

Formulary for the preparation and mode of employing several new remedies : namely, morphine, iodine, quinine, cinchonine ... / with an introduction and copious notes, by the late Charles Thomas Haden ; translated from the 'Formulaire ... par F. Magendie. Troisième édition, 1822.'

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PHARMACEUTICAL SOCIETY OF LONDON
FORMULARY,
FOR THE
PREPARATION AND MODE OF EMPLOYING
SEVERAL
NEW REMEDIES;

NAMELY,
THE NUX VOMICA, MORPHINE, PRUSSIC ACID, STRYCHNIN,
VERATRINE, THE ACTIVE PRINCIPLES OF THE
CINCHONAS, EMETINE, IODINE, &c.

WITH
AN INTRODUCTION AND COPIOUS NOTES.

By CHARLES THOMAS HADEN,
SURGEON TO THE CHELSEA AND BROMPTON DISPENSARY, &c.

TRANSLATED FROM
The "Formulaire pour la Préparation et l'Emploi de plusieurs Nouveaux Médicaments, tels que le Noix Vomique, &c. par F. MAGENDIE, Membre de l'Institut de France, &c. Troisième Edition, 1822."

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PREFACE.

THE utility of antimonial remedies has been long recognised in spite of the opposition of physicians during the seventeenth century—in spite of the celebrated decree of parliament which prescribed emetic tartar—and in spite of the spiritual sarcasms of Guy Patin. For once at least prejudice gave way before evidence.

The same thing I hope will take place with regard to other new substances which chemistry and physiology hold out to us as valuable remedies; and that the repugnance with which many enlightened practitioners look on them will soon disappear before the results of an experience which daily shows their advantages.

The impossibility of isolating by chemical ana-

lysis the elements of medicines has much retarded the progress of the *materia medica* towards perfection; and even now, when such an analysis can be made, the belief that existed and which still exists in some degree that medicines act altogether differently on man to what they do on animals has prevented the ultimate principles of remedies from being investigated. Still nothing is more unfounded than this belief. A varied experience of more than ten years both in the laboratory and at the bedside, leads me to affirm that medicines and poisons act in the same manner on man as on animals.* I am so sure of this, that I would willingly try on myself substances which have been proved to be innocent when given to animals; but I would not recommend any one to make the experiment in an inverse way.

The physiological properties and medical virtues of most of the substances described in this *Formulary* have been determined by a reference to the above principle.

* See remarks on this important observation in the *Translator's Preface*, p. xiv. — Tr.

These substances, which are already sufficiently numerous, act when given in small doses — every principle which might mask or hinder their action has been separated from them — their effects bear a decisive character, which cannot be misunderstood, for they have been studied with care both on animals and on man when in health and when in disease — a perfect knowledge of their chemical properties and great accuracy in their mode of preparation are sufficient to secure uniformity with regard to their strength and manner of action — and lastly each of them forms a medicine in its most simple and energetic state.

Time alone can pronounce definitively on the advantages and inconveniences of these new remedies ; but which ever way it may be the following pages may be useful by teaching the mode of preparing them without making it necessary to consult general treatises of chemistry or pharmacy, and by giving medical men every facility in submitting them to personal experience which is often after all the only really profitable course.

I shall feel extremely grateful for critical and other remarks appertaining to the substances treated

of in this work. To those of my medical brethren who may be kind enough to address them to me I return my thanks beforehand; and I shall hasten to turn them to the improvement of science by inserting them in the next edition.

THE

TRANSLATOR'S PREFACE.

GREAT credit is due to the French chemists and especially to MM. Pelletier and Caventou for having discovered that the active principle of several of our chief remedies resides in peculiar alkalis; and also for isolating these alkalis so that they may be used in practice according to a determinate and intelligent principle. Great praise is also due to M. Magendie for the indefatigable way in which he has investigated the action of these new alkalis on the human body. It cannot therefore be unacceptable to all classes of the Medical Profession to have laid before them a translation of M. Magendie's little work respecting them. To druggists and to operative apothecaries it must be acceptable to have thus collected a full account of the mode of preparing these different alkalis; and it must be acceptable to the practising part of the

Profession to have thus collected all that is at present known respecting the properties and mode of exhibition of these powerful remedies.

M. Magendie however in his preface avows a principle respecting the similarity of the action of poisons and other new remedies on man and on animals which perhaps ought to be taken with some caution. M. Magendie is probably correct in the main; and we are bound to place much dependence on an assertion made by such a man as he is when he says that the truth of his opinion has been proved by ten years experience. If indeed we can believe what we read in Withering's Botany M. Magendie cannot be entirely correct; because we see statements in that work of many plants being poisonous to one animal and often also to man, whilst they are harmless when eaten by other even of the higher class of animals. It is very well known also that the doses of different medicines vary so largely when given to the different domestic animals as to afford comparative deductions, which, if we were to apply the information thus gained to the exhibition of the same remedies in man, would often lead us to err greatly either as to giving the medicine in an under or over dose. It is perfectly well known too that there is perhaps none even of the most virulent vegetable poisons which do not

afford nourishment to one or more individuals of the lower class of animals.

Nevertheless as it is rational to believe that M. Magendie's principle is correct and that the cases mentioned in opposition to it are only those exceptions which we find appertain to all our general and artificial principles, these cases should only teach us caution in the application of the principle to practice.

There exists however an objection to the principle of thus isolating and concentrating the active parts of our remedies. Perhaps every practitioner feels that medicinal substances are more efficacious as they are presented to us combined by the hand of Nature than when their active part is isolated and recombined by the hand of man. Thus then we are all inclined to give our remedies in substance as it is called rather than as prepared in a more convenient form by the chemist or the druggist; and we are only deterred from using these natural preparations by the greater bulk and other inconvenient properties of them as compared with our more artificial preparations. Thus also we all feel that our artificial mineral waters however accurately they may imitate the natural ones do not produce the same good effect as those natural ones do; and even some of them for instance the Bath waters appear

on analysis to be so pure and free from extraneous ingredients that we are reduced to the necessity of attributing their often powerful effects to the presence of some evanescent principle which cannot be detected by chemical analysis.

It is probable that if these objections were rigorously investigated it would be found that there is but little truth in them. The superficial grounds on which most men take up their opinions are very likely to lead to error in cases like this where so many collateral circumstances are to be taken into the account. Medicines, for instance in the form of extract are not usually to be depended on; but that much of this arises from the action of heat on the remedy and much on other injurious modes of preparation is proved by the great improvements that have been lately made in the preparation of extracts. And even with regard to the mineral waters it is a fair question whether the artificial substitutes for them would not be equally efficacious if taken exactly under the same circumstances and the takers were made to believe that they were swallowing the natural and not the artificial production?

At all events if we take these isolated and concentrated remedies as they are we find that at least many of them are endowed with peculiar and

powerful properties ; and as nobody can deny that it is far more convenient to use remedies which are thus small in bulk we have only to take such remedies as if they were simple remedies and investigate their properties as we would those of any natural production, and we have no right to find fault.

In this point of view the several advantages pointed out by M. Magendie in using remedies thus concentrated and freed from their nauseous and often jarring principles stand good in full force ; and we often find particular patients and especially children so averse to take medicine in the ordinary form that life is often lost by the delay which is thus produced, or even by the injurious excitation which offering medicine to such persons frequently occasions.

A further objection to the employment of these remedies remains. The expense of preparing them is very great. It is to be hoped however that such improvements will in future be made as will obviate these inconveniences in a great degree.

The Translator however cannot refrain from mentioning one species of objection to the adoption of such new forms of remedy, because he considers it to be a superficial one ; and an injurious one too, for it is subversive of one of our best means of im-

proving the therapeutical branch of our profession. He is almost angry when he sees the popular authors of the day sneering at the introduction of new remedies, and saying with what he considers to be an ignorant self-conceit "Aye, here they come one after another vaunted to the skies for properties which sober investigation shows not to belong to them; we shall soon see them laid on the shelf, until they are again held up to the world as prodigies by some future enthusiastic searchers after novelty." How humiliating such remarks are to the person who makes them! for it is easy to prove that in the great majority of cases the sneer is applicable not to the remedy but to persons who are too ignorant or too indolent to investigate its properties so thoroughly as to use it with success. Men who really think for themselves and are not content with conclusions unless they are drawn from an accurate and philosophical consideration of *all* the circumstances of each individual case know full well that the trials of new remedies which are made by the Profession at large are so superficial and inconclusive as to be a disgrace to themselves and not worthy of the slightest attention when the value of such remedies is under discussion. It should be recollected that the majority of persons who bring forward a new remedy have studied the properties

of the remedy more or less accurately — at least enthusiastically; and it is too much to give the direct lie to their assertions. It cannot be doubted that most of them have done with the remedy what they say they have done; and it would be at least cautious as well as properly humble if those who come after the first promulgator were to ask themselves before they condemn the remedy if they have taken sufficient pains to make themselves as well acquainted with its powers as the promulgator had done?

To show to what an injurious extent the practice of superficially sneering at new remedies exists the Translator cannot help recording the observations of one of the chief London medical men respecting the stethoscope. He laughed at it as a piece of quackery. He was asked if he had ever used it or personally knew any thing about it, or if he had read Laennec's book? He answered, no!

It will be easy to illustrate these apparently severe remarks. Take any of the depreciated remedies and will it not be seen that many individuals exist in the Profession who have the power of using them with equal if not greater effect than the original promulgators had done? Digitalis for instance is decried by the great majority of practitioners; and yet the Translator knows one practitioner at least who uses it largely and with the very best effect.

But then he does not order so many drops of the tincture to be taken so often and then leave his patient to take his chance; but he increases every dose until he produces the effect which he wishes: besides, he has industry enough to watch the effects which follow each dose; so that he at once acquires a full power over the remedy and secures his patient from the injurious consequences of an over-dose. If the rest of the Profession acted with the same acuteness and industry they would probably change their opinions with regard to the powers of digitalis.

The same observations apply to the use of prussic acid, colchicum, and many other remedies, which are now sneered at by ignorant or idle persons.

Indeed it may be said that they apply almost equally to our most common remedies. Few *study* the powers of any remedy as they ought to do; and hence they use calomel to purge or to salivate — ipecacuanha to produce sickness — and so on, without ever dreaming that all these remedies have much more important powers if industry were employed in searching for them. Thus many persons use calomel beneficially for several purposes; and one at least with whose practice the Translator is acquainted has taught himself the power of employing ipecacuanha not only as what may be called

a new and most efficacious remedy in certain extensive classes of disease namely those of the mucous membranes, but to use it as a powerful means of subduing general increased action.

Again, if a review be made of the different new remedies which have been lately proposed, will it not be seen that each of them is pretended to have certain peculiar and distinctive properties which if they really belong to them are greatly to be valued when properly applied to the treatment of disease? Digitalis for instance seems to exert a direct influence on the action of the heart and arteries. Colchicum appears to do the same thing with the addition of a purgative quality. Prussic acid seems to have similar powers with the additional one of appearing to act particularly on the mucous membranes. Strychnine in like manner is said to exert a peculiar influence over the nerves which supply muscles with their energy; or perhaps it has the power of increasing the irritability of the muscles themselves. Iodine seems to possess a similar stimulating power which is particularly expended on that part of the system which is called lymphatic.

It need not be said, that it is very advantageous to possess remedies (if we do possess them) of such useful as well as distinctive powers; and therefore it is to be hoped that medical men will cease to

humiliate themselves by superficially sneering at new remedies until they have qualified themselves to give an opinion by faithfully and industriously investigating the real properties of these remedies.

Lastly, the fact that some of these remedies produce inordinate effects on particular persons forms no reason for discarding them from practice; because the same fault appertains even to our most favoured remedies. The Translator has seen the sixth of a grain of tartarized antimony vomit and purge an exceedingly robust farmer until it brought his life into danger; cases are on record in which persons could not bear even the smell of ipecacuanha; and the Translator has seen four grains of calomel produce a violent and even dangerous salivation. On the contrary, he has used colchicum almost as largely as any man; and yet he can say that it produces those unlooked-for bad consequences quite as seldom as any of the three remedies he has mentioned above:* and he knows that a practitioner,

* The following anecdote is decisive of the safety of using colchicum and of its utility. A gentleman, whose business as a general practitioner exceeds £3000 a year, and who uses colchicum (principally the powder) as his general remedy for inflammatory complaints, lately told the Translator that only two persons had died in his practice during the preceding twelve months; one of the two having

who is spoken of in a former page rarely if ever sees inconveniences produced by digitalis in his practice, although he sometimes pushes its use to an extent which would frighten less accomplished practitioners; but then he uses it with a philosophic caution and a determinate object which are well worthy of imitation by the Profession at large.

The Translator has added Notes which comprise a reference he believes to almost all the authorities on the subjects treated of. He wishes he could add records of the several remedies having been employed by British practitioners; but with the exception of the prussic acid and iodine which have been somewhat extensively used he believes that the other preparations have not been even seen in this country except as matters of curiosity. It were to be wished that M. Magendie had given the particulars of his experience of their prescription in the human subject. Several French Journals and especially his own excellent *Journal de Physiologie* contain an abundance of cases in which the sulphate of quinine has been used with marked benefit in the latter stages of malignant fevers, in all forms of in-

been a phthisical patient, and the other an old lady who had gradually sunk worn out by an illness of three years continuance.

intermittent fever, and especially in many varieties of neuralgia; but the Translator is ignorant that any published cases exist in which the other alkalis have been employed.

N. B. — In addition to the Notes added by the Translator, it may be remarked, that a good general article on the properties of the new alkalis may be found in the Edinburgh Medical and Surgical Journal. It is in Number LXX. for January, 1822.

Sloane Street, May, 1823.

FORMULARY, &c.

RESIN OF THE NUX VOMICA.

IN the year 1809, I laid before the first class of the French Institute a series of experiments which had conducted me to an unexpected result; namely, that an entire class of vegetables (the bitter strychnos) has the singular property of powerfully exciting the spinal marrow, without involving, except indirectly, the functions of the brain. I announced also, at the termination of my paper, that this property might be advantageously applied to the treatment of diseases.*

* “Medicine will probably derive great advantages from the possession of a substance which will act especially on the spinal marrow; for it is well known that many very severe diseases have their seat in that part of the nervous system. The upas, however, does not exist in commerce; and should even experience show that this vegetable substance is a valuable medicine, how is it to be procured?

The last assertion, which was then conjectural, has been for several years verified by numerous experiments made at the bedside. Some time ago Dr. Fouquier published several cases of paralysis cured by nux vomica. I had also given the remedy with like success before I knew that Dr. Fouquier was engaged in similar researches, and it gave me great pleasure to see my work preceded by the communication of so much esteemed a physician.

This circumstance, however, did not lead me to relax in my exertions; and I have seen the best effects follow the employment of the alcoholic extract of the nux vomica, not only in cases of both partial and general paralysis, but also in many other states of weakness of the constitution both general and local.

Experiments should be instituted for the discovery of a substance with analagous properties to those of the upas."

It was by such experiments that M. Delille and myself discovered the properties of the nux vomica and of the St. Ignatius's bean, and which led us to propose the medical employment of the resin of the nux vomica. See "*An Examination of the Action of certain Vegetables on the Spinal Marrow*," read to the Institute, on the 24th of April, 1809, by M. Magendie, Doctor of Medicine, Anatomical Assistant to the Faculty of Medicine. Paris, 1809.

MODE OF PREPARING THE ALCOHOLIC
EXTRACT OF THE NUX VOMICA.

Take a determinate quantity of rasped nux vomica, exhaust it by repeated macerations in alcohol of 40° (.817), and evaporate it slowly to the consistence of an extract.

Alcohol of much less strength may be used, but the product is proportionably less active.

Dry alcoholic extract of the nux vomica.

Dissolve in water the alcoholic extract of the nux vomica, made by means of alcohol at 36° (.837); filtrate it, and evaporate on evaporating dishes, as in making the dry extract of quinquina.

PHYSIOLOGICAL PROPERTIES.

A grain (gr. 0.82 Troy) of this extract, absorbed from any part of the body, or mixed with food, promptly destroys a dog of considerable size, by inducing paroxysms of tetanus, which by their continuance stop the respiration long enough to produce complete asphyxia.

When the dose is much stronger, the animal

appears to perish entirely from the action of the substance on the nervous system, as M. Ségales has lately demonstrated. (See my *Journal de Physiologie Expérimentale*, for October, 1822.)

If an animal be touched whilst under the action of this substance, it experiences a commotion similar to that of a strong electrical shock; and this takes place every time the contact is renewed.

Dividing the spinal marrow behind the occiput, and even complete decollation, does not prevent these effects, nor even their continuance for some time. This characteristic action of the alcoholic extract of the strychnos distinguishes it from all other exciting substances at present known.

On dissection no lesion is discovered which can indicate the cause of death.

ACTION OF THE ALCOHOLIC EXTRACT OF THE NUX VOMICA ON THE HUMAN BODY WHEN IN HEALTH.

The action of the alcoholic extract of nux vomica on the healthy human body is identical with that above described; and if the dose be sufficiently large, death speedily follows with

the same symptoms. Dissection does not show any apparent lesion of structure; the traces of the asphyxia which caused or accompanied death being alone observable, as I had an opportunity of verifying in the case of a woman who died after taking this substance as a poison.

ITS ACTION ON THE UNHEALTHY BODY.

The effect is still the same on man when affected with paralysis; but what is very remarkable, it is particularly manifested in the paralysed parts: it is there that the tetanic commotions occur, as well as a creeping feeling, which announces the action of the remedy; a local perspiration also breaks out in the same parts, which is not observed in the rest of the body. In cases of hemiplegia submitted to the action of the nux vomica, the halves of the body exhibit a striking contrast; for whilst the healthy side is at rest, the other is violently agitated; tetanic shocks soon succeed, and an abundant perspiration breaks out. In one female the affected side was covered by a peculiar eruption, whilst the opposite afforded no trace of it: even the two sides

of the tongue differ; a decidedly bitter taste being perceived on the one side, whilst the other offers nothing similar.

If a larger dose be given, the two sides of the body participate, but unequally, in the tetanic effect; so that the patient is sometimes thrown out of bed by the violence of the tetanic paroxysm.

The alcoholic extract of the nux vomica, when given in very small doses, has, like many other remedies, no perceptibly immediate effect; and some days pass over before its advantageous or noxious properties can be appreciated.

CASES IN WHICH THE ALCOHOLIC EXTRACT OF THE NUX VOMICA MAY BE EMPLOYED.

These are all diseases attended by debility, whether it be local or general; and paralyses of all kinds, general or partial. Mr. Edwards cured a case of amaurosis with palsy of the upper eyelid by means of the nux vomica. I have seen very excellent effects from the same remedy in marked cases of weakness of the genital organs, in incontinence of urine, &c. I have also given the resin of the nux

vomica in cases of sluggish digestion, and in states of extreme debility attended by an irresistible disposition to sleep.

MODE OF EXHIBITING THE RESIN OF NUX
VOMICA.

This remedy is best given in the form of pills when the practitioner wishes to produce the tetanic commotions, that is to say, when he wishes to have its apparent effect. If each pill contain a grain of the extract (gr. 0.82 Troy), one or two may be given at first, and this daily augmented until the desired effect be produced; the medicine must then be discontinued, to avoid accidents. It is better to give the pills in the evening, because night is the best time for observing the phenomena which we wish to produce.

It is sometimes necessary to increase the dose to from 24 to 30 grains (from 19.68 to 24.6 Troy) in the day before the tetanic convulsions are produced, but generally from 4 to 6 grains (gr. 3.28 to 4.92 Troy) are sufficient.

If the exhibition of the remedy have been accidentally interrupted for some days, it is necessary to recommence with the smaller

doses, and to increase them again gradually, as before.

When it is desirable to produce only the slow effects of the remedy, a grain (00.82 Troy), or a grain and a half (gr. 1.23 Troy), in the day, is sufficient; or the following tincture may be used:—

Tincture of Nux Vomica.

Take of

Alcohol of 36° (.837) 1 ounce (7 dr. 52.56 gr. T.)

Dry extract of nux vomica, 3 grains (2.46 gr. T.)

This tincture is to be given by drops, in mixture or in drink, whenever the alcoholic extract in substance is indicated.

STRYCHNINE.

THE alcoholic extract of nux vomica, nux vomica in substance, St. Ignatius's bean, and the celebrated Java poison, all owe their active effects on man and on animals to the existence, amongst their elements, of a peculiar vegetable alkali, recently discovered by MM. Pelletier and Caventou: * I have proved this fact by direct experiments. †

MODE OF PREPARING STRYCHNINE.

Add a solution of liquid subacetate of lead to a solution of alcoholic extract of the nux vomica in water, until no more precipitate be thrown down; the foreign matters being thus

* The papers on this subject are in the 8th, 9th, and 10th volumes of the *Annales de Chimie et Phys.* It is supposed that in the native state the strychnine is in union with a new acid, called by MM. Pelletier and Caventou Tyasuric acid, from the Malay name of the St. Ignatius's bean.—Tr.

† *Annales de Chimie et Phys.* tom. x. p. 176. 1819.

separated, the strychnine remains in solution with a portion of colouring matter, and sometimes an excess of acetate of lead. Separate the lead by sulphuretted hydrogen; filtrate it, and boil with magnesia, which will unite with the acetic acid, and precipitate the strychnine. Wash the precipitate in cold water; redissolve it in alcohol, to separate the excess of magnesia; and by evaporating the alcohol, the strychnine is obtained in a state of purity. If it be still not perfectly white, it must be redissolved in acetic or hydrochloric acid, and reprecipitated by means of magnesia.

Strychnine obtained by crystallization from an alcoholic solution which has been diluted by means of a small quantity of water, and left to itself, appears under the form of microscopical crystals, forming four-sided prisms, terminated by pyramids with four flattened or depressed faces. Crystallized rapidly, it is white and granular; it is insupportably bitter to the taste, and gives an after-sensation similar to that produced by certain metallic salts; it has no smell; it is not changed by exposure to the air; it is neither fusible nor volatile, for when submitted to the action of heat, it only fuses at the moment of its decomposition and carbonization; it is decomposed

by a degree of heat inferior to that which destroys most vegetable substances. Exposed to the naked fire, it swells, becomes black, and gives out an empyreumatic oil, a little water, and acetic acid, and also carbonic acid gas, and carbonated hydrogen; distilled with deutoxide of copper, it gives out much carbonic acid, and only slight traces of azote.

It is composed then of oxygen, hydrogen, and carbon; the azote not appearing to form a part of its elements. Although strychnine has so strong a taste, it is scarcely soluble in water; 100 grammes (gr. 1544.4 T.) of water, at the temperature of 10° (50° Fah.) dissolved no more than gr. 0.015 (gr. 0.012 T.); 6667 parts of water, therefore, are required to dissolve it at this temperature: boiling water dissolves a little more than double, gr. 0.04 (gr. 0.0324 T.) being only dissolved in 100 grammes (gr. 1544.400 T.) of boiling water. Strychnine then is soluble in 2500 parts of boiling water. It is remarkable that a solution of strychnine made in the cold, and containing therefore only $\frac{1}{6667}$ part of its weight, may be diluted to 100 times its volume by means of water, and still retain a very marked bitter taste. The principal character of strychnine,

however, consists in its forming neutral salts when united with acids.

It would appear from some recent experiments by M. Pelletier, that the *nux vomica* contains two alkaline substances; the one strychnine, of which we have just treated, the other brucine, previously found in the *angustura spuria* by MM. Pelletier and Caven-
tou. When by following the process above mentioned for the separation of strychnine, care is taken to crystallize the substance several times in alcohol, it is pure and deprived of brucine; the brucine being much more soluble in alcohol, and crystallizing with difficulty, remains in the alcoholic *mother waters*. The presence of brucine, however, in strychnine, is by no means a great inconvenience, as the brucine is possessed of properties similar to those of strychnine; only it is less active.

M. Henry, *chef de la Pharmacie Centrale*, has given a new process for the extraction of strychnine. It consists in boiling the *nux vomica* in water, and evaporating the decoction until it has the consistence of syrup; lime is then added, which unites with the acid, and sets the strychnine at liberty; by means of

alcohol it may then be separated from the lime. The strychnine contained in the alcohol is subsequently obtained by evaporation; and it is rendered more pure by being redissolved in alcohol, and again submitted to crystallization.

M. Henry points out another agent for purifying strychnine, namely, combining it with nitric acid. The salt is to be afterwards crystallized, after its colour has been discharged by means of animal charcoal; finally, the strychnine may be precipitated from it by ammonia. We may observe, that at the time when M. Henry published his process, it was not known that brucine existed in the *nuxvomica* along with strychnine; so that in the detail of this process there is no mention made of the separation of the two alkalies: it will be readily seen, however, that whenever the strychnine has been obtained by crystallization, it will be free from brucine, or at least will contain but little of it; whilst, when obtained by precipitation, it will be much mixed with brucine, and consequently will be possessed of less action on the animal economy.

It is unfortunate that the St. Ignatius's bean should be so scarce in commerce; for as

this grain contains strychnine almost entirely free from brucine, as M. Pelletier has proved, it would be highly advantageous to employ it for the preparation of pure strychnine.

ACTION OF STRYCHNINE ON MAN AND ON ANIMALS.

The action of strychnine on man and on animals is exactly like that of the alcoholic extract of *nux vomica*; only it is much more energetic: an eighth of a grain is sufficient to kill a large dog, and a quarter of a grain often produces very marked effects on the human body when in health.

CASES IN WHICH STRYCHNINE MAY BE EMPLOYED.

The cases which authorize the use of strychnine, are those before pointed out as benefitted by the resin of the *nux vomica*; indeed it would not be necessary to use strychnine if the extracts of the *nux vomica* were always made in the same manner, and if they were not liable to vary in strength according to the mode of preparation.

Strychnine then is generally the most proper

preparation, because its properties are constant, and its action uniform.

MODE OF EMPLOYING STRYCHNINE.

It may be made into pills, each pill containing one-twelfth or one-eighth of a grain, and the following formula may be used:—

Pills of Strychnine.

Take of

Very pure strychnine 2 grains (1.64 gr. T.)

Conserve of roses $\frac{1}{2}$ gros (29.5 gr. T.)

Mix accurately, and make it into twenty-four very equal pills, and silver them, to prevent them sticking to each other. *

Tincture of Strychnine.

Take of

Alcohol at 36° (.837) 1 ounce (3vij. and gr. 52.56, T.)

Strychnine 3 grains (2.46 gr. T.)

From six to twenty-four drops of this tincture may be administered in mixture or in drink.

* We are accustomed in England to prevent pills from sticking together by rolling them in liquorice powder, or magnesia, or flour; the old plan of gilding and silvering pills is very inconvenient, for if it be perfectly done, the pills will be effectually preserved from the action of the stomach.—Tr.

I have often used the following mixture:—

Stimulating Mixture.

Take of

Distilled water 2 ounces (1 oz. 7 drs. 45 grs. T.)

Of very pure strychnine 1 grain (0.82 gr. T.)

White sugar 2 gros. (118.0 gr. T.)

A dessert spoonful to be taken every morning and evening.*

* “*Cuillerée-à-bouche.*” The dictionary of the French Academy does not particularize the size of this spoonful; but as *cuiller* is “a table-spoon, a spoon with which soup is eaten,” *cuillerée-à-bouche* probably means a table-spoon also; nevertheless, as the French table-spoons are small, the translator has thought it better to say “a *dessert spoon.*” The French *cuillerée ordinaire* is estimated at 15 grammes, or 4 gros of aqueous fluid.

MORPHINE

AND THE

SALTS OF MORPHINE.*

NOTHING better shows the imperfection of the science of medicines, so singularly called *Materia Medica*, than the history of opium; alternately it has been proscribed as eminently hurtful, or vaunted as a panacea. By some it has been supposed to calm and procure sleep; others, on the contrary, have averred that it is always a stimulant: whilst others, less exclusive, have described it to have stupifying, soporific, narcotic, acrid, calming, and other properties. Led by this latter *dictum*, the chemists of the last age sought to find the divers properties of opium in different principles. On the other hand, the most celebrated physicians have not scrupled to put their names to certain preparations of opium which they thought preferable to all others. What effects

* The name generally used in England is *Morphium* or *Morphia*; but as *Morphine* assimilates better with Strychnine, Cinchonine, &c. it is here retained.—Tr.

are there, however, to authorize the celebrity of the laudanum of Sydenham — Rousseau's drops — the tinctures of opium — the syrups of diacodium — the resinous and aqueous extracts, &c. ? And what reason is there why a practitioner should employ any of these preparations to the exclusion of the others ?

The sciences mutually depend upon and assist each other ; and it would have been impossible to remedy this uncertainty without the recent perfection of our chemical modes of analyzing vegetables, and without the happy application which has been made of them in analyzing opium.

The result of this chemical analysis, and especially of the researches of M.M. Derosnes,* Sertuerner,† and Robiquet,‡ is, that opium is composed, 1st, of a fixed oil ; 2d, of matter analogous to caoutchouc ; 3d, of a vegeto-animal substance, which has not yet been sufficiently investigated ; 4th, of mucilage ; 5th,

* In 1803. See *Annales de Chimie*, vol. xlv.—Tr.

† Ibid. vol. v. His principal paper was published in 1817.—Tr.

‡ Ibid. vol. v. p. 276.—In addition to these gentlemen, M. Seguin, in 1804, discovered a crystalline body in opium, and he described most of its properties ; but he seems to have been perfectly unaware of its alkaline properties. Ibid. vol. xcii.—Tr.

of feculent matter; 6th, of resin; 7th, of the remains of vegetable fibres; 8th, of narcotine; 9th, of meconic acid; 10th, of the acid discovered by M. Robiquet; and, 11th, of morphine. This last principle will alone occupy us on the present occasion.

PREPARATION OF MORPHINE.

M. Robiquet's method is as follows : * — He boils, for a quarter of an hour, a very concentrated solution of opium with a small quantity of magnesia, (10 grains [gr. 8.204 T.] to the pound of opium, [15 oz. 6 dr. 1 gr. T.]) † He

* Annales de Chimie et Phys. vol. v. p. 276.

Dr. Paris (Pharm. vol. ii. p. 313.) gives the following as M. Robiquet's process : — "Three hundred parts of pure opium are to be macerated, during five days, in one thousand parts of common water. To the filtered solution fifteen parts of perfectly pure magnesia (carefully avoiding the carbonate) are to be added. Boil this mixture for ten minutes, and separate the sediment by a filter, washing it with cold water until the water passes off clear. After which, treat it alternately with hot and cold alcohol (12.22° Beaumé) as long as the menstruum takes up any colouring matter. The residue is then to be treated with boiling alcohol (22.32° Beaumé) for a few minutes. The solution, on cooling, will deposit crystals of morphia."

† Mr. Thomson says 184 grains to the lb. of opium, which is probably a mistake; because, although he quotes

collects the greyish and sufficiently abundant deposit on the filter, and washes it with cold water. When this precipitate is well dried, he treats it by weak alcohol for some time, at a temperature less than that of ebullition. By this means he separates very little morphine and much colouring matter. He filtrates and washes the precipitate by means of a little cold alcohol: he then strongly boils it in a large quantity of rectified alcohol; he filtrates again whilst the liquor still boils, and he finds that the morphine separates as the liquor cools. He gets rid of the colouring matter by repeated crystallizations.*

Dr. Thomson has given the elementary composition of morphine in the *Annals of Philosophy* for June, 1820.† He also there describes what he considers to be an easy method

from M. Robiquet's paper in the *Annales de Chimie*, his words are, "boil, &c. with a small quantity (184 grains to lib. 1. of opium) of magnesia." 184 grains is not a small quantity.

* Mr. Thomson obtained "from good *Turkey* opium nearly three times the quantity of morphia yielded by the same weight of *East Indian* opium. That from the latter was also more coloured and in smaller crystals." This fact sufficiently accounts for the superiority of the opium from *Turkey*.—Tr.

† It is useless to give this account, because Dr. T. himself shows that it must be inaccurate.—Tr.

of procuring this base in a state of purity. He precipitates a strong infusion of opium by caustic ammonia. He separates the brownish white precipitate by means of the filter. He evaporates the infusion to a sixth of its volume; and on mixing it with a fresh quantity of ammonia, he obtains a new precipitate of pure morphine. He gives time for the deposit to form; he then separates it, by means of the filter, and washes it with cold water. After it is sufficiently drained, he sprinkles it with a little alcohol, which he permits to pass through the filter; this fluid dissolves a large portion of the colouring matter, and also a little of the morphine. He then entirely dissolves the morphine in acetic acid, and takes away the colouring matter which remains, by treating the solution with a little ivory-black. He shakes this mixture often during twenty-four hours, and then throws it on the filter. The liquid passes through entirely colourless; and on treating it again by ammonia, the morphine is precipitated in the form of a white powder. If this base be then dissolved in alcohol, and the solution be permitted to evaporate spontaneously, the morphine crystallizes in the form of beautiful regular crystals. These crystals are perfectly white, have a slight opaline trans-

parency, are entirely devoid of odour, and have an extremely bitter taste. They appear in the form of rectangular four-sided prisms.*

ACTION OF MORPHINE ON MAN AND ON ANIMALS.

Pure morphine being but little soluble, would scarcely seem to form the narcotic part of opium.† Nevertheless, direct experiment has abundantly proved that such is the fact. For example, even the weak dose of a quarter of a grain, or half a grain, of morphine, dissolved in oil, produces very marked narcotic effects; but this narcotic power becomes very manifest when the morphine is combined with acids;

* Sertuerner also uses ammonia, instead of magnesia, to decompose the natural meconate. He then forms a sulphate of morphine by adding sulphuric acid, which he again decomposes by means of ammonia; and after dissolving the free morphine in boiling alcohol, he obtains it in crystals as the liquor cools. This latter method is said, however, to form an impure coloured salt, and also not to yield as much morphine as those described above.—Tr.

† It must be recollected that morphine does not exist free in opium. It is united to the meconic acid, and is thus in the state of a salt of morphine. Should not the meconate be made and tried, it being the natural preparation? —Tr.

because the salts of morphine are more soluble than the morphine itself.*

I employed the acetate, the sulphate, and the hydrochlorate, of morphine, as remedies nearly three years ago, and have found that these salts afford all the advantages which we can hope to find in opium, without having any of its inconveniences.† As my first trials showed that the hydrochlorate was less useful than the acetate and sulphate, I soon discontinued my researches respecting that salt. Perhaps it would be as well if they were resumed.

PREPARATION OF THE ACETATE OF MORPHINE.

This salt is formed by combining directly, in an evaporating dish, acetic acid and morphine, and letting the mixture slowly evaporate to dryness. The difficulty of obtaining it crystallized, on account of its extreme deli-

* See MM. Orfila and Magendie's experiments on this subject in the *Nouveau Journal de Médecine*, tom. i. p. 123.—Tr.

† *Nouveau Journal de Médecine*, Paris, 1818.

quescence, renders it necessary to adopt this mode of preparation.*

PREPARATION OF THE SULPHATE OF MORPHINE.

Dissolve the morphine in sulphuric acid, previously diluted with water. The solution, made hot and evaporated to a certain point, crystallizes, on cooling, in silky tufts. This salt very much resembles the sulphate of quinine, with which it may be confounded; but it becomes red when treated with concentrated nitric acid, which is not the case with the sulphate of quinine.

MODE OF PRESCRIBING THE SALTS OF MORPHINE.

As it was my desire to form officinal preparations of the salts of morphine, which should resemble as closely as possible the most common preparations of opium, I first made a

* The *acetate* of *morphia* crystallizes in soft silky prisms, which are very soluble; the sulphate, in arborescent or branching crystals, soluble in two parts of water at 60°; the *carbonate*, in short prismatic crystals, soluble in four parts of water at 60°. (Thomson's Dispensatory, p. 419.)—Tr.

syrup of morphine according to the following formula :—

Syrup of Morphine.

Take of

Perfectly clarified syrup •• 1 pound, (15 oz. 6 dr. 1 gr. T.)

Acetate of morphine •••• 4 grains, (gr. 3.281 T.)

Form a syrup which will supply the place of the syrup of diacodium; and the more advantageously, as the latter preparation is, as it were, arbitrary, and therefore not uniform.

The syrup of morphine is at present generally used in Paris. The dose is a coffee-spoonful* every three hours. Sleep, however, is often produced by a much smaller quantity — a single coffee-spoonful, for example, given at bed-time in a little water.

Syrup of Sulphate of Morphine.

Take of

Perfectly clarified syrup •• 1 pound, (15 oz. 6 dr. 1 gr. T.)

Sulphate of morphine •••• 4 grains, (gr. 3.28 T.)

Form a syrup.

The dose is the same as that of the syrup of morphine.

* Anglicè, “a tea-spoonful.” The French drink much coffee and but little tea. Their coffee-spoons are very small.—Tr.

I use this syrup when patients have become accustomed to the action of the syrup of the acetate: for, generally speaking, by varying the salts of alkaline medicines, their action on the animal economy may be kept up for a very long time, and without increasing the dose too much.*

Anodyne Drops.

Take of

Acetate of morphine.....	16 grains, (gr. 13.12 T.)
Distilled Water.....	1 ounce, (7 dr. 52.5 gr. T.)
Acetic acid	3 or four drops.
Alcohol	1 gros, (gr. 59 T.)

To keep the salt in solution.

These drops are a good substitute for liquid laudanum, Rousseau's drops,† tincture of opium, &c.

* Some English writers have denied the truth of this observation; but they have not given any reason for their scepticism. Why should it not be true?

† Rousseau's drops resemble the black drop. The mode of forming them is as follows: — "Take of white honey ℥xij (11 oz. 6 dr. 30.72 gr.), warm water ℔ij. (47,203 T.); dissolve the honey in the water; pour the mixture into a matrass, and place it in a very warm place: when the fermentation commences, add 4 ounces (3 oz. 7 dr. 30.2 gr. T.) of opium, previously dissolved in ℥xij. (11 oz. 6 dr.

The dose is from 6 to 24 drops. The sulphate of morphine may be used instead of the acetate, if it be thought right.

Besides these forms of prescription, the acetate and sulphate of morphine may be given in pills, in electuary, in draughts, or in mixtures; the dose being from a quarter of a grain to a grain (from gr. 0.205 to 0.820 T.) in the twenty-four hours.

30.7 gr. T.) of water; suffer the fermentation to continue for a month, in a situation the temperature of which is 30° (86° Fah.); then strain, filter the liquor, and evaporate it until only 10 ounces (9 oz. 6 dr. 45.6 gr. T.) remain; strain again, and add of alcohol ꝑivss. (4 oz. 3 dr. 26 gr. T.) Seven drops of this liquid contain about one grain of opium.” — *Conspectus des Pharmacopées de Dublin, d'Edimbourg, de Londres, et de Paris, &c.* Paris, 1820. — Tr.

NARCOTINE;

OR,

THE MATTER OF DEROSNES.

MY researches have not led me to consider this matter as a medicine; I shall, however, give its physiological history here, in a few words, because it is one of the immediate principles of opium, and has thrown, and still throws, much uncertainty over the subject.

If a grain of narcotine, dissolved in oil, be given to dogs, it produces a state of stupor, which superficial observers may readily confound with sleep; it differs, however, evidently from it: the animal's eyes are open, but the respiration is not deep, as in sleep, and it is impossible to rouse the animal from his sullen and motionless state. Death generally takes place in twenty-four hours.

Narcotine, combined with acetic acid, pro-

duces entirely different effects. Animals can support a dose of even 24 grains without perishing, and whilst under its influence, they are agitated by convulsions like those which camphor produces. They exhibit the same signs of fright, the same motions backwards, the same incapability of going forwards, and, lastly, the same foaming at the mouth, the same convulsions of the jaws, &c.

When I have given morphine and narcotine together, the different effects of each have been produced at once in the same animal.

A grain of morphine, for instance, and a grain of narcotine, each dissolved in acetic acid, were placed in the pleura of a dog. The animal soon became drowsy, and even actually fell asleep under the influence of the morphine; but a very singular and remarkable struggle appeared, at the same time, to go on for an hour and a half between the stimulating effects of the narcotine and the anodyne effects of the morphine. At last, however, the animal slept soundly; it being probable that it was then under the sole influence of the morphine. May it not be inferred from this experiment, which I have often repeated in various ways, and with analogous results, that the variable

effects of opium are to be attributed to its containing these two opposite principles.

This opinion derives support from the fact, that persons who take morphine do not experience the exciting property which they can readily distinguish in the aqueous extracts of the shops, in which the narcotine and morphine are contained together.*

* M. Magendie's conjecture is probably true ; and, as it is said in the Translator's Preface, it forms one of the most valuable properties of the isolated morphine, that the stimulating and constipating effects of opium are thus avoided. Mr. Battley ought to publish the formula for his *liquor opii sedativus*. It is beneath him, as an old practising member of the profession, and *really useful* chemist, or rather druggist, to practise such a paltry concealment ; but the Translator knows, by personal experience, that the liquor opii sedativus is devoid of exciting, and almost of constipating, properties — his pulse has repeatedly fallen several beats within a minute after taking 12 or 15 drops.

It seems that Dr. Porter, of Bristol, recommends a *liquor morphii citratus*, which he makes as follows :— Beat four ounces of the best crude opium in a mortar with ʒij. of crystallized citric acid ; mix well with a pint of boiling water ; filtrate after twenty-four hours' maceration. Dr. Paris speaks well of this preparation, and probably with justice.

The Translator, who has, unfortunately, taken more than he likes of Mr. Battley's preparation, once, from necessity, made a substitute, by macerating the dregs remaining after

EXTRACT OF OPIUM DEPRIVED OF NARCOTINE.

Led by these facts, M. Robiquet prepares an extract of opium, which seems to be greatly superior to the common aqueous extract.

He macerates coarsely divided opium in cold water. He filtrates and evaporates to the consistence of a thick syrup. He digests in rectified ether, and, after frequent shakings, decants the ethereal tincture, and then separates the ether by distillation. He repeats this operation as long as crystals of narcotine appear as the residue of the distillation. When the ether produces no further effect, he evaporates the solution of opium to a pilular consistence, and thus obtains an extract which is entirely devoid of narcotine.

This extract may be used instead of the aqueous extracts of the shops.

making tincture of opium in a solution of tartaric acid. The preparation formed a tolerably deep tincture, and 40 drops acted, he thinks, in all respects, like 20 of the liquor opii sedativus. It neither stimulated nor produced costiveness.

EMETINE.

IN a memoir laid before the Academy of Sciences in 1817, M. Pelletier and myself established, by a series of chemical and physiological experiments, that the different species of ipecacuanha owe their emetic properties to a particular immediate principle, which M. Pelletier has called *emetine*. This substance is much more active than ipecacuanha; and as it has neither its disagreeable taste nor nauseous odour, we are of opinion that it may be advantageously used for ipecacuanha on all occasions.

PREPARATION OF COLOURED EMETINE.

Powder the ipecacuanha, and digest it in ether at 60 degrees (.720) to dissolve the fatty odorous matter. When the powder yields nothing more to the ether, exhaust it again by means of alcohol. Place the alcoholic tinctures in a water bath, and redissolve the

residue in cold water. It thus loses a portion of wax and a little of the fatty matter which still remained. It is only necessary further to macerate it on carbonate of magnesia by which it loses its gallic acid, to redissolve it in alcohol, and to evaporate it to dryness.

Emetine, when thus prepared, is not quite pure, as we at first thought. But it may be used with advantage as a medicine in this state.* It appears in the form of transparent scales, of a reddish brown colour. It is nearly devoid of odour. It has a bitter, but not nauseous taste. It is capable of supporting the heat of boiling water without change; is very deliquescent, soluble in water, and incrustallizable.

PHYSIOLOGICAL PROPERTIES OF EMETINE.

Emetine, when given to dogs and cats, in a dose of from half a grain to two or three grains (gr. 0.41 to 1.64 or 2.46 T.), produces vomiting, which is sometimes followed by a long sleep. In a larger dose (10 grains, for instance, [gr. 8.20 T.]) it produces, on dogs, repeated vomitings, after which the animal falls asleep; but instead of awaking in a state

* See the following article on *pure emetine*.

of health, as in the case when emetine is given in a weak dose, the animal usually dies in twenty-four hours. It is found, on dissection, that death is produced by violent inflammation of the substance of the lung, and of the mucous membrane of the alimentary canal extending from the cardia to the anus. These phenomena have the greatest analogy with those which are produced by emetic tartar, which I described, in 1813, in a paper entitled, "*On the influence of emetic tartar on man and on animals.*"

The result is still the same if the emetine be thrown into the jugular vein, or be simply absorbed from any part of the body.

ACTION OF EMETINE ON MAN IN A STATE OF HEALTH.

Two grains (gr. 1.64 T.) of emetine, swallowed fasting, produce continued vomiting, followed by a decided disposition to sleep. Even a quarter of a grain (gr. 0.205 T.) is sometimes sufficient to produce nausea and vomiting.

ACTION OF EMETINE ON MAN IN A STATE OF
DISEASE.

Emetine acts in this case exactly in the same way as it does on man in a state of health. It vomits and purges, as in the former; in addition, however, it is easy to prove that it exerts a happy influence on catarrhal affections, especially when chronic.*

The cases in which emetine may be employed are exactly such as ipecacuanha may be used in.

MODE OF USING EMETINE.

To produce vomiting, 4 grains (gr. 3.28 T.) may be dissolved in any vehicle, and given in divided doses, repeated at short intervals.

If the whole of so soluble a medicine be given at once, it is entirely expelled by the first vomiting, and no other action is produced.†

* See Chemical and Physiological Researches on Ipecacuanha, by MM. Magendie and Pelletier. Paris, 1817.

† This is a curious and somewhat improbable circumstance; for although a large dose of the powdered ipecacuanha produces scarcely more effect than a small one, and probably for the reason given by M. Magendie above,

The following mixture may also be used:—

Emetic Mixture.

Take of

Emetine 4 grains (gr. 3.28 T.)

A light infusion of orange

flowers 2 ounces (1 oz. 7 dr. 45 gr. T.)

Syrup of orange flowers .. $\frac{1}{2}$ an ounce (dr. 3.56 T.)

A dessert spoonful* to be given every half hour.

In chronic pulmonary catarrhs, in whooping-cough, in chronic diarrhœa, the following lozenges may be advantageously employed, instead of the common ipecacuanha lozenges:—

Pectoral Lozenges of Emetine.

Take of

Sugar 4 ounces (3 oz. 7 dr. 30 gr. T.)

Coloured emetine 32 grains (gr. 26.24 T.)

Form into lozenges of 9 grains (gr. 7.38 T.) each.

yet this is supposed to arise from the powder being a bulky and insoluble substance. The truth of this explanation is supposed to be proved by the fact, that the same exemption from an increase of effect does not follow when emetic tartar is given in a large dose; its emetic power increasing with the dose. By analogy, a similar increase of effect might be when an increased dose of emetine is given; it being in solution, and in as small a bulk as in the case of emetic tartar. But M. Magendie is not a man to speak at random.—Tr.

* *Une cuillerée-à-bouche.*" See note above, page 16.—Tr.

It is common to colour these lozenges red, to distinguish them from ipecacuanha lozenges. A little carmine may be used for this purpose.

One of these lozenges may be given every hour : if oftener, they will excite nausea.

Emetic Lozenges of Emetine.

Take of

Sugar 2 ounces (1 oz. 7 dr. 45 gr. T.)

Emetine 32 grains (gr. 26.24 T.)

Form into lozenges of 18 grains (gr. 14.76 T.) each.

One of these lozenges, taken fasting, is commonly sufficient to make a child vomit ;—three or four do the same thing promptly for adults.

The syrup of ipecacuanha of the shops may be replaced by the following syrup.

Syrup of Emetine.

Take of

Simple syrup 1 pound (15 oz. 6 dr. 1 gr. T.)

Coloured emetine 16 grains (gr. 13.12 T.)

This syrup may be employed under the same circumstances, and in the same manner, as the syrup of ipecacuanha.

PURE EMETINE.

EMETINE, as treated of in the preceding article, is not in a state of purity. It is to pure emetine what moist sugar is to white and crystallized sugar. M. Pelletier, in a work, the chemical part of which is not yet finished, shows how the active matter of the different species of ipecacuanha may be isolated. This matter is a new vegetable alkali, the principal characters of which are as follows:—

PREPARATION OF PURE EMETINE.

To obtain pure emetine, it is necessary to substitute calcined magnesia for the carbonate, used in the former process;* a sufficient quantity of this base being added to take up the free acid which exists in the liquor, and unite with that which is combined with the emetine.

The emetine, thus isolated, and rendered less

* See above, page 32.

soluble, is precipitated in combination with the excess of magnesia. This magnesian precipitate, after being washed by means of a little very cold water, to separate the colouring matter, which is not combined with the magnesia, must be carefully dried and digested in alcohol, which dissolves the emetine. After the emetine has been separated from the alcohol by evaporation, it must be redissolved in a diluted acid, and blanched by digestion with purified animal charcoal. It must then be precipitated by a salifiable base.

The waters used to wash the magnesian precipitate still contain emetine, which may be separated by a second series of operations.

Pure emetine is white, pulverulent, and unalterable by the air; although coloured emetine is deliquescent. It is scarcely soluble in water, but is very easily dissolved in ether and in alcohol. Its taste is slightly bitter. It restores the blue of turnsol when reddened by an acid. It is dissolved by all the acids, the acidity of which it diminishes, but without entirely destroying it. It resembles veratrine, in forming evidently crystallizable saline combinations with the acids. It may be precipitated from these combinations by the gall-nut, like the alkalis of the different species of cinchona.

ACTION OF PURE EMETINE ON MAN AND ON
ANIMALS.

This action is similar to that of coloured emetine; but it is much more energetic. Two grains (gr. 1.64 T.) are sufficient to destroy a large dog. In one case the $\frac{1}{16}$ th of a grain (gr. 0.051 T.) produced vomiting in a man of 85 years of age. It is true, however, that the man was easily made to vomit.

MODE OF PRESCRIBING PURE EMETINE.

For some time past I have used the following lozenges:—

Lozenges of Pure Emetine.

Take of

Sugar 4 ounces, (3 oz. 7 dr. 30 gr. T.)

Pure emetine 8 grains, (gr. 6.56 T.)

Form into lozenges of 9 grains (gr. 7.38 T.) each.

To produce vomiting, a grain (gr. 0.820 T.) of pure emetine may be given in a draught; it being first dissolved in acetic or sulphuric acid, on account of its being so little soluble in water.

The following formula may be employed.

Emetic Draught.

Take of

Infusion of the flowers of

the Tilia 3 ounces, (2 oz. 7 dr. 37 gr. T.)

Pure emetine dissolved in

a sufficient quantity

of nitric acid 1 grain, (gr. 0.820 T.)

Syrup of marsh mallows 1 ounce, (7 dr. 52.56 gr. T.)

A dessert-spoonful to be taken every quarter of an hour until vomiting be produced.

The following syrup may also be prescribed.

Syrup of Pure Emetine.

Take of

Simple syrup 1 pound, (15 oz. 6 dr. 1 gr. T.)

Pure emetine 4 grains, (gr. 3.28 T.)

To be given by coffee-spoonsful.

ALKALIS

EXTRACTED FROM

THE DIFFERENT SPECIES OF CINCHONA.

MM. LAUBERT, STREUSS of Moscow, and GOMEZ of Lisbon, published, some years ago, and about the same time, very interesting works on the cinchona; but they did not at all agree with respect to the substance in which they thought that the febrifuge property resided. MM. Pelletier and Caventou, led, by their preceding researches, to believe in the existence of such a substance, endeavoured to find it; and following the same principles which had so happily led to the discovery of strychnine, emetine, &c. they obtained a substance which they recognized as that which M. Gomez had described under the name of *cinchonine*: they discovered also that it was alkaline — a very important property which had escaped the Lisbon chemist.

They obtained the *cinchonine* by operating

on the grey cinchona, the *cinchona condaminea* (they add an *e* to *cinchonin*, to make the word harmonize with the names of the other vegetable alkalis). The yellow bark (the *cinchona cordifolia*) furnished an alkali, which, although it resembled the first in many points, differed in too many important ones to allow of its being confounded with it. They called it *quinine*.

The analysis of the red bark (*cinchona oblongifolia*) followed. It was an interesting question to determine whether this species, which is considered by many medical men as eminently febrifuge,* contained cinchonine or quinine, or a third variety of alkali? They did not dream, however, of obtaining, not only cinchonine, in all respects like that of the grey bark, in threefold quantity, but almost twice as much quinine as they had been able to extract from an equal quantity of yellow bark. This quinine, however, had nearly all the characters of the other, and only showed some

* This is not the common opinion; at least so says Mr. Thomson, on the authority of Zea and Mutis, in his Dispensatory. We side, however, from theory, with M. Magendie's account of the eminent qualities of the red bark. Its containing so large a quantity of both cinchonine and quinine is apparently decisive of the question. Still Mr. Thomson says, "its taste is much less bitter," &c.—Tr.

shades of difference in its greater fusibility, and the appearance of its sulphate.

Ulterior experiments, made on large masses, have shown, indeed, that quinine and cinchonine exist simultaneously in all the three species of bark; but the cinchonine is, relatively to the quinine, in greater quantity in the grey bark; whilst, in the yellow bark, the quinine so predominates, that the presence of the cinchonine might well have escaped notice when small quantities were operated on.

PREPARATION OF CINCHONINE AND QUININE.

Boil the bark in alcohol until it loses all its bitterness; evaporate to dryness in a water bath; dissolve the alcoholic extract entirely in boiling water, strongly acidulated with hydrochloric acid; add an excess of calcined magnesia, which, after boiling some minutes, will fix all the red colouring matter, and make the liquid clear. When cold, filtrate and wash the magnesian precipitate with cold water; dry it on a stove; separate all the bitterness by repeated digestions in boiling alcohol; mix the alcoholic liquors, and the cinchonine will crystallize as the fluid cools. The cinchonine, which

is thus obtained, still contains a green fatty matter, which may be separated by solution in a very weak acid. If the acid be too strong, it will dissolve a part of the fatty matter, and the intended object will be thus defeated.

Quinine may be obtained from the yellow bark by a similar process to the one described above.

It has been said that both cinchonine and quinine are to be found in all the three species of bark. They may be procured by one operation, as follows:—

After having obtained directly the sulphate of quinine, by the process described below, collect the mother waters and the washings of that operation; these contain the sulphate of cinchonine. It is probable that the sulphate has been rendered incrySTALLIZABLE by the small quantity of fatty matter which is contained in these liquors. Decompose these liquors by magnesia or lime. Dissolve the quinine and cinchonine which they contain by digesting the magnesian precipitate, when washed and well dried, in boiling alcohol. If the spirit be sufficiently charged, the cinchonine, which predominates, will crystallize; if it do not, further concentration is required. To purify the cinchonine which is thus obtained, it must

undergo a recrystallization. For this end, dissolve it in a sufficient quantity of boiling alcohol; it will thus become very pure. The alcoholic mother waters still contain quinine, which may be separated by evaporation.

CHEMICAL PROPERTIES OF CINCHONINE.

Cinchonine is white, translucent, crystallizable in needles, and soluble only in 700 parts of cold water. The latter circumstance occasions its little sapidity. If it be dissolved in alcohol, or rather in an acid, its flavour is a powerful bitter, which exactly resembles that of the grey bark. Cinchonine is only dissolved in very small quantity by the fixed oils, the volatile oils, and sulphuric ether; it forms more or less soluble salts with acids. Cinchonine is volatilized at a certain temperature: the largest portion of the substance, it is true, is destroyed during the operation, but still a sensible portion escapes the decomposing action of the caloric.

The sulphate and acetate of cinchonine are used in medicine. The first of these salts is very soluble in water; the second is much less so, but an excess of acid dissolves it with tolerable facility.

CHEMICAL PROPERTIES OF QUININE.

Quinine is white and incrySTALLIZABLE; it is as little soluble in water as the cinchonine; it is much more bitter, however, to the taste. Its salts also are in general more bitter; they are distinguished by a pearly aspect. Quinine is very soluble in ether, while cinchonine is very little so. This difference not only serves to distinguish these cases, but also to separate them when united:

PREPARATION OF SULPHATE OF QUININE.

M. Henry the younger has lately made known an expeditious and cheap process for directly obtaining the sulphate of quinine. He digests, repeatedly, in hot water, acidulated by sulphuric acid (6 or 8 grammes [gr.92.66 or gr.123.55 T.] to each kilogramme [oz.32.17 T.] of distilled water). He blanches the liquors by means of hot lime, and washes the precipitate to separate the excess of lime. He repeatedly digests this precipitate, when well drained, in alcohol at 36° (.837). He then obtains, by distillation, a brown viscid matter, which becomes brittle when cold, and is very

bitter. He digests it in hot water, acidulated by sulphuric acid, and the liquor, when cold, gives perfect crystals of pure sulphate of quinine. He has not succeeded so well in extracting the sulphate of cinchonine from the grey bark by this mode of preparation.

The sulphate of quinine obtained in this way, is in the form of white crystals, which are entirely soluble in water; little so, however, in cold water, but more so in boiling, and especially in weakly acidulated water.*

PREPARATION OF THE ACID SULPHATE OF QUININE.

M. Robiquet, by proceeding somewhat differently, has obtained a sulphate, the characters of which are not the same as those of the preceding. His sulphate is in solid transparent

* Dr. Paris gives the above process with some variation. He directs two pounds of the powdered bark to be boiled for half an hour in sixteen pints of distilled water, acidulated with two fluid ounces of sulphuric acid. The quantity of lime recommended is half a pound, or enough to render the solution of a dark brown, and to produce a reddish brown precipitate. He says that the two pounds yield 3v. or 3vi. of the sulphate; 8 grains being equivalent to an ounce of bark.—Tr.

prisms, of a flattened quadrangular form, well terminated, and soluble even in the cold. M. Robiquet found, by comparative trials, that this difference arises from the prismatic sulphate being acid and the other alkaline. He is certain of the stability of these characteristics; for the salts preserve them without alteration after several crystallizations, although the subsulphate lost each time a small portion of its acid. M. Robiquet found, besides, that he constantly only obtained the acid sulphate, when, in digesting the quinine in water, he could not succeed in dissolving it without a slight excess of acid; whilst, if he made use of alcohol, as the quinine is soluble in that fluid, it is more workmanlike to add only the quantity of acid which is necessary for saturation.

At present the neutral sulphate has been obtained only in solution.

COMPARATIVE ANALYSIS OF THE TWO SULPHATES OF QUININE.

M. Robiquet has given an analysis of the two sulphates in the work just quoted; but as he found that the subsulphate lost a portion of its acid during each crystallization, he has

50 ALKALIS FROM THE CINCHONAS.

given the composition of this salt both after the first and third crystallization.

100 parts of acid sulphate of quinine contains	{ of acid 19.1 of quinine .. 63.5 }	82.6
100 parts of subsulphate, first crystallization	{ of acid 11.3 of quinine .. 79.0 }	90.3
100 ————— third crystallization	{ of acid 10.0 of quinine .. 89.9 }	99.9

ACETATE OF QUININE.

The characteristic of this salt is the great facility with which it crystallizes; it is little soluble in the cold, even with an excess of acid. It thickens in a mass when exposed to cold.

ACTION ON ANIMALS.

As soon as the alkalis were discovered, M. Pelletier, one of the discoverers, sent to me a certain quantity, that I might study their effects on animals. I soon found that neither these alkalis nor their salts were in any respect poisonous, and indeed that they had no sudden appreciable action. This gave a sufficient assurance that they might be tried on man.

ACTION ON THE HUMAN BODY BOTH IN
HEALTH AND IN DISEASE.

A sufficient number of cases induced me to believe that these two alkalis possess the medical properties of the cinchonas, and, consequently, that they may be substituted on all occasions. Several physicians, amongst whom I may mention MM. Double, Villermé, and Chomel, have arrived at similar conclusions.

We know how advantageous it is in the treatment of disease to be certain of the precise dose of all active remedies ; this advantage especially applies to the present case, because the quantity of the alkalis contained in the cinchonas varies prodigiously, according to the nature and quality of the bark which is employed. It is often also very desirable to administer this medicine in a small volume, and in an agreeable form. Patients often die of malignant fevers, because they cannot swallow the necessary quantity of the bark in powder. Some throw it up after having taken it ; and in others superpurgation arises, so that the powder passes through the intestinal canal without producing any effect ; even in the most favourable cases it is necessary the

patient's stomach should, as it were, chemically analyse the bark with which it is filled, and extract its febrifuge principle. A process like this will be always difficult and fatiguing even for the strongest stomach. Chemistry, therefore, has done a great service to medicine, by showing how this separation may be accomplished beforehand.

MANNER OF EMPLOYING THE ALKALIS EXTRACTED FROM THE CINCHONAS.

The sulphates of quinine and cinchonine are the preparations most commonly employed. From one to ten grains (gr. 0.82 to gr. 8.20 T.) of either of them may be given in the twenty-four hours. Some physicians have thought it necessary to carry the dose much higher than this, but in general the success has not answered to their expectations; several patients, indeed, have experienced somewhat severe accidents, such as great agitation with very strong cerebral excitement. In no case have I been obliged to give more than ten grains (gr. 8.204 T.) in the twenty-four hours, and I have never found it to fail in its effect.

M. Pelletier has prepared, according to my

formula, a colourless and transparent syrup of cinchona, each ounce (7 dr. 52 gr. T.) of which contains two grains (gr. 1.64 T.) of quinine. I daily use this preparation with the most satisfactory results; it appears to me to exert a happy influence over the scrophulous affections of children.

Syrup of Quinine.

Take of

Simple syrup..... 2 pounds, (31 oz. 4 dr. 2 gr. T.)
Sulphate of quinine .. 64 grains, (gr. 52.48 T.)

Six spoonful of this syrup are commonly sufficient to arrest the progress of intermittent fevers; I have even seen one of the pernicious kind yield to the same dose.

Wine of Quinine.

Take of

Good Madeira wine 1 litre, (oz. 32.104 T.)
Sulphate of quinine..... 12 grains, (gr. 9.84 T.)

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

Tincture of Quinine.

Take of

Sulphate of quinine..... 6 grains, (gr. 4.92 T.)
Alcohol of 34° (.847) 1 ounce (7 dr. 52.5 gr. T.)

54 ALKALIS FROM THE CINCHONAS.

The sulphate is to be preferred to the pure quinine in this case, because, when the tincture is made by using alkali not saturated by an acid, a precipitate is formed on adding it to aqueous liquors.

The wine of quinine may be extemporaneously prepared by putting two ounces (1 oz. 7 dr. 45 gr. T.) of the tincture to each pint bottle (lbs. 2.54 T.) of wine.

PREPARATIONS OF CINCHONINE.

Cinchonine has also been employed as a febrifuge and tonic, particularly by Dr. Chomel; but although both these properties have been observed in it, it would seem to possess them in a minor degree when compared with the quinine; in certain cases, indeed, the febrifuge effect has been completely wanting. It is consequently to be desired that practitioners should institute fresh trials regarding the virtues of this substance, which is found in almost all the cinchonas united with quinine, and may be met with alone in that of Carthagena. In order to forward such researches, I have made the following formulæ: —

Syrup of Cinchonine.

Take of

Simple syrup 1 pound, (15 oz. 6 dr. 1 gr. T.)

Sulphate of cinchonine, 48 grains, (gr. 39.36 T.)

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

Wine of Cinchonine.

Take of

Madeira wine 1 litre, (oz. 31.104 T.)

Sulphate of cinchonine 18 grains, (gr. 14.76 T.)

Like the wine of quinine, this may be made with *vin ordinaire*.

Tincture of Cinchonine.

Take of

Sulphate of quinine 9 grains, (gr. 7.383 T.)

Alcohol at 34° (.847) 1 ounce, (7 dr. 52.5 gr. T.)

This tincture may be used for preparing extemporaneously the wine of cinchonine, by adding two ounces (1 oz. 7 dr. 45 gr. T.) of the tincture to a pint (lbs. 2.54 T.) of Madeira wine.

VERATRINE.

It is again to the labours of MM. Pelletier and Caventou that we are indebted for the new alkali which we are about to consider. These indefatigable chemists having remarked, that almost all the individuals of the family of *veratrum*, besides having the characteristics described by botanists, possess a very acrid taste, and exercise a common action over animals, thought that it would be interesting to discover if these properties did not arise from a particular substance common to all these plants. An analysis of the seeds of the *veratrum sabadilla* confirmed their conjectures. They isolated this acrid principle, in which they recognised all the alkaline characters. They ultimately discovered it in the root of the colchicum (*colchicum autumnale*), and in that of the white hellebore (*veratrum commune*); and they called it *veratrine*, from the name of the family to which these vegetables belong.

PREPARATION OF VERATRINE.

They repeatedly digested the seeds of the *veratrum sabadilla* in boiling alcohol. These tinctures, filtrated whilst almost boiling, deposited, on cooling, whitish flakes of wax. They redigested the matter which remained dissolved, after evaporating it to the consistence of an extract, in cold water: a small quantity of fatty matter now remained on the filter. The solution was slowly evaporated, and it formed an orange yellow precipitate, which possessed the characteristics of the colouring matter found in almost all the woody vegetables. On adding a solution of acetate of lead to the liquor, which was still deeply coloured, a new and very abundant yellow precipitate was immediately formed, which was separated by means of the filter. The liquor, now nearly colourless, still contained, amongst other substances, the acetate of lead, which had been added in excess: a current of hydrosulphuric acid was used to separate the lead. The liquor was then filtrated and concentrated by evaporation, was treated by magnesia, and again filtrated. The magnesian precipitate was digested in boiling alcohol. The alcoholic

liquors gave, on evaporation, a pulverulent substance, which was extremely acrid, and possessed all the properties of the alkalis. This substance was at first yellowish; but, by solutions in alcohol, and subsequent precipitations, caused by pouring water into the alcoholic solutions, it was obtained in the form of a very white and perfectly inodorous powder.*

CHEMICAL PROPERTIES OF VERATRINE.

Veratrine is scarcely at all soluble in cold water; boiling water, however, dissolves $\frac{1}{1000}$ of its weight, and becomes sensibly acrid.

It is very soluble in ether, and still more so in alcohol. It is insoluble in the alkalis, and soluble in all the vegetable acids. It saturates

* MM. Pelletier and Caventou's paper is in the Journal de Pharm. for August, 1820. According to these gentlemen, the root of the veratrum album consists of "a fatty matter, composed of elaine, stearine, and ammonia, acidulous gallate of veratrine, a yellow colouring matter, starch, gum, and lignin;" and the colchicum bulb of veratrine, a fatty matter, gallic acid, a yellow colouring matter, gum, starch, inulin in great abundance, and lignin. Thomson's Dispensatory, p. 545 and 257. Hence both hellebore and colchicum owe their powerful properties to the *gallate of veratrine*. — Tr.

all the acids, and forms with them incrySTALLIZABLE salts, which, on evaporation, take the appearance of gum. The sulphate alone affords rudiments of crystals when its acid is in excess.

Nitric acid combines with veratrine ; but if added in excess, especially when concentrated, it does not produce superoxidation, as in the cases of morphine and strychnine ; but it very rapidly converts the vegetable substance into its elements, and gives birth to a yellow detonating matter analagous to the *bitter of Welther*.

Veratrine restores the blue of turnsol paper when reddened by acids. Exposed to the action of heat, it liquefies at a temperature of 50° (122° Fah.) above zero, and has then the appearance of wax : on cooling, it forms an amber-looking mass of a translucent appearance. Distilled on the naked fire, it swells up, is decomposed, and produces water, much oil, &c. A voluminous carbonaceous mass remains, which, when incinerated, only leaves a very slightly alkaline residuum.

ACTION OF VERATRINE ON ANIMALS.

A very small quantity of acetate of veratrine,* thrown into the nostrils of a dog, immediately provokes a violent sneezing, which sometimes continues for nearly half an hour.

One or two grains (gr. 0.82 or 1.64 T.) placed in the gullet, immediately produces abundant salivation, which continues for some time.

If a small quantity be thrown into any part of the intestinal canal, and the body be opened to observe the effects, the intestine is found to become much indurated, and to relax and contract alternately for a certain time. The part of the mucous membrane which comes in contact with the veratrine is inflamed; the irritation spreads, and vomiting and purging are produced. In a much larger dose the substance induces a very great acceleration of the circulation and of respiration, which is soon followed by tetanus and death.

The effects are still more rapid if one or two grains (gr. 0.82 or 1.64 T.) be thrown into the

* Of all the preparations of veratrine, the acetate alone, as being one of the most active, has been used in the experiments instituted for determining the action of this substance on animals.

pleura, or into the tunica vaginalis. In less than ten minutes death occurs, preceded by tetanic convulsions.

The same quantity thrown into the jugular vein equally induces tetanus and death in a few seconds. Dissection shows, even in this case, that the veratrine has produced an effect on the intestinal canal; for the mucous membrane is found to be highly injected. The lung also presents signs of inflammation and of engorgement.*

* It is apparent from the above, that when a small quantity of this substance is placed in the intestinal canal, it produces only local effects, or, at least, that the effects are restricted to the canal; and that it must be given in a large dose, or be applied to parts whence absorption goes on very actively, as to the pleura and the tunica vaginalis, in order that its terrific general effects above-mentioned may be produced.†

† It may be added to this note of the Author, that the deleterious effects of an over-dose of colchicum in the human subject do not exactly accord with the account given by him. Colchicum certainly induces inflammation of the mucous membrane of the bowels, whenever it is given in too large a dose; the Translator, from a large experience, thinks in all cases: but it never, probably, produces tetanic convulsions, nor any thing resembling them. The Translator thinks it right to give the following fatal case of gout, from an over-dose of the tincture of colchicum

ACTION OF VERATRINE ON MAN IN A STATE
OF HEALTH AND OF DISEASE.

The effects of veratrine in a large dose have not been observed on man: doubtless, how-

bulb, in elucidation of this opinion. He has also heard of other corroborative cases, where death followed a large dose of other preparations of colchicum, especially one where a female took a tea-spoonful of the seeds. The note of the case of gout, made at the time, has been kindly furnished by the attendant practitioner.

"Mrs. —, aged forty, after frequently suffering from gout, requested her medical man to give her the colchicum in a very severe fit.

"She took ʒiiss. of a tincture made by infusing ʒiv. of the root in ʒviiij. of proof spirit for three days, the mixture being kept at nearly 100° of temperature. This was given in the morning of Dec. 5. In the evening it had produced no effect, except slight qualmsiness. Calomel gr. iij. opii gr. i. was ordered at bed-time, and a purging draught for the morning. However, in the night, vomiting and purging commenced, and continued all the next day, in spite of effervescing volatile saline draughts with opium; so that in the evening of the 6th, opii gr. i., camphor gr. iii., were given and repeated in two hours.

"On the 7th, from accident, she was not seen till three *p. m.*, when she was found in the collapse preceding death. The gout had previously gradually subsided. It was stated that she became faint at two o'clock *p. m.*, and not

ever, they would be the same as those which are observed in animals.

The taste of veratrine is very acrid, but without bitterness. It excites a very abundant salivation, however small the quantity may be which is put into the mouth.

Though veratrine is absolutely inodorous, it is inconvenient to smell at it too closely when in a state of powder; for even the small quantity which is thus carried into the nostrils is often sufficient to produce violent sneezing, which may become dangerous.

till then were her friends alarmed. By opium and spirits warmth was reinduced upon the extremities, and a feeling of greater comfort produced; but the pulse never completely recovered, although the sickness was completely subdued; so that at ten *p. m.* she fell into an apoplectic kind of sleep, which terminated in death before morning.

“It is peculiar, in this case, that Mrs. — was delicate, and some years before had nearly suffered death from incessant vomiting attended by cold extremities; it was relieved by inducing gout on the swelled knee by mustard cataplasms. In the fatal attack the sinapism was applied, with the effect of producing great pain, but without inflammation or heat of skin.

“It should be mentioned also, that this female’s mother is exceedingly susceptible of the action of colchicum, in even very small doses. The attendant practitioner begged also to add, that he only prescribed so large a dose as $\mathfrak{z}\text{iiiss.}$, because the tincture had only been made three days, and the formula directed it should be infused a fortnight.’

A dose of a quarter of a grain (gr. 0.205 T.) rapidly induces very abundant alvine evacuations. If the dose be augmented, it occasions more or less violent vomiting.

I have lately given it in the dose of two grains (gr. 1.64 T.) in the 24 hours, without producing too many alvine evacuations. The subject of the case was an old man, who had been struck with apoplexy some time previously. This circumstance forms an additional proof of the influence which the nervous system possesses over the mode of action of medicines.

After having cautiously tasted the mixture which contained the two grains (gr. 1.64 T.) of veratrine, I experienced, for several hours, an almost insupportable acrid sensation in the mouth and pharynx, the impression of which had not entirely disappeared on the following day. The patient experienced no such inconvenience.

CASES PROPER FOR THE EXHIBITION OF VERATRINE.

As veratrine produces the same effects as the plants from which it is extracted, it may be substituted very advantageously for them because it allows of the quantity of the active

substance used to be estimated, which the other does not.

Veratrine is particularly applicable in cases where it is necessary to excite quickly a strong action of the bowels. When given with this intention, it has answered very well in the case of old people, where an enormous accumulation of fæces existed in the great intestine.

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PRUSSIC

OR

HYDRO-CYANIC ACID.

IN a paper laid before the Academy of Sciences in November, 1817, I made known the successful results which followed the employment of prussic acid in the treatment of diseases of the chest. Since that period this medicine has been used by a great number of medical men, not only in Europe, but in several towns of the United States of America. Every where the success has been the same; so that this formidable substance may now be considered as one of the most interesting remedies which we possess.

Scheele discovered the prussic acid in 1780; but he only obtained it mixed with a varied proportion of water. M. Gay-Lussac first procured it in a state of purity.*

* Annales de Chimie, tom. lxxvii. p. 128. and tom. xcvi. p. 136.

PHYSIOLOGICAL PROPERTIES.

This acid is liquid, transparent, and colourless, at the ordinary temperature. Its taste is at first cooling, but soon becomes acrid and irritating. It slightly reddens the tincture of turnsol, has a very powerful, and it may be deleterious odour, which is only supportable when mixed with a very large quantity of air. It then is found to be the same as the odour of bitter almonds.

CHEMICAL PROPERTIES.

Prussic acid is very volatile; in fact, it boils at $26^{\circ}.5$ (79.7 Fah.) under a pressure of $0^m.76$,*

* $0^m.76$ probably means $\frac{76}{100}$ of a metre; if so, it is equal to 29.9 English inches, and $0^m.38 = 14.95$. With regard to the $0^m.38$ as the measure of a column of mercury, it may be useful to remark, that it is not uncommon to estimate the force of the expansion of all fluids at any temperature by the column of mercury which they will sustain. This is done by introducing into a Torricellian vacuum a small portion of the fluid to be examined, and applying heat thereto. The apparatus is a curved tube, with two pretty nearly equal legs, one of them being sealed, and the other open to the atmosphere. The force of the vapour is shown by the depression of the mercury in the sealed leg, and its elevation in the other; the difference in the height of the two columns being the measure of it. —Tr.

and at 10° (50 Fah.) it sustains a column of mercury of 0^m.38; still its congelation takes place at 15° (59 Fah.) Also, when a few drops are put on paper, the portion which almost immediately evaporates produces enough cold to crystallize the rest. It is the only liquid which possesses this property.

Prussic acid is but little soluble in water: hence, when it is shaken with ten or twelve times its volume of that fluid, it again collects on the surface like the oils and the ethers. Alcohol easily dissolves it.

When left to itself in close vessels, it sometimes becomes decomposed in less than an hour. It rarely preserves its integrity for more than a fortnight.

MODE OF PREPARING THE PRUSSIC ACID.

Hydro-cyanic acid is obtained by digesting the crystallized deuto-cyanuret of mercury, in two-thirds of its weight of liquid and slightly fuming hydrochloric acid, in a tubulated retort, which communicates with a receiver containing fragments of chloruret of calcium and chalk, and which itself communicates with a much smaller receiver, intended to collect the product. These receivers must be surrounded by

a mixture of ice and salt. After the deuto-cyanuret of mercury and the acid have been successively put into the retort, a slight heat is to be applied; a little ebullition soon succeeds, arising in part from the evaporation of the prussic acid, which is formed and is condensed in the first receiver with a little hydrochloric acid and water. When the quantity of water becomes very sensible, the operation must be suspended. He orders that the product which is already obtained be purified; this is performed by isolating the first receiver from the retort, taking away the ice which surrounds it, and replacing the ice by water at 32 or 33 degrees (89.6 or 91.4 Fah.) Under these circumstances the hydro-cyanic acid passes alone into the smaller receiver; for the water and the hydrochloric acid, which were at first volatilized with it, are now retained in the first receiver; the water by the chloruret of calcium, and the hydrochloric acid by the lime.

ACTION ON ANIMALS.

One drop of pure prussic acid placed in the throat of the most vigorous dog makes it fall

stone dead, after two or three deep and hurried inspirations.

The effects of placing a small quantity of the acid in the eye are similar and almost as sudden.

A drop of acid mixed with a few drops of alcohol, when injected into the jugular vein, kills the animal instantly, as if he had been struck by lightning.

Scarcely any traces of irritability can be found, a few moments after death, in the muscles of animals thus poisoned by prussic acid.

ACTION ON MAN IN A STATE OF HEALTH AND IN DISEASE.

Pure prussic acid produces the same effects on man as on animals. Even the vapour of it must be cautiously avoided; for, if breathed, it produces considerable pain of the chest, and a feeling of oppression, which often remains for several hours. When properly diluted, however, it has the effect of calming the increased irritability which resides in certain organs when in a state of disease.

Even when given in proper doses, if the in-

tervals be too short, it will produce headache and a species of vertigo, which goes off in a few minutes.

CASES IN WHICH IT MAY BE PRESCRIBED.

Properly diluted prussic acid may be given with success in all cases of augmented irritability of the pulmonary organs. Hence it is proper in the treatment of nervous and chronic coughs, of asthma, of hooping-cough, and in the palliative treatment of consumptions. Nay, numerous observations would seem to show that it will cure this latter disease when not beyond its first degree. In England it has been used with success for that hectic cough which is sympathetic of an affection of another organ, and in dyspepsia. In Italy it has been found to calm the too great irritability of the uterus, even in cases of cancer, and to moderate the activity of the heart in almost all sthenic diseases.

MODE OF PRESCRIBING IT.

The medical properties of prussic acid, prepared according to Scheele's method, are not sufficiently determinate, on account of the

arbitrary nature of the process. It is better then to use M. Gay-Lussac's acid, when properly diluted, by adding six times its volume, or 8.5 times its weight, of distilled water. A mixture is formed, which I call *medicinal prussic acid*.

I commonly use the following forms:—

Pectoral Mixture.

Take of

Medicinal prussic acid, 1 gros (gr. 59.07 T.)

Distilled water 1 pound (15 oz. 6 dr. 1 gr. T.)

Pure sugar 1½ ounce (11 dr. 10 gr. T.)

Take a dessert-spoonful every morning and evening at bed-time. The dose may be gradually increased to six or eight spoonful in the twenty-four hours.

It is necessary to shake the mixture every time it is used, lest great inconvenience arise from the acid being accumulated on the surface.

Pectoral Potion.

Take of

Infusion of ground ivy... 2 ounces (1 oz. 7 dr. 45 gr. T.)

Medicinal prussic acid... 15 drops.

Syrup of marsh mallows, 1 ounce (dr. 7.52 T.)

A dessert-spoonful to be taken every nine hours, always shaking the bottle.

Cyanic Syrup.

Take of

Clarified syrup 1 pound (15 oz. 6 dr. 1 gr. T.)

Medicinal prussic acid... 1 gros (gr. 59.07 T.)

This syrup may be added to common pectoral mixtures, and be used as other syrups are*.

* In this country Scheele's method of preparing prussic acid is used almost exclusively, and forms the preparation which is obtained from Apothecaries' Hall and other places. We shall, therefore, give this process below. The dose of this preparation is from $\mathfrak{m}\mathfrak{i}\mathfrak{j}$. to $\mathfrak{m}\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{j}$. given in distilled water, or in almond emulsion. The Translator's doses, however, are regulated by a different rule. He thinks that the advantageous effects of prussic acid, as well as of other powerful remedies, as digitalis, can only be obtained by increasing the dose to the required amount, let that be what it may. But he dare not, with such views, entrust the rate of increase to the patient's discretion: he, therefore, gives nearly every dose himself, regulating the increase and the interval by the effect produced. He makes these observations here, because he is sure that powerful and valuable remedies like these have fallen into disuse, on account of the insufficient or evil effects which have followed a less methodical or cautious exhibition of them.

Scheele's Process, as given by Mr. Thomson, p. 23.—
“ Mix two ounces of Prussian blue with six ounces of red precipitate of mercury, and add six ounces of water: boil the mixture for some minutes, constantly agitating it, when the blue colour will disappear, and the mass assume

REMARKS ON PRUSSIC ACID.

It is not without reason that we have objected to the employment *Scheele's prussic acid*: in fact, this acid is never constant in the proportion of the real acid and the water which it contains, if

a yellowish grey hue. Pour the whole on a filter, and wash the residuum with a little hot water, which is to be added to the filtered liquor. Pour this upon an ounce and a half of clean iron filings, and add three drachms of strong sulphuric acid. Shake this mixture well, and after the powder subsides, pour the fluid into a retort, and distil one-fourth part of it over into a well-luted receiver. This is the hydro-cyanic acid, containing an admixture of a little sulphuric acid, which is readily separated by means of barytic water. La Planche recommends $\frac{1}{6}$ only to be distilled over, and this to be rectified by means of a gentle fire over $\frac{1}{200}$ of carbonate of lime, drawing off afterwards, by means of a gentle fire, $\frac{3}{4}$ only of the whole, thus treated by a second distillation. The acid is obtained of a uniform strength by this method.

“ Other practitioners again prefer *laurel water*, made by distilling two drachms of fresh leaves chopped with four ounces of water, recommitting the distilled water twice afterwards on the same quantity of fresh leaves, and making, ultimately, four ounces of the menstruum; of which, from $\mathfrak{m}\text{xxx.}$ to f. 3j. every six hours, may be given until a sedative effect is produced.”—*Paris's Pharmacologia*, vol. ii. p. 23.

Scheele's process be followed in the making of it: this is owing to the difficulty which exists in uniting the same circumstances in each operation. If, in order to avoid this inconvenience, we wish to prepare the acid, called *Scheele's*, with the pure acid of M. Gay-Lussac, by diluting the latter acid with water, what quantity must we add to it? M. Robiquet (*Journal de Pharmacie*, 1818) proposes to employ two parts of water to one of the pure acid. The acid of Scheele, thus prepared, is twice as strong as the acid which I have recommended, and is consequently attended with greater inconveniences in its employment. These inconveniences are made still greater by the incorrect manner in which M. Robiquet's process is detailed in the *Codex de Paris*. In this formula it is recommended, quoting at the same time M. Robiquet's *Mémoire*, to dilute the prussic acid with an equal quantity of water. After describing this process, the same formulary gives the form for a syrup in which the prussic acid, thus prepared, enters in the proportion of one part to nine of simple syrup. The syrup, so prepared, can only be administered by drops.* Should,

* Several serious accidents have followed the employment of this syrup of the new Codex.—M.

unfortunately, an ounce (7 dr. gr. 52.56 T.) be mixed in a potion, it would produce death.

Notwithstanding what we have just said regarding the strength of the *prussic acid of Scheele*, prepared according to the *Codex*, and the process of M. Robiquet, the majority of physicians represent it as much weaker than my *medicinal prussic acid*, and sometimes order it in the proportion of more than *a gros* (gr. 50.07 T.) in a potion of four ounces (3. oz. 7 dr. 30 gr. T.) to be taken by spoonful. The *pharmaciens* of Paris are in general so much accustomed to see the *prussic acid of Scheele* enter in a large dose into the medical prescriptions, that, in order to avoid accident, they prepare this acid by diluting the prussic acid of Gay-Lussac with *forty parts* of water. This perfectly arbitrary quantity of water, at least, permits them to fulfil without danger the orders which they receive, when, from the high dose of the acid, they observe that it is not my *medicinal acid* which the physician could have meant in his prescription.

SOLANINE.

THIS alkali has been very lately discovered by M. Desfosses, apothecary at Besançon, in two species of the family of solanum, namely, in the nightshade (*solanum nigrum*), and the bitter-sweet (*solanum dulcamara*). It exists in both these plants; but whilst it is evidently contained in the leaves of the latter, those of the nightshade afford no traces of it.

PREPARATION OF SOLANINE.

It is found most abundantly in the berries of the nightshade, where it exists in the state of a malate. In order to obtain it, digest the filtrated juice of these berries in ammonia; a greyish precipitate is formed, which, when washed in a filter and digested on boiling alcohol, gives, by evaporation, the salifiable base in a state of sufficient purity, if perfectly ripe berries have been operated on; but if the berries have been green, the solanine is mixed

with a certain quantity of *chlorophylle*,* which cannot be separated without much difficulty.

PROPERTIES OF SOLANINE.

Perfectly pure solanine is in the form of a white, opaque, and sometimes pearly powder.

It is inodorous; its taste is slightly bitter and nauseous; and its bitterness is developed by solutions in acids, especially in acetic acid. Its salts are incrustallizable, the solutions giving by evaporation a gummy transparent mass, which may be easily powdered.

Solanine is insoluble in cold water, and hot water only dissolves $\frac{1}{8000}$ part. Alcohol dissolves a small quantity.

Its alkaline properties are scarcely manifested by any action on turmeric. It, however, restores the blue of turnsol paper when reddened by acids. It unites with acids even in the cold, and perfectly neutral solutions may be obtained if care be used. Like all other vegetable alkalis, it is saturated by a very small quantity of acid.

* What is this? Probably a name for some of the green matters, or remains of certain vegetables. — Tr.

ACTION ON ANIMALS.

From two to four grains (gr. 1.64 to gr. 3.28 T.) introduced into the stomach of a dog or cat, excites violent vomiting, which is soon followed by a sleep of several hours. Even eight grains (gr. 6.56 T.) were insufficient to kill a young cat. After vomiting violently, the animal slept soundly for more than thirty-six hours.

ACTION ON MAN.

A very small quantity of solanine produces great irritation in the throat. It has a slightly bitter nauseous flavour in the mouth, which is much more intense, however, if the substance be dissolved in a little acetic acid. The acetate is the only salt which has been tried on man: a quarter of a grain produces nausea, but no disposition to sleep.

It appears then that solanine, like opium, produces vomiting and sleep; but whilst its emetic properties seem to be more apparent than those of opium, its narcotic ones are evidently much less powerful.

CASES IN WHICH SOLANINE MAY BE USED.

It has not yet been tried in cases of disease, but it may be used wherever the extract of nightshade, or that of *dulcamara*, is indicated.

DELPHINE.

THIS alkali was discovered, in 1819, by MM. Feneulle and Lassaigne, in the seeds of the stavesacre (*delphinium staphisagria*); the name of *delphine* being borrowed from delphinium, because it is probable that the acrid nature of the plants of this family is owing to the above principle. The other species of delphinium, however, have not yet been examined.

Preparation of Delphine.

Boil a portion of the seeds of delphinium, cleared of their coverings, and reduced to a fine paste, in a little distilled water; pass the decoction through a linen cloth, and filtrate it. Add very pure magnesia, and boil for some minutes. Filtrate again; wash the residue carefully, and digest in highly rectified alcohol. On evaporating the alcoholic tincture, delphine is obtained in the form of a white powder, which affords some points of crystallization.

This is the most simple mode of obtaining delphine. If a large quantity be required, the following is a preferable method, on account of the time and patience necessary to decorticate the seeds.

Submit the uncleaned grain, when well bruised, to the action of weak sulphuric acid. Precipitate the liquor by ammonia, and redissolve in alcohol the delphine which is still slightly coloured. To purify it, draw off the alcohol by distillation; dissolve the residuum in hydrochloric acid, and boil it with magnesia. Alcohol will now dissolve the deposit in a state of perfect purity.

Properties of Delphine.

Pure delphine is in the form of a white powder, which is crystalline when moist, but soon becomes opaque on exposure to the air. It is inodorous, and has a very bitter and afterwards acrid taste.

Water dissolves so small a quantity of it, that it can only be discovered by the slight bitterness it communicates.

Alcohol and ether dissolve it very readily. The alcoholic solution powerfully acts in making the syrup of violets green, and recovers

the blue of turnsol paper when reddened by acids.

Delphine forms with the sulphuric, nitric, hydrochloric, oxalic, acetic, and other acids, very soluble neutral salts, the taste of which is extremely acrid and bitter. Alkalis precipitate it in the form of a white jelly.

CASES IN WHICH DELPHINE MAY BE
PRESCRIBED.

Delphine has not yet been used as a medicine; but if the stavesacre have any medical virtue, we may presume that it resides in the alkali above described. Delphine should, therefore, be given where the stavesacre is indicated, when the salts of this base should be employed on account of their solubility.

GENTIANIN.

THE discovery of this alkali was attended by a circumstance so curious as to deserve to be related.

M. Henry, *chef de la Pharmacie Centrale*, and M. Caventou, were both occupied in analysing gentian at the same time, without being aware of the coincidence. Their results were so identical that it almost seemed as if they had acted in concert; they, therefore, agreed to publish them conjointly.*

Préparation of Gentianin.

Digest powdered gentian in cold ether. A greenish yellow tincture is obtained at the end

* This fact is doubly remarkable: first, because it proves how perfect the means of analysing vegetables have lately become; and, secondly, because it shows the change which the progress of science has made in those who follow scientific pursuits. One hundred years ago, such a coincidence would have produced a violent quarrel, whilst now it only induces a feeling of joy in those who find their discoveries confirmed by others.

of forty-eight hours. If this tincture be filtrated, and the liquor be sufficiently concentrated by exposure to heat in an open vessel, it forms, on cooling, a yellow crystalline mass, which possesses strongly the taste and odour of gentian.

Digest this mass in alcohol until it ceases to give a lemon colour. Add the washings together, and expose them to a slight heat; the yellow crystalline mass reappears, which, towards the end of the evaporation, becomes solid. This mass is very bitter. Redigest in weak alcohol, and all will be redissolved, except a certain quantity of oily matter.

This last alcoholic solution, besides the bitter principle of the gentian, contains its odorous matter, and also an acid substance.

By evaporating this liquor to dryness, dissolving the matter in water, adding a little well-washed calcined magnesia to it, and by boiling and evaporation in a water bath, the greatest part of the odorous matter of the gentian may be driven off. The bitter acid is also taken up by the magnesia, and the yellow bitter principle remains partly free, and partly combined with the magnesia, to which it gives a fine yellow colour. The largest part of the bitter principle may then be obtained pure and

isolated by boiling the magnesia in ether, and evaporating the solution. If it be desirable to separate still more of the bitter principle which the ether has failed to take from the magnesia, it may be done by digestion in enough oxalic acid to make the liquor acidulous. The acid unites with the magnesia, and the bitter principle, which is left free, may be obtained by the means indicated above.

PROPERTIES OF GENTIANIN.

Gentianin is yellow, inodorous, and possesses very strongly the aromatic bitterness of gentian; more decidedly so, however, when it is dissolved in an acid.

It is very soluble in ether and in alcohol, and it may be separated from them by spontaneous evaporation in the form of very small yellow needle-like crystals. It is much less soluble in cold water, which it renders, however, very bitter. Boiling water has more action on it.

Its colour is much deepened by the diluted alkalis, which dissolve rather more of it than water does.

Acids weaken its yellow colour very notably. Its solutions in the sulphuric and phosphoric

acids are even almost colourless. Those with the other weaker acids, however, such as the acetic, are yellowish. Concentrated sulphuric acid carbonizes it, and destroys its bitterness.

Gentianin, exposed in a glass tube to the heat of boiling mercury, is partly decomposed and partly sublimed in the form of small yellow crystalline needles.

Gentianin does not sensibly change the colour of turnsol either when blue or when reddened by acids. It appears to be neutral.

ACTION OF GENTIANIN ON ANIMALS AND ON MAN.

It would seem, from some trials which I have made, that gentianin has no poisonous quality. Several grains thrown into the veins produced no apparent effect. I have myself swallowed two grains (gr. 1.64 T.) dissolved in alcohol: the only inconvenience which I experienced was an extreme bitterness, and a slight sensation of heat in the stomach.

Mode of Prescribing Gentianin.

Apparently the tincture ought to be used the

most frequently. It may be prepared after the following formula:—

Tincture of Gentianin.

Take of

Alcohol at 24° (.903).....1 ounce (7 dr. gr. 52.5 T.)

Gentianin5 grains (gr. 4.1 T.)

This tincture may be used for the elixir of gentian, and in similar circumstances.

Syrup of Gentianin.

Take of

Syrup of sugar1 pound (15 oz. 6 dr. 1 gr. T.)

Gentianin16 grains (gr. 13.12 T.)

This syrup is one of the best bitters that can be prescribed in scrofulous affections.

IODINE.

IODINE is a simple body, discovered, in 1813, by M. Courtois, in the mother waters of soda, as it is obtained from sea-weed. The name of iodine is derived from the Greek word *ἰωδης*, on account of the blue colour of its vapour. Iodine is solid at the ordinary temperature, in the form of small greyish crystals, which have but a feeble tenacity, and the aspect of plumbago. It fuses at 170° c. (338° Fah.) and volatilizes at 175° c. (347° Fah.) forming a very beautiful violet-coloured vapour. This vapour, when enclosed in a receiver, recondenses into crystalline scales.

Iodine is soluble in ether and in spirit of wine; the former taking up more or less according to its degree of rectification. At 35° (.842) and a temperature of 15° c. (59° Fah.) it dissolves nearly $\frac{1}{9}$ of its weight. At 40° (.817) of concentration, and at the same temperature (104° Fah.) it dissolves $\frac{1}{6}$. Water only dissolves $\frac{1}{7000}$ of its weight.

Iodine enjoys the property of forming an acid with hydrogen, and another with oxygen.

Iodine cannot be combined with oxygen in the gaseous form : it unites, however, with it when the gas is in a nascent state, and forms iodic acid.

Iodine has much affinity for hydrogen, and takes it from a great number of bodies. It absorbs it in a gaseous state when the temperature is elevated, and forms with this gas the hydriodic acid, which is composed exclusively of iodine and hydrogen. This acid presents itself under the form of a colourless gas, which has a very strong taste, a very penetrating odour, powerfully reddens the tincture of turnsol, and extinguishes burning bodies.

This gas is very rapidly absorbed by water, and is very largely dissolved in it. It gives out also white fumes in the air by uniting with the aqueous vapour contained in the atmosphere.

Hydriodic acid is obtained by pouring water on an ioduret (*iodure*) of phosphorus, made of eight parts of iodine and one of phosphorus, and distilling the liquor. The first part which rises is scarcely any thing but water ; the last, on the contrary, when collected separately, is

very concentrated, and throws up thick fumes into the air.

Hydriodic acid can be united to a great number of bases: it forms natural salts of them, of which the hydriodate of potash has hitherto been the most commonly employed in medicine. The hydriodate of soda has sometimes also been employed, and apparently with similar success.

Preparation of Iodine.

It has been stated that iodine is extracted from the mother waters formed in the preparation of soda from sea-weeds, where it exists in the form of hydriodate of potash.

These waters are obtained by burning the different fuci which grow on the sea-shores of Normandy, lixiviating the ashes and concentrating the liquor.

To obtain the iodine, pour an excess of concentrated sulphuric acid on these waters, and boil the liquor by degrees in a glass retort to which a receiver is attached. The sulphuric acid seizes on the base of the hydriodate, and on the hydrogen of the hydriodic acid. Hence result sulphate of potash, water, sulphureous acid, and iodine; which latter passes into the receiver along with a little acid in the form of

a violet vapour, and is there condensed. To purify it, it must be washed, mixed with water which contains a little potash, and redissolved.

PREPARATION OF THE HYDRIODATES OF POTASH AND SODA.

If a solution of soda or of potash be poured on iodine in its metallic state, an iodate and an hydriodate are formed, which may be separated by means of alcohol, which only dissolves the latter of these salts. The hydriodate may then be obtained by evaporation. The hydriodates of soda and of potash may also be obtained, like other neutral salts, by directly combining the acid with the oxide.

The hydriodates of soda and of potash are deliquescent salts, and therefore very soluble in water. Their solutions are still capable of dissolving iodine, thus forming an ioduretted hydriodate.

ACTION OF IODINE ON MAN AND ON ANIMALS.

M. Gay-Lussac, soon after the publication of his excellent work on iodine, sent a certain quantity to me, that I might study its effects

on animals. In my first experiments I introduced as much as a gros (gr. 59.07 T.) of tincture of iodine into the veins without any apparent effect.

Dogs made to swallow it vomited; but no other effect followed.

Finding that this new substance was innocuous, I myself swallowed a spoonful of the tincture without farther effect than a disagreeable taste, which went away by degrees after continuing several hours.

I lately also saw a child of four years old who had swallowed, by mistake, a tea-spoonful of the tincture of iodine, prepared by M. Pelletier. The child's lips and tongue were colloured yellow, but no bad consequences resulted.*

* The Translator, who has used iodine freely and successfully in several cases of disease, finds that the above observations scarcely tally with his experience. The tincture frequently stimulates the arterial system so much, that it is necessary to discontinue its use. In one scrofulous case, a girl, six years of age, although she immediately began to recover when she first took the tincture of iodine, and has continued to improve under its use more rapidly than during any former plan of treatment, is still unable to take the remedy for more than three or four days in succession, in consequence of her skin becoming hot, and a disposition to delirium on waking from sleep invariably

CASES IN WHICH THE PREPARATIONS OF
IODINE MAY BE EMPLOYED.

M. Coindet, a physician of Geneva, first used iodine in medicine. He employed it in the treatment of goitre with very marked effects. These trials were repeated by several physicians, both in France and Switzerland; and their observations would seem to prove that we now possess, in iodine, an efficacious remedy for the cure of a disease which has been hitherto cured with difficulty.

Although success may be especially expected to follow the use of iodine when the goitre is recent, and has occurred in individuals who have not yet arrived at maturity, the remedy has, nevertheless, been known to dissipate old, hard, and voluminous goitres: but, as the treatment in these cases is necessarily more protracted, it is found that the long-continued use of iodine injures the stomach. To avoid this inconvenience, iodine has also been applied outwardly by means of friction.

coming on. However, if M. Magendie's observations be taken literally, they lead to an inference, that tincture of iodine is an inert substance, unworthy of notice as a remedy.

Iodine has been employed in the treatment of scrofula with an equal appearance of success. This point, however, is not so well ascertained as in the case of goitre; because much fewer observations have yet been made on the subject.

M. Coindet recommends iodine as a powerful emmenagogue; but this latter assertion has not been hitherto confirmed by the observations of any other physician, and consequently it requires to be proved by other facts.

At the present day (November, 1822,) the Genevese and Swiss physicians are much less enthusiastic with regard to the advantages which they at first imagined to have accrued from the preparations of iodine; they now say that serious accidents have followed their employment, such as chronic inflammation of the stomach, and considerable emaciation of the whole body, particularly of the *mammæ*. I have never witnessed similar accidents, unless the doses have been carried very high; but this is no reason why we should not be very circumspect in the employment of these new preparations.

MODE OF PRESCRIBING IODINE.

Tincture of Iodine.

Take of

Alcohol at 35° (.842)..... 1 ounce (7 dr. 52.5 gr. T.)

Iodine 48 grains (gr. 39.36 T.)

This tincture ought not to be prepared long beforehand, for it soon deposits crystals of iodine. It is to be feared also that the iodine may take up a portion of the hydrögen of the alcohol, and be thus converted into ioduretted hydriodic acid.

The tincture of iodine has been employed with great success in the treatment of bronchocele. It has been also used in scrofula, but not so often as the two following preparations.

The tincture of iodine may be given to adults in a dose of 10 drops, three times a-day, in a little sugared water. The dose may be progressively increased to 20 drops three times a-day:—20 drops contain about a grain of iodine.*

* Besides using the tincture of iodine successfully in a few cases of scrofula, the Translator once saw it signally beneficial in a case probably of pulmonary tubercles, in

Solution of Hydriodate of Potash.

Take of

Hydriodate of Potass..... 36 grains (gr. 29.52 T.)

Distilled water 1 ounce (7 dr. 52.5 gr. T.)

This solution is still capable of dissolving iodine; and it may thus be made to form an ioduretted hydriodate of potash.

Both these preparations, which may be

which he prescribed it according to the suggestion of Dr. Baron in his last work on Tubercles. A thin youth passed the winter and early part of the spring of 1823 in suffering from an almost unremitted succession of attacks of pulmonary excitement. His pulse rose during these exacerbations, his skin became hot, cough came on, and frequently the attack did not terminate without the expectoration of purulent matter and the occurrence of hectic fever and of night sweats; generally however these exacerbations were speedily and perfectly dissipated by the moderate use of colchicum, so that the pulse fell to 72 beats in the minute and all the other symptoms subsided. Still, early in May, the patient was thin, pale, and in other respects having the appearance of a person labouring under incipient phthisis. Under these circumstances he took ten drops of the tincture three times a-day. He almost immediately said he had not received so much benefit from any former medicine; and after continuing its use for a month he was discharged apparently well, not

given in the same manner as the tincture of iodine, are like it used in the treatment of goître and of scrofula. In this latter case tonics are usually joined with them in the treatment.

Ointment of Hydriodate of Potash.

Take of

Hydriodate of potash..... $\frac{1}{2}$ gros (gr. 29.5 T.)

Hog's lard $1\frac{1}{2}$ ounce (11 dr. 48 gr. T.)

This ointment is to be rubbed, morning and evening, on the bronchocele or scrofulous enlarged glands. The quantity for each friction must be about half a drachm (gr. 29.5 T.) At the end of eight days it may be increased to a drachm (gr. 59 T.), and even more according to the age of the individual and the extent of the tumour.

It sometimes happens that tumours are coming, having had one feverish attack, and being fat and with the countenance of health.

In a case too of intermittent fever (a girl eight years old), in which the fever had repeatedly recurred after being suspended by cinchona, the tincture of iodine was prescribed in a small dose three times a day, and the fever did not again recur.

pletely removed by this application which the saline solutions had not been able to dissipate entirely. Sometimes also the treatment by friction is not alone sufficient; so that it is often necessary to join the two methods together. Generally the saline solutions would seem to be the most efficacious in the treatment of scrofula.

When the method by friction is used in goître the action of the iodine is sometimes much assisted by emollient fomentations or leeches. Occasionally after the first applications the goître instead of softening becomes hard and slightly painful. Leeches commonly remove this local irritation; and then the effects of the iodine show themselves in a very marked manner.*

* Quære.—What have the leeches to do in producing this very marked effect?

EXTRACT OF OPIUM

DEPRIVED OF MORPHINE.

THE operation described under the article MORPHINE does not entirely deprive the opium of this alkali. The residuum always contains a certain quantity. M. Robiquet having communicated to me this fact, I was desirous of seeing whether some further preparation could not be made from a matter considered to be useless and abandoned as such by the apothecaries.

I remarked that this residuum still exerted a certain narcotic property on animals and on man, a less marked one it is true than that of the common aqueous extracts, but sufficiently strong to make it perhaps useful in practice.

This extract may be given by grains; four grains are not apparently equivalent to a grain of the ordinary aqueous extract or to a quarter of a grain of morphine.

Extract of opium deprived of morphine ought to be kept by all apothecaries who prepare their morphine.

EXTRACT OF OPIUM

DEPRIVED OF THE MATTER OF DEROSNES.

My experiments on the matter of Derosnes having shown that it is hurtful when not united to an acid, and very exciting when so united,* M. Robiquet attempted to prepare an extract of opium which should be entirely devoid of this substance. For this purpose, he digested the ordinary aqueous extract in ether, and thus deprived it of all the matter of Derosnes.†

* This latter fact has been recently disputed by M. Orfila. I am ignorant what it is which has prevented him from arriving at a similar result to myself; but I vouch for the exactness of the fact which I have advanced and am ready to prove it to M. Orfila whenever he wishes.

† Mr. Thomson, in a note to the account of the *extractum opii*, in his *Dispensatory*, says,

“ This extract, however, contains some of Derosnes’ salt also, or narcotine as it has been lately termed; and this is supposed to produce the excitement, which even the aqueous extract occasions previous to its sedative effect. M. Robiquet (*Jour. de Pharmacie*, May, 1821,) proposes to free it of this principle by agitating the extract as soon as it acquires the consistence of syrup with ether,

I have tried the extract thus prepared on animals. Its action appears to be decidedly narcotic and entirely like that of morphine; only weaker.

I have also employed it in practice with advantage, especially on a young Greek physician of the greatest promise who had not been able to bear well the common aqueous extract of the shops.

This new preparation of opium, therefore, seems to deserve the attention of physicians.

and repeating this agitation with fresh portions of ether as long as the extract on distillation deposits any crystals of narcotine. The extract, thus prepared, contains only morphia, gum, and extractive." p. 769.

It may be added that the freedom from narcotine which characterizes the *extractum opii* (which is aqueous) ought to recommend it to medical men as preferable to the tincture of opium, which contains narcotine in abundance on account of its being a spirituous solution. — Tr.

LUPULINE.

THE existence of this substance in the hop has lately been remarked by M. Ives of New York. It had been described in France by M. Planche and more recently by MM. Chevalier and Payen under the name of *matière jaune du houblon*.

It presents itself under the form of small shining yellowish grains which cover the base of the scales of the hop.

It is of a golden colour, pulverulent, and of an aromatic odour.

When submitted to analysis it is found to be chiefly composed of resin, volatile oil in small quantity, and a bitter principle. It is to this latter principle that the name of *lupuline* ought it would seem to be reserved. It has a very bitter taste and is soluble in water, alcohol, and ether, to which it communicates its bitterness.

ACTION ON MAN AND ON ANIMALS.

M. Ives esteems it at once aromatic, tonic, and narcotic. On this subject I can say no-

thing with certainty. I have tried at different times both the lupuline in substance and its different preparations on animals; but I have never observed that it is a narcotic, although the property is one which is the most strikingly displayed in experiments on animals.

MODE OF EMPLOYING LUPULINE.

Powder of Lupuline.

Take of

Lupuline..... 1 part.

White sugar, powdered,..... 2 parts.

First powder the lupuline in a porcelain mortar and afterwards add by degrees the sugar: mix them accurately.

Pills of Lupuline.

Bruise it strongly and divide into pills.

This substance becomes converted into a ductile mass, which renders it unnecessary to add any excipient.

Tincture of Lupuline.

Take of

Bruised Lupuline..... 1 ounce (7 dr. 52.56 gr. T.)

Alcohol at 36° (.837) 2 ounces (1 oz. 7 dr. 45 gr. T.)

Digest for six days in a close vessel; strain, press it

strongly, filter, and add a quantity of alcohol at 36° (.837), so as to make three ounces (2 oz. 7 dr. 37.6 gr. T.) of tincture.

Extract of Lupuline.

This extract may be prepared, either with the aqueous infusion when it is bitter and aromatic, or with the decoction when it is equally bitter but less aromatic, and retains some resin.

Syrup of Lupuline.

Take of

Alcoholic tincture of lupuline..... 1 part.

Simple syrup..... 7 parts.

The doses of these preparations are not yet precisely established; but, as the lupuline contains no poisonous property, practitioners may easily determine them.

BRUCINE.

THIS organic salifiable base was discovered, in 1819, by MM. Pelletier and Caventou, in the bark of the false angustura (*brucea antidysenterica*). M. Pelletier has since found it joined with strychnine in the nux vomica.

MODE OF PREPARING BRUCINE.

Brucine is extracted from the bark of the false angustura by a process similar to that pointed out for the extraction of strychnine, with this difference that in this case the *magnesian precipitate* should be much less washed because the solubility of brucine in water is greater than that of strychnine. The brucine is afterwards obtained by evaporating the alcoholic liquors which have been used for treating the magnesian precipitate. It is, however, in a resinous form, on account of its not being yet sufficiently pure to crystallize.

In order to purify it it must be combined with oxalic acid, and the oxalate treated by

a mixture of alcohol at 40° (.817), and of ether at 60°. The colouring matter will thus be dissolved and the oxalate of brucine will remain under the form of a white powder. Decompose this oxalate by magnesia, and add alcohol to take up the brucine. By suffering the alcoholic solution to evaporate in the open air the brucine may be obtained crystallized: if it be evaporated by the aid of heat the brucine will be obtained fused but not less pure.

PROPERTIES OF BRUCINE.

Brucine has a very intensely bitter taste; it is but little soluble in water, although more soluble than strychnine. When it is procured regularly crystallized it presents itself under the form of oblique prisms with parrallelogrammic bases. It dissolves at a temperature nearly equal to that of boiling water, and on cooling concretes like wax. It unites with acids forming with them neutral salts, the majority of which are capable of being regularly crystallized. When placed in contact with concentrated nitric acid it acquires a most intensely crimson colour, which when the substance is warmed changes to yellow. If in this state a solution of the

proto-hydrochlorate of tin be poured upon it a most beautiful violet-coloured precipitate is formed; this property appertains solely to brucine.*

ACTION OF BRUCINE ON THE ANIMAL ECONOMY.

The action of brucine on the animal economy is similar to that produced by strychnine, but it is less energetic. Its intensity has appeared to us in some experiments to be to that of pure strychnine† as 1 to 12. It required four grains (gr. 3.281 T.) of brucine to kill a rabbit. A tolerably strong dog after

* Strychnine, extracted from the *nux vomica*, when treated by the same means sometimes assumes a violet tint. Under such circumstances we may feel assured that it retains brucine; for the strychnine from St. Ignatius's bean and even that from the *nux vomica* when perfectly purified does not produce the *violet colour* with the proto-hydrochlorate of tin.

† Dr. Andral jun. has lately made some fresh comparative experiments on brucine and strychnine, and he has arrived at this result that six grains of brucine are required to produce the effects of one grain of impure, and of a quarter of a grain of pure strychnine.

The difference of action would therefore appear to be greater than what we had at first estimated.

having taken four grains experienced some strong attacks of tetanus, but recovered. Brucine might then be substituted for strychnine, and it would have the advantage of producing similar effects without being attended by the inconvenience of being so very powerful.

MODE OF ADMINISTRATION.

Brucine, like strychnine, may be administered in pills or in tincture, gradually increasing the dose. For medical use the brucine extracted from the bark of the false angustura should be adopted; that which is obtained from the nux vomica is too apt to remain mixed with a certain quantity of strychnine which increases its activity and prevents us from calculating its effects.

CASES IN WHICH IT MIGHT BE EMPLOYED.

As brucine possesses the properties of strychnine, but in a weak degree, it may be administered in the dose of one, two, and even three grains (gr. 0.82, 1.64 or 2.46 T.) without fear of accident in the same circumstances in which the preparations of nux vomica are

indicated. It is even probable that the dose might be carried much higher, but it is better to use the remedy with a wise caution.

It is for experience to decide whether this new substance should be preserved as a medicine or rejected.

THE END.

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