a case of old standing and scrofulous ulceration of the throat, with purulent discharge from the ears, the ointment of creosote to the former, and the injection of creosote water into the latter, put an end to both in the course of three weeks.

Internally, M. Reichenbach has given it in several cases of hemoptysis; in two of these, the sanguineous expectoration had continued for upwards of a week, when the administration of four drops of creosote on sugar, daily for four days, arrested the flow of blood.



Künckel has used it in syphilitic ulcers of the throat in conjunction with the constitutional administration of corrosive sublimate, which alone did not suffice to heal them. (Bull. Gen. de Therapeut. t. v. p. 311.) Graëfe of Berlin, too, has given it in pretty nearly the same cases, though not always with equal success. It has been employed in cancer of the womb by Professor Wolff, of Berlin, but without any beneficial end, even in alleviating the symptoms. (Medicinisches Zeitung vom vereine für Heilkunde in Preussen, 1834, No. 30.) And in the same Journal, Hahn, of Stutgard, states that he has used it in the shape of fomentation to chilblains, with some success. In gonorrhœa, however, he found it of no use. With Hœring and Fichtbauer it has succeeded in cases of infantile excoriation and chapped skin from cold. Fremanger (Bull. Gen. de Therap. t. viii. p. 269,) recommends the following lotion in irritation of the gums.

Water . . . . .	2 ounces.	
Creosote . . . . .	4 drops.	Mix.

Turning to the practice of the French physicians, we find that creosote has been successfully employed in burns, by Berthelot and Goupil, who observe, that in treating these with creosote, the tendency to cicatrize from the circumference to the centre, and the consequent contractions and irregularities, are avoided; in various dry and moist tetters by Goupil, Coster, Berthelot, Martin-Solon, Duchesne-Duparc and Dauvergne: in chancres and old venereal ulcers, by Künckel, Lesseré, and others: in sanious ulceration of the cervix uteri, by Colombat: in a cancerous ulcer of the nose, by Breschet: in chronic inflammation with supuration of the edges of the eyelids, by Coster: though applied to the eye itself, Sanson found it of no use whatever: in cancer of the womb, by Hippolyte Cloquet and Tealier: in varicose, ill-conditioned ulcers of the leg, by Goupil, &c. &c. Chilblains are also considerably benefited by frictions, with creosote ointment or water. M. Regnart, of Paris, among many other patients, had the good fortune to relieve the gifted



Broussais from an excruciating tooth-ache, by the free application of concentrated creosote to the carious tooth; we cannot wonder that the worthy professor should be an advocate of the doctrine of "irritation."

In this application of creosote great care should be taken to withdraw all foul matter from the tooth previously.

As this application of creosote may be of more extensive and familiar use than many others, it may be well to inquire how it acts as a sedative in this instance. When the teeth are painful it is almost always because the nervous pulp near to the root is exposed to the contact of the air. If in this circumstance a few drops of undiluted creosote are applied, a fierce increase of pain is the first effect, then a total cessation of it: in this, either the nervous pulp is destroyed as by some caustic: or the creosote, by coagulating the albumen of the fluids that are always flowing from the caries, forms an albuminous layer that defends the pulp from the air; or lastly, it acts as a powerful stimulant, causing the inflamed vessels of the pulp to contract and expel the load of blood by which they are oppressed. In any case the pain is apt to return, and this fact is only explicable by one of the two latter suppositions; for so long as the irritating cause, carious bone, remains, so long are the vessels of the pulp liable to relapse into their former congestion.

Fremanger is of opinion that creosote arrests caries by combining with the salts of the bone, and forming a new combination which by its solubility tends to disengage the areolar tissue and stop the ulceration at the point for the commencement of cicatrization. He found creosote effectual in the cure of fistula of the finger with carious bone when iodine had failed.

Creosote has been employed by the French physicians in pulmonary phthisis, but from all that I have read on the subject, the alleged successful cases are strained, and should not be recorded as such. It has not been more successfully used in several cases of chronic bronchitis by inhalation.



In bronchorrhœa, that is, copious secretion from the bronchi, without inflammatory symptoms, Dr. Elliotson thinks creosote beneficial. In accordance with the opinion just advanced, he found it of no benefit in pulmonary phthisis. Where, however, a single tubercle exists without a tendency to the formation of more tubercles, he considered it useful: but I question whether more extensive experiments will not contradict this idea also.

Some British practitioners have essayed the effects of creosote. My friend, Dr. Copland, tells me he has employed it in cachectic affections as a tonic, and also in dropsical cases, where it has proved diuretic. In two cases of diabetes he considers that he was not allowed to make a fair trial of it. The dose he gives is generally from 1 to 8 minims three or four times a day, combined with powdered liquorice root, into pills. In porrigo favosa, he has used a lotion of a saturated solution of creosote with good effect.

Dr. Elliotson's experience of its effects appears to have been most extensive. He tells us that he has found it more effectual than anything else in the treatment of chronic pustular eruption. And with it he has cured acne rosacea when it had resisted everything else for seven years. In gonorrhœa he found it of no use. Four cases of diabetes were treated with creosote, and were partially relieved; in one of them the specific gravity of the urine rose during its employment from 1031 to 1037, at the same time that the secretion was reduced in quantity; while in another case the gravity fell from 1037 to 1030. But it is in arresting vomiting that Dr. Elliotson has found the most certain operation of this remedy: for he says that from whatever cause the emesis may arise, it is equally efficacious, and will even enable the stomach to bear the sulphates of copper and iron, the hydriodate of potass and diuretics. In instances where prussic acid had failed to quiet the stomach creosote had succeeded. In epilepsy he thought at first that it soothed and relieved the symptoms, but subsequent



experience showed that it rather aggravated the violence of the paroxysms. In neuralgia and hysteria it frequently succeeded: as also in rheumatic neuralgia unaccompanied with inflammatory symptoms.

With regard to the dose, Dr. Elliotson remarks that some will scarcely bear half a drop, while in the instance of a lady he increased the quantity to 40 drops, which, however, being exceeded even by a single drop, head-ache and nausea supervened. In the onset the medicine should be well diluted, (for instance, one drop to half an ounce of water,) and is then less liable to induce sickness. Few persons can take many drops in less than half a pint without supervision of heat of the pharynx, œsophagus and stomach.

It may be mentioned that Dr. Elliotson's colleague, Dr. Roots, is by no means so warm in his praise of creosote in its character of a sedative to vomiting. The trials I have made of it in such cases, certainly only warrant a qualified laudation.

Mr. Syme, of Edinburgh, found the pain of lupus alleviated by the use of creosote. Dr. Shortt, of the same city, derived no benefit from its employment in chronic ophthalmia;—if applied pure it aggravated the disease.

My own experience of the effects of creosote is as yet confined to cases of scrofulous ulcers of the leg, tooth-ache, lumbago, aphthæ and vomiting. In the first case, of ulcers, I premised a seton in the arm, and the rapid desiccation of the ulcers caused by the creosote had no ill consequence on the brain or any other viscus. In tooth-ache I have verified the reports above alluded to. In the case of rheumatism I found the remedy at first produce distressing nausea, but the warm and copious sweat that ensued soon compensated for that symptom, and effectually removed the rheumatic pain; copious diuresis was also one of its effects. Its efficacy in vomiting I have already mentioned.

In a case of extensive aphthous ulceration of the mouth occurring in an adult, I employed the following wash with the greatest advantage; the sloughs came



away after the second time of washing, and the depressions in the mucous membrane filled up with astonishing rapidity: several of the ulcerated surfaces were as large as half of a sixpence.

Creosote .....	$\frac{1}{2}$	a drachm.	
Gum Arabic mucilage .	$1\frac{1}{2}$	ounce.	
Camphor mixture ...	$10\frac{1}{2}$	ounces.	Mix.

To wash the mouth every two hours.

### *Mode of Administering Creosote.*

M. Reichenbach says, that his observations demonstrate that in the cure of certain ulcers, tetters, and wounds, creosote water was sufficient. But it should be remembered that water does not dissolve more than about 1-80th of creosote—a proportion that will be found most inefficient in the generality of obstinate cases of ulceration. In such instances the employment of pure creosote becomes necessary.

The application of concentrated creosote to ulcers, causes, in the first instance, more or less of inflammation, which, however, quickly subsides; as soon as this inflammation appears, the remedy should be discontinued for a few days, and the wounds allowed to remain quiet. The application is then renewed with similar consequences; and this is repeated until the bad condition of the ulcer is changed, that is, until the greenish pus becomes white, the blue or white flesh becomes red, and firm granulations fill up the solution of continuity. Creosote should therefore be employed more freely at the commencement than at the close of the treatment of these cases. When the ulcer has taken on the appearance above described, it will suffice to dress it with the creosote ointment, or water, or even desist altogether from its use, and introduce other desiccating remedies.

The best mode of applying it, is by means of a camel-hair brush to paint the surface of the sore; or from five



to a dozen drops may be placed on the surface of a poultice, and this applied over the diseased point.

When used to stop external hemorrhages, it may be poured by drops into the wound; but in these cases it seems to act with more certainty if imbibed by cotton or lint, and thus applied.

To form a lotion for the employment of frictions, from two to eight drops are added to each ounce of distilled water. Creosote ointment is made from ten drops of that substance and one ounce of lard: it may be used either to dress ulcers or to rub into the sound surface.

The internal administration is either in draught or pills; the former being composed of one or two drops of creosote dissolved in camphor mixture; the latter of the same quantity and some absorbent powder with mucilage. This dose may be repeated three or four times a day, and may gradually be increased to eight drops.

The inhalation of creosote is effected, first, by steeping paper in it and placing this in approximation with the nostrils; next, by heating the creosote in the immediate neighbourhood of the patient, so that he cannot fail to inhale the fumes: or, lastly, a portion of it may be poured into hot water in a Mudge's inhaler, and the creosoted vapour inspired in the usual manner.

It should not be continued internally for too long a period, for it is apt to produce irritation of the system and pains of the stomach and intestines. Demulcents should accompany its employment, and should occasionally replace it.

From all that I have advanced concerning the therapeutical properties of creosote, the following general conclusions may be made.

1. That creosote is beneficial in the different stages of burns.
2. It cures or alleviates the majority of herpetic, furfuraceous, squamous, and crustaceous skin diseases.



3. It cicatrizes obstinate syphilitic ulcers, prevents or diminishes suppuration, and destroys the fungous growth without injuring the surrounding tissues. It also corrects the condition of cancerous ulceration.

4. In phthisis and bronchitis, though it fails to cure either, it facilitates greatly the expectoration.

5. Chronic lymphatic tumours are frequently dispersed by frictions or fomentations of creosote.

6. It is almost always successful in allaying the pain of carious teeth, but does not prevent its return nor the progress of the caries.

7. It arrests capillary hemorrhage with remarkable certainty, but fails in that from the large vessels.

8. It is an effectual remedy in atonic rheumatism, and may be tried with chance of success in cachectic disorders.

9. In vomiting, from whatever cause, it is generally beneficial.

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## IODURET AND HYDRIODATE OF IRON.

The ioduret of iron has been known for a considerable time as a chemical substance, chiefly employed in the preparation of the iodide of potassium, or hydriodate of potass; but Dr. A. T. Thomson has recently called attention to its medicinal properties.

### *Mode of Preparation.*

In preparing this substance, 126 parts of iodine, and from 40 to 50 parts of clean iron filings, are mixed in a flask with 1500 parts of water; heat is applied till the mixture becomes clear, after which it is filtered. The liquor is a solution of hydriodate of protoxide of iron, consisting of hydriodic acid 127 parts, or one atom, and oxide of iron 36 parts, or one atom. By evaporating the solution nearly to dryness, the acid



and oxide are decomposed; water is formed by the union of the hydrogen and oxygen evolved; and a solid combination of iodine and iron remains, which contains 126 parts, or one atom, of the former, and 28 parts, or one atom, of the latter.

*Physical and Chemical Properties of Ioduret and Hydriodate of Iron.*

The ioduret of iron is deliquescent, and, in decomposing the water, is transformed into hydriodate of iron, with some precipitation of oxide of iron, and some free iodine. Pure ioduret of iron is of an iron-grey colour, brittle and crystalline in texture like antimony; when dry it is inodorous; moistened, it exhales the odour of iodine. It fuses at 350° Fahrenheit, and at a higher temperature is decomposed, the iodine being volatilized and leaving a peroxide of iron.

The solution in distilled water, or the hydriodate, varies in colour from a deep greenish brown to a very pale green, or to perfect transparency, according to the neutrality of the salt and the quantity of water employed. It is decomposed by chlorine, mineral acids, arsenious acid, solutions of opium, tannin, the alkalis and their carbonates, sulphate of copper, nitrates of mercury, lead, silver, quinia, and cinchonia, infusions of foxglove, henbane, nightshade, tobacco, and all vegetable infusions containing starch. It remains in solution with all bitter vegetable infusions which contain no tannin or gallic acid.

*Cases for the Employment of Hydriodate of Iron.*

Dr. Thomson administers it in those cases "in which the capillary system requires to be stimulated, and the tone of the habit to be maintained or brought up to the healthy standard," and he mentions, as examples, atonic dyspepsia, strumous affections, chlorosis, amenorrhœa, tabes mesenterica, rickets, &c. &c.



*Mode of Administration.*

The dose is two, three, or four grains taken in distilled water three or four times daily. When raised above four grains, it sometimes induces pain and uneasiness of the epigastric region, and it seems to irritate too violently.

*Action on the System.*

The results of experiments, which Dr. Thomson performed on his own person, in order to ascertain the effects of this remedy, I shall give in his own words.

“When taken in doses from 3 to 5 grains, the hydriodate of iron makes no sensible impression on the stomach, although it sharpens the appetite and improves the digestive function; it seems to stimulate moderately the intestinal canal, through its entire length, as it opens the bowels; and whilst it produces the black colour of the alvine discharges, characteristic of all the preparations of iron, it corrects their fœtor. When it does not affect the bowels, it augments the action of the kidneys, increasing the flow of urine; and, if the solution be taken two or three times a day, for several successive days, the presence of both the iodine and the iron can be readily detected in the urine. The temperature of the skin is moderately elevated, and the insensible perspiration increased. On one occasion, having taken 10 grains for a dose, it almost immediately caused an uneasy sensation at the epigastrium, accompanied with nausea, that continued for several hours, and a slight degree of headache. These symptoms were relieved by a copious stool, which was perfectly black. Two hours after swallowing the medicine, a large quantity of urine was discharged; and on being tested, it displayed the presence of both iodine and iron.”

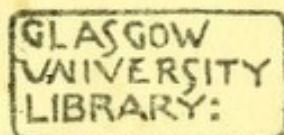
On the whole, this promises to be a most useful remedy. Hitherto its most conspicuous effects have



been displayed in cases of amenorrhœa, in which and in leucorrhœa, M. Pierquin has recently lauded it. M. Andral has employed it in phthisis, to modify the qualities of the blood, under the idea that the hematosiis in that disease is imperfect.

An inconvenience which attends the use of the ioduret and hydriodate of iron is found in the extreme facility with which they are decomposed. Unlike most medicines, which lose their energy by decomposition, the quantity of iodine disengaged becomes too large for a wholesome dose. It will behove the practitioner to bear this fact in mind.

THE END.



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