The nurses' materia medica / by Herbert French.

THE NURSES MATERIA MEDICA

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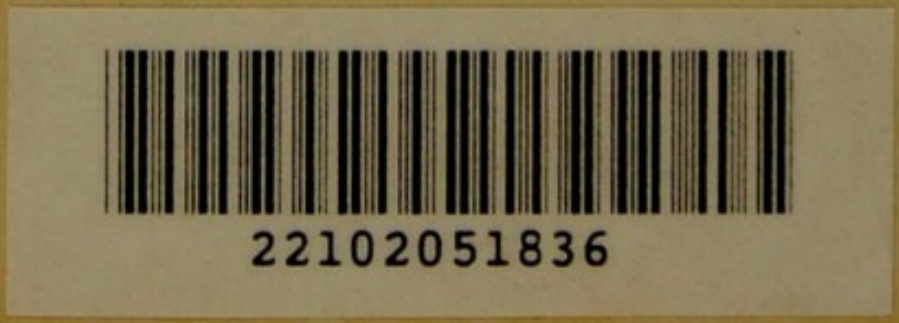

THE NURSES'

MATERIA MEDICA

BY

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PREFACE

The author has responded to repeated requests that a series of articles upon Materia Medica for Nurses which appeared in The Nursing Mirror should be reprinted in book form. It is by no means easy to know how much of a subject should be omitted in order to make the remainder both interesting and useful; whether any success has been attained in this respect in the present instance will be decided by those for whom the volume is intended, namely—the members of the nursing profession.

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THE NURSES' MATERIA MEDICA

BY

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"MATERIA MEDICA" is a wide term which includes such very different subjects as: knowledge of the source, and physical and chemical characters of drugs; the processes by which crude drugs are dealt with by druggists; the ways in which they are prescribed by physicians; their individual modes of action in health and disease; their possible poisonous effects; and the art of alleviating illness by the administration of suitable doses of appropriate drugs in different combinations to patients. It is proposed in the following series of articles to indicate the nature of the drugs that nurses will find in common use, and, without going into too great detail, to give some account of the physiological actions of each and of the kinds of diseases in which they are employed.

The following introductory remarks will perhaps prove helpful before particular or individual drugs are discussed; but the reader is invited to spend but little time in trying to master any of the terms that may seem unduly difficult.

THE SOURCES OF DRUGS.

Drugs are derived from four main sources—namely, (1) From minerals, as in the case of Epsom salts and iodide of potassium; (2) organic chemical compounds, such as sodium salicylate and carbolic acid; (3) from

animal sources, as in the case of thyroid extract or anti-diphtheritic serum; and (4) from vegetable sources, rhubarb, for instance, or belladonna, or nux vomica. A very large proportion of the total number of best known drugs are either of mineral or of vegetable origin; the new-fangled remedies that are constantly being discovered and advertised in the papers are chiefly of the class of organic chemical compounds.

Varieties of Preparations.

Drugs, especially vegetable drugs, are very seldom employed in their crude or original state. The roots, leaves, flowers, or other parts which contain the active ingredients are generally dealt with in some way in order to extract from them as much of the active principles as possible, the useless residue being thrown away. Thus in the case of nux vomica, for example, the crude drug is a flat hard bean of about the area of a halfpenny; one does not prescribe the bean itself, but one uses the extract, or tincture, or other preparation made from the bean—tincture of nux vomica, for example. The following are some of the better-known pharmaceutical preparations that are made from the crude drugs for use in practice:—

Tincturæ or Tinctures.

These are made by treating the crude drug in one way or another with alcohol. It is important to realise this, for whenever one prescribes a tincture one is giving the patient a certain amount of alcohol at the same time in each dose.

There are altogether some sixty-five tinctures in officinal use, though some of them are seldom employed. Those that are commonly met with in practice are tincture of iodine, tincture of belladonna, tincture of digitalis, ethereal tincture of lobelia, tincture of nux vomica, tincture of opium, compound tincture of

benzoin, compound tincture of cardamoms, tincture of guaiacum, and compound tincture of lavender, a colouring reagent. The others will be met with now and then, but not so commonly as the above.

Spiritus or Spirits.

Spirits are also solutions of drugs in alcohol, but they differ from tinctures in their method of preparation; perhaps the best known spirits are spiritus ætheris nitrosi or sweet spirit of nitre, aromatic spirit of ammonia, rectified spirits, and brandy, which is known officinally as spiritus vini gallici.

Pulveres or Powders.

These are very finely powdered dry drugs or mixtures of two or more dry drugs finely powdered together; the best known pharmacopœial powders probably are the following five laxatives or purgatives: Seidlitz powder, officinally known as pulvis sodii tartarati effervescens; compound powder of jalap, or pulv. jalapæ co.; compound scammony powder—pulv. scammonii co.; compound rhubarb powder—pulv. rhei co.; and compound liquorice powder—pulv. glycyrrhizæ co. Two astringent powders that are not infrequently met with are pulv. cretæ aromat.—aromatic chalk powder; and pulv. cret. aromat. cum opio—aromatic chalk powder with opium. A well-known hypnotic powder is pulv. ipecac. co., or Dover's powder; and compound tragacanth powder—pulv. tragacanth. co., is commonly used in order to thicken fluid mixtures in which insoluble solids, such as those of bismuth, have to be suspended.

Aquæ or Waters.

These are for the most part solutions of flavouring agents in water, and they are employed chiefly in

making mixtures and giving the latter suitable tastes. Some of the best known are perhaps peppermint water —aqua menth. pip. ; chloroform water—aqua chloroformi; dill water—aqua anethi; cinnamon water—aqua cinnamomi; and rose water—aqua rosæ.

Extracts.

Extracts are concentrated preparations obtained either by expressing the juice from plants or by steeping the plants in water or alcohol and then evaporating either the juice or the solution obtained nearly to dryness; according to slight differences there are in the precise method of making the extracts, different varieties are described, such as green extracts, alcoholic extracts, liquid extracts, and so on, but the distinction is not of material importance. Upwards of forty extracts are in use, of which the following are probably the best known: Extract of belladonna, extract of cannabis indica, extract of nux vomica, extract of opium, extract of Barbados aloes, liquid extract of ergot, liquid extract of cascara sagrada, liquid extract of male fern—extractum filicis maris liquidum, and liquid extract of liquorice.

Infusions.

Infusions differ from liquors chiefly in their method of preparation; boiling water is poured on to the crude drug in a covered jar, stirred from time to time and then filtered; the fluid thus obtained is an infusion. These preparations have to be made fresh for they will not keep long without decomposing; for the most part they are used as flavouring reagents in mixtures.

Decocta or Decoctions.

Decocta or Decoctions differ from infusions only that in addition to the boiling water being merely added to the crude drug and allowed to stand, it is kept

boiling for some time before straining. Some drugs are so volatile that if they are boiled the active principle gets expelled into the air, in which case it is not possible to make a decoction, but only an infusion.

Emplastra or Plaisters.

Emplastra or Plaisters are sufficiently well known to need no special description; one of the most familiar plaisters is, perhaps, emplastrum belladonnæ or belladonna plaister. Curiously enough, one that is well known—the so-called mustard plaister—is not called an emplastrum, but a charta, namely charta sinapis. This is because it is spread not upon leather, brown holland or silk, like ordinary plaisters, but upon cartridge paper.

Unguenta or Ointments.

Unguenta or Ointments are familiar to all as semi-solid fatty applications for external use. The basis is generally lard, or wax, or spermaceti, or paraffin, or olive oil, or hydrous wool fat; and very often, in order to prevent decomposition, some antiseptic is employed, as in the case of benzoated lard. For use in hot countries it is common to employ paraffin wax of a higher melting-point than that used in Great Britain in order to prevent the ointment from becoming unduly liquid.

Suppositories.

Suppositoria or Suppositories are conical, solid preparations, consisting of active principles mixed with a basis of oil of theobrome, which is more or less firm at the temperature of the air, but which becomes liquid at the temperature of the body, when it is introduced into the rectum or the vagina.

Aceta.

When the active principle of a drug is extracted with acetic acid, the preparation is then known

as an acetum, of which the best known, perhaps, are acetum ipecacuanhæ and acetum scillæ, both of which are employed in cough mixtures.

Lamellæ.

Lamellæ are small flat discs, containing atropine or some other active ingredient, and they are used for putting into the eye.

Trochisci, Troches, or Lozenges.

Drugs are sometimes administered in the form of lozenges, for which the officinal term is *Trochisci.*

There are, of course, many other terms employed in pharmacology, but the above are those which are more likely to be met with in practical nursing.

ACTIVE PRINCIPLES.

Even when drugs have been treated by one or other of the various processes which convert the crude vegetable or other product into a tincture, or an extract, or a decoction, and so forth, as the case may be, the preparation so obtained does not consist entirely of the effective ingredient of the drug in question; for instance, in the case of tincture of nux vomica the active portion of the remedy consists of a very minute quantity of the active principle strychnine dissolved in a much larger quantity of alcohol and water. There are various kinds of active principles. These are obvious enough in the case of simple chemical compounds, such as perchloride of mercury or magnesium sulphate, but they are much more complex in the case of vegetable and animal preparations.

Alkaloids.

The active principles of certain vegetable drugs are known as *Alkaloids,* which are very potent nitrogenous substances that are obtainable in a pure crystalline form. Amongst the best known of the

alkaloids are atropine, cocaine, strychnine, quinine, morphine, codeine, pilocarpine, and nicotine. The termination *-ine* generally indicates that the substance in question is an alkaloid.

Glucosides.

Glucosides differ entirely from alkaloids in that, when they are dry, they decompose, and therefore they have always to be kept in a watery or alcoholic solution. They are called glucosides because the active principle is present combined with glucose or grape sugar. Some examples of drugs whose active principles are glucosides are digitalis, cannabis indica, and male fern.

Essential Oils.

Essential oils are active principles which differ from ordinary oils in that they are so volatile that they evaporate entirely when exposed to the air, leaving behind no greasy mark on paper or on cloth, such as would be left by what are known as *Fixed oils*, of which olive oil is an example. Most essential oils are prepared by distilling the crude drug from which each is obtained, and amongst the best known of them may be mentioned oil of peppermint, oil of cinnamon, essential oil of turpentine, oil of lemon, aniseed oil, and cajaput oil.

Other active principles, which we need not trouble about here, are saponins, resins, oleo-resins, balsams, animal extracts, and the various anti-microbial and anti-toxic sera.

DOSAGE.

The question of dosage is one which concerns the physician and the chemist, rather than the nurse. Certain general principles, however, are worthy of being borne in mind. The Pharmacopœia fixes the dose of each drug and of each officinal preparation of

it, giving the maximum and minimum limits; for instance, it says of tincture of digitalis that the dose is from 5 to 15 minims; what is meant by these figures is that these are the usual lower and upper limits of the dose to be employed for adults, and it may generally be concluded that the pharmacopœial dose may be given with safety; it by no means follows, however, that it would be wrong to give less than the minimum dose mentioned in the pharmacopœia, and it happens not infrequently that the doctor in charge of a case may have good reasons for prescribing more than that which is mentioned officinally as the maximum dose. The dosage given in the books, in other words, is meant merely to afford some indication of the kind of quantity of any given preparation that it is usual and safe to prescribe, but it by no means implies that these are the only possible doses that can be used in correct practice.

Some drugs are very much more powerful than others, and consequently there are very wide differences in the dosage. For example, the dose of alkaloids such as atropine sulphate is from $\frac{1}{200}$ to $\frac{1}{100}$ of a grain. The dose of the average tinctures, such as tincture of opium, is from 5 to 15 minims. The dose of most solid extracts is from one quarter of a grain to one grain; the dose of most aquæ is from one to two ounces; and so on.

There is, however, no need for nurses to try and learn by heart the officinal doses of various preparations: it is sufficient if they acquire a rough idea of whether the dose of a given drug is likely to be a big one or a small one, and this they will learn by experience.

Broadly speaking, when a drug is given per rectum the dose then employed is double that which would be given by the mouth.

Dosage for Children.

As a general rule the dosage of a drug given to children is much less than that for adults. In arriving at the dosage at any given age for children under twelve, the rule is to add twelve to the child's age and then divide the age by the number thus obtained; the resulting fraction will give the proportion of the adult dose that should be given to the child in question. Thus at the age of six the dose will be $\frac{6}{6+12} = \frac{6}{18}$ or one-third of an adult does. From twelve to sixteen years of age from one-half to two-thirds of the adult dose is usually prescribed, and so on up to twenty, when the full dosage is reached. There are exceptions to this general rule, however; certain individual drugs, particularly iron, cod-liver oil, arsenic, chloral hydrate, and belladonna, can be taken in big doses by children; whilst conversely some drugs, particularly opium, have to be prescribed for infants and young children with the very greatest caution.

Weights and Symbols.

The unit of weight employed in Materia Medica in Great Britain is a grain, the symbol for which is gr. Sixty grains make one drachm, the symbol for which is ʒ; and 8 drachms make 1 ounce, the symbol for the latter being ℥. The unit for the measurement of fluids is a minim, the symbol for which is ♏; 60 minims make 1 fluid drachm, and 8 fluid drachms make 1 fluid ounce; 20 fluid ounces make one pint, the symbol for which is O. Roughly speaking a drachm and an ounce are equivalent to each other both in solid and liquid measures. Upon the Continent the metric system is used, and it is probable that this will be more and more widely used in England also, but for the sake of clearness no details in regard to it will be given here.

In practice it is wise to employ accurately graduated glass measures, but sometimes it may be of service to know the equivalence in various sized spoonfuls. A tea-spoonful of average size corresponds fairly well to 1 drachm ; a dessert-spoonful is about 2 drachms ; a table-spoonful is about ½ ounce.

After these preliminary remarks it is now possible to pass on to a discussion of the action and uses of the different groups of drugs commonly employed.

METALS.

Arsenic.

Arsenic is a metal which is never prescribed in its metallic form, though several of its salts are useful remedies. During the process of obtaining lead and tin from ores that come from mines in such places as Cornwall quantities of oxide of arsenic are obtained as a by-product, and from this oxide a solution is prepared known as *Liquor Arsenicalis*. It is frequently known, from the name of its inventor, as Fowler's Solution ; the dose of which is from 2 to 8 minims, and as it has an alkaline reaction owing to the presence in the solution of potassium carbonate it can only be prescribed in neutral or alkaline mixtures ; that is to say, it cannot be prescribed along with acid substances.

There is another preparation, known as *Liquor Arsenici Hydrochloricus*, which is of exactly the same strength as Fowler's solution, but which is so prepared that it can be prescribed in acid mixtures, in which it would be impossible to use Fowler's solution. There are other preparations of arsenic besides these, but one or other of the above liquors is that form which is by far the most frequently employed. It is usual to begin with quite small doses, such as 2 minims at a time, and then, if the patient shows that he is able to bear the remedy without any of the untoward symptoms developing that will be described presently, it is a com-

mon custom to add 1 minim more of the liquor to each dose, at intervals of about a week or ten days, until quite big doses may sometimes be taken with great benefit. There are, however, very marked differences in patients in regard to the amount of arsenic that they can take, so that whereas some can never exceed 5 minim doses of the liquor, others may reach so high a dose as 12 minims or even more.

Another point of great importance in connection with the administration of medicines containing arsenic is that they should always be given when there is food in the stomach, so as to prevent the remedy from coming into direct contact with the gastric mucous membrane before it has been greatly diluted and spread about amongst the food. The instructions will generally be therefore that the dose has to be given p.c., which means *post cibum*, or after food.

Another point in connection with the drug is that patients are apt to become so accustomed to it that the benefits of its action are no longer obtained if it is prescribed continuously. As a rule therefore when arsenic has been given in slowly increasing doses for a period of a few weeks, its administration is then interrupted to be begun again after an interval of another week or two; and when it is begun again in this way it is necessary to start with the small dose once more, and not with the same dose as that at which the patient left off.

The Actions of Arsenic.

(*a*) *In Skin Diseases.*

There are certain maladies in which arsenic is almost constantly employed, and prominent amongst these are certain affections of the skin. It may be used simply to improve a complexion that is not quite perfect, in which case it should be given in quite small doses only; but the skin diseases in particular for which it is of

great use are: Psoriasis, Lichen Planus, Pemphigus, and eruptions associated with the formation of blisters allied to Pemphigus. It has also been found to benefit certain cases of eczema. Broadly speaking the more acute the condition, the less is the arsenic likely to do good.

(*b*) *As a General Tonic.*

The drug is also employed as a general tonic for a very large number of different conditions that may be associated with more or less anæmia. Thus it is frequently given in association with iron to anæmic girls; it may be employed to accelerate convalescence from almost any malady, such for instance as influenza, pneumonia, or typhoid fever, and so on; it may be given to improve the general health and thus assist in the cure of tuberculous glands in the neck or early phthisis, or the anæmia that results from malaria, or the cachexia of tertiary syphilis.

(*c*) *In Chorea.*

Some physicians rely upon arsenic more than upon any other drug in the treatment of St. Vitus' dance or chorea, though in this connection there is increasing evidence to show that greater benefits may be derived from aspirin or aceto-salicylic acid.

(*d*) *In Pernicious Anæmia.*

There are also certain very severe blood diseases, of which one may mention pernicious anæmia as an example, in which, although an absolute cure is scarcely to be hoped for, material benefit has often been obtained, at any rate for a time, from the administration of *liquor arsenicalis* in increasing doses. It is employed in a similar way in cases of Hodgkin's disease and of leucocythæmia.

(*e*) *In Dental Practice.*

Finally it may be mentioned that a paste containing arsenic is employed by dental surgeons for the destruc-

tion of the exposed pulp of carious teeth in that procedure which is generally referred to as "destroying the nerve."

Toxic Effects.

It is important to bear in mind that even medicinal doses of arsenic may produce symptoms of poisoning in certain patients. Amongst the earliest of its untoward effects are loss of appetite, nausea, troublesome diarrhœa, possibly griping pains in the abdomen, and vomiting. Either along with these symptoms or instead of them there may be headache, and a condition of the eyes that may at first be attributed to a cold, the eyelids becoming a little puffy and there being a severe coryza or running of the eyes and nose.

A long continued use of the remedy is apt to produce pigmentary changes in the skin, the most common of these being the development of a general brownness both of the exposed parts, such as the face and hands, and also of the body and limbs even where they are not exposed; in addition to the general brownness there is nearly always extensive spotting with darker brown in a manner which may perhaps be compared to a widespread and general freckling; this general pigmentation is very likely to be permanent, and it is clear therefore that a patient who is taking arsenic regularly should be watched carefully, and the earliest sign of pigmentation should be reported to the doctor, who will then use his discretion as to whether the medicine should be stopped, or whether the malady requires its continuance notwithstanding the concomitant skin changes.

Another ill effect of arsenic, which though fortunately rare is nevertheless very severe when it does occur, is peripheral neuritis, which may lead to extensive wasting of all the muscles of the body and limbs with complete paralysis, and a prostration which even

if it does not prove fatal takes a great many months to cure. Probably the earliest symptom of arsenical neuritis is the occurrence of feelings of pins and needles in the hands and feet, and of cramp-like pains in the muscles of the calves, so that it is important to pay most careful attention to any such symptoms that may occur in a patient under treatment with arsenic, in order that the doctor may hear of them at the earliest possible moment, and modify the treatment accordingly.

Acute Arsenic Poisoning.

The symptoms just detailed are those which arise after small doses have been given over long periods to unduly susceptible persons. It happens occasionally, however, that one has to treat a patient who has taken a single large dose of arsenic accidentally or with suicidal intent; a child may have taken the arsenic by accident owing to some vermin destroyer or weed killer containing the poison being left lying about. The symptoms consist of the most violent gastro-intestinal irritation, which are very apt indeed to produce severe collapse, followed by death in a few hours. Soon after the poison has been swallowed the patient experiences faintness, nausea, and vomiting, together with pain and tenderness in the pit of the stomach. These symptoms rapidly increase, the abdominal pain becoming very severe indeed, and the vomited material containing streaks of blood. When the poison has passed from the stomach into the intestine it leads to profuse diarrhœa, or rather to very frequent and painful action of the bowels with the passage not of fæces but of a watery, almost colourless fluid, like rice water, which may be blood-stained. There is a burning sensation in the throat, with an intense desire to drink, vomiting is incessant, consciousness is retained, though the extremities are cold,

the forehead has a clammy sweat upon it, the pulse is rapid, running, and perhaps barely perceptible at the wrist; the patient rapidly becomes absolutely prostrated and dies of sheer exhaustion. Treatment to be effective has to be adopted at the earliest possible moment. The stomach should be washed out with warm water by means of a rubber tube and funnel; fluids are given in unlimited amount, for even though they are vomited at once they will thereby serve to eliminate any poison that may be still present in the stomach. The special antidote for arsenic is freshly prepared peroxide of iron, which can be made readily by mixing together 3 oz. of Liquor Ferri Perchloridi (B.P.) with 1 oz. of sodium bicarbonate, and enough water to make the resultant precipitate not too thick to swallow. Half an ounce of this should be given every five or ten minutes, its action being to produce an insoluble arsenate of iron, which is innocuous. It is also a good thing to give large doses either of magnesium sulphate, or castor oil, with a view to driving out from the bowel any of the poisonous arsenic that may have passed from the stomach. Simultaneously with the carrying out of the above treatment it is necessary to nurse the patient upon general lines for his collapse, by putting him between hot blankets in a comfortable bed, in a room kept as hot as possible by means of a good fire; hot bottles should be applied to the feet and flanks, and brandy, ether, strychnine solution, hot strong coffee, the hypodermic syringe and needle, rectal tube and funnel, and transfusion apparatus should be got ready for the use of the doctor the minute he arrives.

Bismuth.

Bismuth itself is a metal; it is not used in medicine in the metallic form, but various of its salts are

frequently prescribed, particularly Bismuth Oxycarbonate, of which the dose is from 5 to 20 grains; Bismuth Subnitrate, the dose of which is also 5 to 20 grains, and Liquor Bismuthi et Ammonii Citratis, usually referred to as Liquor Bismuthi, the dose of which is one half to one drachm. The oxycarbonate and subnitrate are both white powders, which are insoluble in water so that when they are prescribed in the form of mixtures the latter are opaque and white, and on standing a heavy white precipitate falls to the bottom of the bottle, which has therefore to be well shaken up before each dose is measured off. It is customary in such cases not to use plain water in making the mixtures, but to thicken the water by adding to it something of a gummy nature, which will prevent the insoluble powder from settling to the bottom so quickly as would otherwise be the case. The mixture of the gum and the water produces a mucilage for the better suspension of the heavy bismuth salts, and the commonest substance to use for the making of such a mucilage is probably compound powder of Tragacanth, usually spoken of as Pulv. Tragacanth. Co. The dose of this is from 20 to 60 grains, and broadly speaking a mucilage of sufficient thickness is produced when 20 grains of the Compound Tragacanth powder are prescribed for each ounce of water.

The chief use of bismuth salts is in connection with symptoms of gastric disorder, particularly in certain cases of dyspepsia, of gastritis, or of gastric or duodenal ulcer. The oxycarbonate may be employed in conjunction with sodium bicarbonate, especially in the relief of acid dyspepsia, and when there is much epigastric pain it is usual to prescribe at the same time small doses—5 to 10 minims, for example—of liquor morphinæ hydrochloridi.

In addition to stomach cases, not a little relief is sometimes obtained from the use of bismuth salts when

diarrhœa is a more prominent symptom than is vomiting or gastric pain. This is particularly the case in children, in whom after any irritating food that may have been present in the bowel has been expelled by means of a purge, but in whom there is still persistent diarrhœa, it is not at all uncommon to prescribe an astringent bismuth mixture such as the following:—

Bismuth oxycarbonate	2 grains
Aromatic powder of chalk with opium	1 grain
Glycerine and tannic acid	5 minims
Mucilage mixture	1 fluid drachm

this being the dose for an infant a year old.

Salts of bismuth have also been employed externally, both as dusting powders for sore places to which it is desired to apply a mild astringent, and also as ointments of various kinds, of which perhaps the best known is that containing the oleate of bismuth.

Another use to which bismuth salts are now being put to a considerable extent is in connection with the diagnosis of gastric and intestinal diseases by means of the *x*-rays. No less than one or even two ounces of the oxycarbonate or oxychloride of bismuth may be taken at one time by a patient without any untoward effects, and when it is desired to give such big doses the salt is usually stirred up with thin arrowroot or milk or gruel sweetened to taste. It is perfectly white and tasteless, and yet it is so opaque to the *x*-rays that if a patient who is swallowing the bismuth gruel is looked at with the *x*-rays whilst he is swallowing it, each mouthful that he takes can be seen passing down his œsophagus as a perfectly black mass, and it can be followed down into his stomach, the outlines of the latter being thus made visible so clearly that the exact size and condition of the organ can be made out. If the patient is re-examined at intervals of a few hours, the black shadow of the bismuth can still be seen after

it has left the stomach and passed on into the intestine. It is clear, therefore, that this method of examination is one that is of great value in the investigation of gastro-intestinal disorders.

Iron.

The preparations of iron that are used in medicine are very numerous, and there are even a larger number of proprietary and unofficinal iron remedies than those that are recognised in the British Pharmacopœia. Its main use is in the relief and cure of anæmia, particularly the chlorotic type of anæmia that is so common in girls and young women, and also in the anæmia of convalescence from all kinds of prolonged illnesses. Iron may be prescribed in a form derived directly from nature in various mineral waters; iron-containing waters are generally referred to as chalybeate. It is also prescribed not infrequently in the form of certain wines which are produced from grapes that have grown upon ferruginous soils, some of the best known of these being perhaps products of Australia; there are also artificial wines in which, in addition to iron, there are various other ingredients, such as meat-juice and so forth. Perhaps the best known of the officinal salts and other preparations of iron are: Sulphate of iron; the liquor and the tincture of the perchloride of iron; the carbonate of iron; Easton's Syrup, which contains phosphate of iron along with small quantities of strychnine and quinine; and the so-called "scale" preparations of iron—namely, the tartrate of iron, iron and ammonium citrate, and iron and quinine citrate.

Untoward Effects.

There are three main varieties of untoward effects that are apt to result from the administration of iron. There are, first of all, the liability there is to discolora-

tion of the teeth. Anyone who has seen the tongue of a person who has been taking an iron mixture must have been struck immediately with its superficial blackness; precisely similar discoloration of the surface of the teeth is liable to occur, and it may be very difficult to get rid of it again; it is usual therefore, to warn patients of this, and to prevent the discoloration from taking place either by sucking the medicine through a straw so that the fluid passes to the back of the mouth to be swallowed without touching the teeth at all, or else by advising the patient to rinse the mouth out with plain water, preferably using a tooth-brush also, after each dose of the medicine has been taken.

Secondly, iron salts are very apt to upset the stomach, producing discomfort in the upper part of the abdomen, a sense of fulness with consequent lack of desire to take food, and sometimes a very severe pain in the back between the lower parts of the shoulder blades, or under one or other shoulder blade, particularly the left. As a rule it is the stronger of the iron salts, namely, the perchloride of iron, the sulphate of iron, and the carbonate of iron, that are apt to produce these troublesome symptoms most, in which case it is not unusual to prescribe one or other of the " scale " preparations, which can very often be taken without any upset to the digestion by patients who have been entirely unable to take iron in any other form. They are called " scale preparations " because in their manufacture a solution of them is spread out in a thin layer upon large plates and allowed to dry; after drying they peel off from the plates in the form of scales. The names of the various scale preparations are given above, and the dose of each is from 5 to 10 grains.

The third untoward effect of iron is the great ten dency its salts have to produce constipation with all its associated discomforts. It is on this account that

it is usual to prescribe some laxative along with the iron, either in the same mixture or pill, or else as a dose to be taken separately as required.

Iron salts should be freshly prepared.

There is no need to go into any great chemical detail here, but it is important to know that there are two types of iron salts—namely, the ferrous salts, which are, so to speak, half oxidised ; and ferric salts, which are fully oxidised. Now it has been found that if any ferrous or half-oxidised salt is allowed to stand, especially if exposed to the air, it will become more and more oxidised until it has completely changed into a fully oxidised or ferric salt. In the treatment of anæmia the ferrous are upon the whole very much more effective than are the ferric salts. It will be clear therefore that if one makes a mixture containing, let us suppose, ferrous sulphate, much better effects will be obtained from it if the patient takes it during the few days that immediately follow its being dispensed than if the mixture, though originally prepared in exactly the same way, has been kept for weeks or months before being taken. In other words, iron preparations that have been kept are of very much less benefit to patients than are iron preparations that are fresh. It has been noted again and again that patients who have been receiving iron treatment at home without benefiting much from it, and who have afterwards gone to a hospital where they have received what seemed to be precisely the same iron treatment, often improve in health rapidly forthwith. It has been suggested that the sole difference in such cases has been that, owing to the great turnover of medicines at a hospital dispensary, the iron mixture or pill has been prepared fresh every day, whereas at home it may have been taken from a stock-bottle which is replenished at much longer intervals.

Griffith's Mixture.

Griffith's mixture is known officinally as Mist. Ferri. co. (Mistura Ferri Composita), and its active ingredient is sulphate of iron in association with potassium carbonate and certain flavouring agents. It is a dark green mixture which is very apt to change in colour progressively day by day to a brown or even a yellow tint, to the alarm of the patient, unless he realises that the change is due to oxidation of the iron present.

Blaud's Pill.

Blaud's pill, like Griffith's mixture, contains ferrous sulphate, together with a carbonate; the dose is from 5 to 15 grains. The carbonate of sodium acts upon the sulphate of iron to produce ferrous carbonate, of which there is one grain in each pill. To be effective the pills must be freshly prepared. There are various commercial firms which manufacture the equivalent of Blaud's pills in such a way that the ferrous sulphate and the carbonate of sodium are kept separate from each other until they have passed into the stomach, where the gastric juice dissolves off the gelatine or other coating in which each is embedded, and thereby allows the two ingredients to come into contact with each other and produce fresh ferrous carbonate. The object of thus separating the two chief ingredients of the Blaud's pills is to prevent that oxidation of the ferrous carbonate which is so apt to occur in the Blaud's pill itself, especially if the latter is allowed to become in the least degree damp.

Easton's Syrup.

Easton's syrup is also known by the somewhat cumbersome names of Syrupus Trium Phosphatium and Syrupus Ferri Phosphatis cum Quininâ et Strychninâ. It is a very well known remedy which is used rather

as a tonic than as a cure for anæmia, the dose being from ½ to 1 drachm. Each drachm contains 1 grain of ferrous phosphate, ⅛ grain of quinine sulphate, and 1/32 grain of strychnine. The presence of the alkaloids quinine and strychnine should always be remembered, for there are certain patients who are unable to take these, particularly the quinine. The medicine has a strong bitter taste.

Liquor Ferri Perchloridi.

This is a solution of the perchloride of iron, an orange-brown liquid, the dose of which is from 5 to 15 minims. The tincture is a corresponding solution containing alcohol. When either the liquor or the tincture is prescribed, it is usual to include a teaspoonful or more of glycerine in each dose, in order to cover the rough taste of the iron salt. In addition to their employment in the treatment of anæmia, particularly in patients who are not liable to dyspepsia, liquor ferri perchloridi is used as a styptic—a styptic being a remedy which is applied to a bleeding spot or surface to check the hæmorrhage. It may be applied directly to the bleeding spot, as in the case of oozing leech bites, for instance, or when there is troublesome hæmorrhage from a gum after the extraction of a tooth ; or it may be employed as a spray, particularly when there is a bleeding from the nose. It is also a powerful astringent, and on this account it is used not infrequently as a gargle for sore throat, often in association with potassium chlorate, as in the following mixture :—

Potassium chlorate	10 grains
Solution of ferric chloride ...	15 minims
Glycerine	30 minims
Water to	1 fluid ounce

Dose : Two tablespoonfuls to be used as a gargle as often as directed.

One great advantage of this gargle over others containing formalin or carbolic acid, or other potent antiseptic, is that it is not dangerous if it is swallowed.

Liquor Ferri Perchloridi as an Antidote.

Liquor ferri perchloridi, to which sodium carbonate has been added, has already been referred to as an antidote in cases of acute arsenical poisoning.

Parrish's Food.

Parrish's Food is not officinal, but it is employed so frequently that it is important to know what ingredients it contains. It is very nearly equivalent to the officinal Syrupus Ferri Phosphatis Co., the ingredients being phosphate of iron, phosphate of soda, carbonate of calcium, bicarbonate of potassium, cochineal, sugar and distilled water. The dose is from half to two teaspoonfuls, and it is a preparation of iron which seems to be particularly beneficial to weakly children, who generally take it quite readily in a little milk.

Malt and Iron.

Another preparation of iron that is particularly serviceable in the case of children consists of extract of malt with iron. The malt extract varies in consistency, according to its mode of manufacture, from a thick treacle-like syrup to a thin fluid; upon the whole children seem to take it best when it is thick, treacly, and sweet, and there can be no doubt that extract of malt with iron is a very important medicine for the use of children living in towns. The following is a useful formulary for its preparation:—

Take of pyrophosphate of iron 2 parts; water 3 parts; dissolve and add extract of malt, 95 parts. Mix. Each teaspoonful contains about 1 grain of pyrephosphate of iron.

Alkalies and their Salts.

The chief alkalies whose salts are used in medicine are potassium, sodium, and ammonium.

Liquor Potassæ.

Liquor potassæ is a solution of Potassium hydrate or caustic potash in water. It is seldom used internally, though it is well known in connection with the routine test for pus in urine.

Potassium Acetate.

Potassium acetate is a salt which is very deliquescent, that is to say, it is very liable to absorb moisture out of the air, and therefore if it is left exposed for a short time instead of remaining a solid substance it will be found to be changed into a pool of liquid. The dose is from 10 to 60 grains.

Potassium Citrate.

Potassium citrate is also a very deliquescent salt similar in character and in action to potassium acetate though the dose is slightly smaller—namely, from 10 to 40 grains. Both of these salts are used as diuretics, that is to say, as remedies for increasing the outflow of urine. For this purpose they are employed frequently in febrile conditions of many different kinds, especially perhaps in children. They are also used not infrequently when there is a tendency to gout, or to uric acid gravel, or to actual calculus in the kidneys, the object being to make the urine under these circumstances as abundant and as dilute as possible. Another use to which their diuretic action may be put is to assist in the clearing up of accumulations of fluid in the body, for instance, in some cases of ascites, or of pleuritic effusion, or of pericarditis, or of general œdema. When

so used it is not uncommon to combine together several diuretic drugs in one mixture such as the following:—

Potassium acetate ...	...	... 20 grains
Tincture of squills...	...	... 10 minims
Spirit of nitrous ether	...	... 30 minims
Juice of broom ...	...	... 1 fluid drachm
Water ...	...	... to 1 fluid ounce

Dose: Two tablespoonfuls three times a day.

Potassium Nitrate.

Potassium nitrate is also known as nitre, and as saltpetre—not Chile saltpetre, which is sodium nitrate ($NaNO_3$), but ordinary saltpetre (KNO_3). It is a solid substance, which forms prismatic crystals, and like most potassium salts it is very soluble in water. Its dose is from 5 to 20 grains. It has a mild diuretic action like that of the citrate and acetate, but the two chief uses to which it is put in medicine are, first as an ingredient of cough mixtures, particularly when there is a considerable amount of phlegm to be loosened, in which case either of the two following mixtures will be found of much value:—

1. Oxymel ... ... 2 fluid drachms
   Potassium nitrate ... ... 10 grains
   Water ... ... to 1 fluid ounce
   One ounce to be taken as often as directed.

2. Vinegar of ipecacuanha ... ... 15 minims
   Compound tincture of camphor ... 30 minims
   Oxymel mixture as above ... to 1 fluid ounce
   One ounce to be taken as a dose.

and secondly, it is used as an ingredient of asthma powders. The object of the nitre here is to make the powders burn slowly with a steady glow, and at the same time give off a quantity of vapour and smoke. These asthma powders very often consist of a basis of nitre mixed with some combustible substance such as dry tea-leaves, or blotting-paper, with which are

incorporated various active ingredients, particularly stramonium, lobelia, or belladonna. A teaspoonful of the powder is placed upon a dry saucer and made up into a little conical heap, the apex of which is then lighted with a match. There should be no flame, but much smoke, and the patient inhales the latter as he holds the saucer containing the burning powder beneath his nose.

Potassium Chlorate.

Potassium chlorate is a crystalline salt of peculiar taste and of an astringent action. It has a dosage of from 5 to 15 grains, and its main use in medicine is in the treatment of septic infections of the mouth, tonsils, and pharynx. It is particularly beneficial when used in conjunction with liquor ferri perchloridi in the form of a gargle (gargarisma) for tonsillitis, as in the prescription given on page 22.

If there is any particular objection to the use of iron in a given case the potassium chlorate may be used in solution by itself. It is also employed in the form of a lozenge—trochiscus potassii chloratis—each lozenge containing 3 grains of potassium chlorate with a rose basis.

Toxic Effects.

Potassium chlorate is by no means a dangerous drug, and yet if it is taken in too large a quantity at one time, whether in the form of a gargle or of lozenges, instead of the cure of the tonsillitis or other condition for which it has been used being accelerated the patient may suffer from a peculiar form of blood destruction which leads to the passage in the urine of met-hæmoglobin, which is a pathological product of the colouring matter of the blood. This blood destruction leads to anæmia, which in rare cases may become very severe and even result in death.

Sodium Carbonate.

There are two forms of sodium carbonate—namely, sodium carbonate proper, which is the same as washing soda, and sodium bicarbonate. Both may be employed in the treatment of patients, but upon the whole sodium bicarbonate is used much the more commonly of the two, its dose being from 5 to 30 grains.

Sodium and Potassium Bicarbonate.

Potassium bicarbonate is used under precisely the same conditions as the sodium salt, and in the same doses, both being employed chiefly in the treatment of disturbances of the stomach. An ordinary preparation for the relief of many kinds of simple dyspepsia is as follows:—

Sodium bicarbonate	15 grains
Aromatic spirit of ammonia ...	30 minims
Compound infusion of gentian to	1 fluid ounce

Dose: two tablespoonfuls for an adult.

There are some who hold that an alkaline mixture of this kind should be given only before meals, in order to promote the flow of gastric juice and thus accelerate the digestive processes afterwards. There are some, on the other hand, who hold that the bicarbonate is best given after meals to neutralise undue acidity. There is probably truth in both views, some patients finding most relief from taking the mixture before they eat, others immediately after a meal, others again at an interval of half an hour or more after they have finished eating.

In regard to whether the potassium or the sodium bicarbonate is likely to be given, the potassium salt is not only the more expensive of the two but it is also the more depressing, and therefore when there is no other indication to the contrary it is the sodium bicarbonate that is most often employed. In gouty patients, however, it is not unusual to prescribe the potassium salt

rather than that of sodium, it being supposed that potassium is a much better solvent for uric acid than sodium is.

An alkali such as sodium bicarbonate is a very good antidote for poisoning by mineral acids ; owing to the heat that may be produced by the mixing together of the alkali with the strong acid in the stomach, however, it is important to give the antidote in a large bulk of water. The method of preparing freshly precipitated carbonate of iron by adding sodium bicarbonate solution to liquor ferri perchloridi in the active treatment of acute arsenical poisoning has been referred to before, when arsenic was being discussed. It will be remembered also that carbonate of soda or carbonate of potassium is an ingredient of both Blaud's pill and of Griffith's mixture, the object in each case being to convert the ferrous sulphate into ferrous carbonate, which in its fresh state is an excellent remedy for anæmia, as has already been described.

Sodium Sulphate and Sodium Tartrate.

Sodium sulphate is popularly known as Glauber's salts, whose action is chiefly that of a saline purgative. Sodium tartrate is also used as a purgative, and it is an active ingredient of the well-known Seidlitz powder ; this is prescribed in two parts, the first of which consists of 120 grains of sodium tartrate and 40 grains of sodium bicarbonate mixed together and wrapped in a blue paper, whilst the second part consists of 38 grains of tartaric acid wrapped in a white paper. The object of keeping the two portions separate is that the tartaric acid in the white paper acts upon the sodium bicarbonate in the blue paper immediately the two are mixed together in water, and the multitudes of bubbles of gas that come off in the form of an effervescence consist of carbonic acid gas which is given off as the tartaric acid

converts the sodium bicarbonate into sodium tartrate. The directions usually given are to dissolve the powder in the blue paper in about half a pint of cold or warm water and then to add the powder in the white paper, stirring with a spoon and drinking whilst the mixture is effervescing. The dose of sodium tartrate itself when a purgative action is required is from two to four teaspoonfuls, and for a single administration the dose of sodium sulphate is the same, though for repeated administrations it is from half a teaspoonful to two teaspoonfuls. Generally speaking sodium sulphate acts rather more strongly upon the bowels than does sodium tartrate. When large doses of sodium salts are given the motions are very watery, and therefore these remedies are employed not infrequently when it is desired to clear up effusions in the body, especially in certain cases of dropsy and ascites. They are also employed with benefit in cases of gall-stones, and they form one of the chief ingredients of many of the natural mineral waters, particularly those of Carlsbad and Marienbad, and in bottled aperient waters such as those which bear the names of Hunyadi János, Apenta, Friedrichshal, Rubinat, and Kissingen.

Ammonium Salts.

It may be said broadly that whereas potassium salts act, upon the whole, chiefly upon the kidneys, producing diuresis; and whereas sodium salts act mainly upon the bowels, as laxatives and purgatives; ammonium salts act chiefly upon the skin upon the one hand, producing sweating or diaphoresis, and upon the cardiac and respiratory centres in the lower part of the brain upon the other hand, increasing the force of the heart's beat and assisting patients who are short of breath or who have difficulty in expectorating when they cough. The three chief medicinal salts of ammonia are the

acetate, which acts mainly on the skin, and the chloride and the carbonate, which act chiefly upon the respiratory centres.

Ammonium Acetate.

Ammonium acetate is so deliquescent a salt—that is to say, it so readily absorbs moisture from the air—that it becomes liquid unless it is kept hermetically sealed. It is therefore usually prescribed in the liquid form as Liquor Ammonii Acetatis, of which the dose is from two to six teaspoonfuls. A mixture containing 4 drachms of Liquor Ammonii Acetatis diluted with 4 drachms of water is employed very frequently as a diaphoretic in febrile illnesses with dry skin, such as lobar pneumonia, or one of the common attacks of febrile illness that affect children.

Ammonium Chloride.

Ammonium chloride, popularly known as sal ammoniac, is quite a different salt; it occurs as colourless crystals which are so volatile that they are constantly evaporating into the air in such a way that they are made use of not infrequently as smelling salts, either for the relief of a common cold or of catarrh of the nose, throat, or respiratory passages, or as a stimulant in those who feel faint. The salt may be given internally, but it is seldom so employed, its place for internal use being taken by ammonium carbonate, the dose of which is from 3 to 10 grains. It is rare that patients can take anything like 10-grain doses of this repeatedly for any length of time, because the salt then acts as an emetic and makes the patient sick.

Ammonium Carbonate.

The chief use of ammonium carbonate is as a stimulant and expectorant, especially in cases of bronchitis with feeble heart action, in which cases the dose seldom exceeds 4 or 5 grains. The following

is an example of such a mixture, in which ammonium carbonate is combined with squill:—

Tincture of squill ...	...	...	10 minims
Compound tincture of camphor ...			40 minims
Ammonium carbonate	...	...	5 grains
Infusion of senega	...	to	1 fluid ounce

Dose: One ounce to be taken every four hours.

Another use to which ammonium carbonate is commonly put is as an emergency dose in cases of faintness, a useful prescription for this purpose being as follows:

Ammonium carbonate	...	...	20	grains
Clarified honey	...	...	1	fluid drachm
Water	...	... to	1	fluid ounce

Dissolve.

Syrup of lemon	...	...	1	fluid drachm
Citric acid ...	...	..	15	grains
Water	...	... to	½	fluid ounce

Dissolve.

Dose: 1 fluid ounce of the former and ½ fluid ounce of the latter to be given in an effervescing state.

Aromatic Spirit of Ammonia.

When it is desired to prescribe some such drug as potassium bromide, which given by itself may have a depressing action upon the patient, it is not uncommon to obviate the depression by giving at the same time aromatic spirit of ammonia, which contains both ammonium carbonate and solution of ammonia; it is sometimes spoken of as spirit of sal volatile, and is prescribed in mixtures in doses varying from 20 minims to 1 drachm.

Linimentum Camph. Co.

The stimulating effects of ammonia and its salts are made use of not only internally, as described above, but also externally upon the skin, and particularly in the form of liniments when it is desired to relieve underlying pain or inflammations such as may occur in

nerves, joints, or muscles. Perhaps one of the best known liniments of the kind is the compound camphor liniment (Lin. Camph. Co., or Linimentum Camphoræ Compositum), which differs from ordinary camphorated oil (Lin. Camph. or Linimentum Camphoræ) chiefly in the fact that it contains a quantity of strong ammonia, which simple camphorated oil does not. Linimentum Camph. Co. is a very much stronger application than is Linimentum Camphoræ, and unless care is taken it may produce a troublesome dermatitis.

Sodium Salicylate, Salicylic Acid, and Salicin.

Sodium salicylate is a crystalline compound of which the salicylic portion is of much more importance than is the sodium ; and it is the salicylic constituent which gives a similar importance to salicylic acid itself, to salicin, to salol, to betul oil, and to aspirin. All these drugs are employed mainly for the relief of the joint pains of acute rheumatism, betul oil being applied externally, and the remainder internally.

It was not until about 1882 that physicians knew of salicylates and of their potency in relieving certain joint pains ; the mode of their discovery is of some interest. The tortures of the joint pains in acute rheumatism cases used to last for upwards of three weeks, repeated doses of morphia being the only method by which they could be relieved ; it was argued by certain individuals, however, that Providence would not inflict mankind with so severe a complaint without supplying a remedy, which would probably be found close to the places where rheumatic fever was itself most common. It was recognised that rheumatism was particularly prevalent in marshy and damp places, and this led to the idea that a cure for rheumatism might be found in connection with some of the trees or shrubs

that grow in marshy places: of such plants the willow naturally attracted attention, and investigations led to the discovery that the bark of various species of willow and birch contained an active principle of the nature of a glucoside capable of relieving rheumatic pains. The Latin for willow is "salix" and therefore this active glucoside was termed salicin, the dose being from 5 to 20 grains; further investigations led to the discovery of an acid that could be derived from salicin in crystalline form, and this was termed salicylic acid, the dose of which is also from 5 to 20 grains. Salicylic acid itself will relieve acute rheumatic joint pains, but it is not very soluble in water. It is readily dissolved by alcohol, but it requires 500 parts of water to dissolve one part of salicylic acid. Sodium salicylate on the other hand, the dose of which is from ten to 30 grains, requires only one part of water to dissolve one part of the salt, and it is largely on account of this greater solubility that sodium salicylate and allied salts are employed rather than salicylic acid for the treatment of acute rheumatic joint pains.

Salol.

Salol is a compound of salicylic acid and carbolic acid, and although it may also be employed for cases of rheumatism its chief use is as a mild internal antiseptic which may be given in doses of from 5 to 15 grains, and used when there is evidence of intestinal decomposition. It has sometimes been employed for the same reason in typhoid fever and in other forms of intestinal ulceration. Besides this, when absorbed from the bowel it is excreted in the urine in the form of a carbolic acid compound, and this fact is made use of in the disinfection of the urine in cases when pus is present in it. Salol, however, is not soluble in water, and therefore it either has to be given in the form of

powders, or else suspended in an emulsion, the bottle requiring to be well shaken before each dose is given.

Aspirin.

Aspirin is a proprietary medicine which has come into great vogue recently. It is a compound of acetic and salicylic acids, and it is frequently ordered in doses of about 10 grains. It has been employed not only for the relief of joint pains in acute rheumatism, but also for many other affections, particularly chorea, febriculæ, influenza, and also as a mild hypnotic.

Betul Oil.

Betul oil contains various salicylic acid products, and it is sometimes found to be of very great benefit when rubbed externally over painful joints, or into the back in cases of lumbago and so forth. It has a strong aromatic odour, however, and patients who have been treated by rubbing with this oil not infrequently object to the smell of it. It is the same product that gives the characteristic odour to Russian leather, but the odour in the oil itself is very much stronger than it is in the leather. The reason why it is called betul oil is that it is derived from the bark of birch trees, and the Latin for birch is *Betula*; it is particularly from Russian birch trees that the oil is prepared.

In regard to the treatment of a case of acute rheumatism by means of sodium salicylate it is important to remember that all the drug does is to bring the temperature down to normal and to relieve the joint pains. It does not cure the rheumatic fever in the sense that is generally understood by the term "cure," for if the sodium salicylate were stopped directly the temperature was normal and the joint pains had gone, these symptoms would all return again at once. Moreover, the ordinary complications of acute rheumatism, such for instance as endocarditis and pericarditis may occur

just as much in patients who are being treated with salicylates as in those who have not received such treatment. A patient with acute rheumatism uncomplicated by endocarditis or pericarditis has to be kept in bed for three weeks or more, receiving salicylates all the time, and the duration of the attack is no shorter nowadays than it used to be before salicylates were discovered. In other words, the giving of salicylates in acute rheumatism may be compared with the giving of bromides in epilepsy. Just as bromides frequently serve to stave off epileptic convulsions, so do salicylates serve to stave off the acute joint pains and the pyrexia in acute rheumatism; if the bromides are stopped in epilepsy then the fits recur, whilst if the salicylates are stopped in acute rheumatism within less than about three weeks the joint pains will return. The salicylates are an immense boon to rheumatic patients by reason of the fact that they relieve them of their joint pains, but they do not essentially cure the rheumatic fever.

Owing to the acidity of the sweat in acute rheumatism it is the custom of many physicians to prescribe sodium bicarbonate at the same time as sodium salicylate, in order to neutralise some of the poisonous acids that these patients produce as the result of their illness.

Salicylic Collodion.

In addition to its use internally salicylic acid is of service as an external application, particularly in cases where there is some induration or hardening of the skin that requires to be softened. It is used for instance in the form of salicylic collodion in the treatment of corns, the directions being that the patient should paint the place with the preparation night and morning, peeling off that which was put on at the last application before fresh is applied. The salicylic acid in the collodion so to speak eats off the superficial layers of the

corn, so that every time the dried collodion is peeled away there is a little less of the corn left.

Salicylic Ointment.

There is also an ointment of salicylic acid which is employed for a similar purpose in the treatment of hardened areas of skin such as result for instance in some cases of severe and chronic acne, either of the face or of the back.

Salicylism.

Some patients are unduly susceptible to the effects of salicylic acid and its compounds, sodium salicylate upon the whole being more liable to produce toxic symptoms than are the other preparations. One of the first things that may be noticed is a ringing or buzzing in the ears associated with impairment of hearing, or even temporary deafness. Headache may also be severe ; anæmia and constipation are liable to be troublesome ; the patient feels depressed and mournful, and the pulse becomes very slow. In quite rare cases delirium and hyperpyrexia have been attributed to salicylates. None of these symptoms, except the last, are really serious, and they cease within a day or two after the administration of the drug is stopped. Nevertheless if it is found that sodium salicylate is producing salicylism it is usual to change the preparation and give in its place either salicylic acid, salicin, salol, or aspirin, as the case may be, and it will generally be found that one of these preparations will be borne without untoward effects. In order to minimise the constipating effects of sodium salicylate it is usual to prescribe in the mixture along with it some mildly laxative remedy, such for instance as teaspoonful doses of liquid extract of liquorice ; and when it is intended to continue the drug for any length of time it is common to prescribe some mild preparation of iron along with it ;

for instance 10-grain doses of iron and ammonium citrate. The following is a type of such a prescription :—

Sodium salicylate	... ...	15 grains
Iron and ammonium citrate	...	5 grains
Liquid extract of liquorice	...	1 fluid drachm
Water	to	1 fluid ounce

Dose : Two tablespoonfuls thrice daily, or as directed.

Ammonium Benzoate.

Ammonium benzoate is a crystalline compound of ammonia with benzoic acid, the latter being a complex substance obtained from benzoin, the popular name of which is "gum Benjamin." The chief use of ammonium benzoate, the dose of which is from 5 to 15 grains, is in the relief of conditions in which the urine contains pus, especially when there is alkaline or ammoniacal decomposition in the urine, as evidenced by its smell. The ammonium benzoate serves to make alkaline urine acid, and also, owing to the fact that it is excreted in the form of hippuric acid, it disinfects the urinary tracts. Before the discovery of urotropine and helmitol, which are now prescribed largely in doses of about 10 grains in cases of this kind, ammonium benzoate was one of the chief urinary disinfectants, as in the following prescription :—

Ammonium benzoate	... ...	15 grains
Tincture of hyoscyamus	... ...	30 minims
Spirit of chloroform	... ...	10 minims
Infusion of bearberry	... to	1 fluid ounce

Dose : Two tablespoonfuls thrice daily, or as directed.

The use of salol in a similar way has been mentioned above.

Friar's Balsam.

Benzoin itself—a crude gum from which benzoic acid is prepared—is used largely in the form of Friar's

Balsam, which is officinally known by the name of Tinct. Benzoin Co. (Tinctura Benzoini Composita); this is used externally for the most part, and particularly as a means of relieving cough and disinfecting the respiratory passages when there is bronchitis, laryngitis, bronchiectasis, phthisis with cavitation, and so forth. A teaspoonful of Friar's Balsam is put into a pint of boiling water, either in a bronchitis kettle or in a suitable inhaler or jug, and the steam impregnated with the Tinct. Benzoin Co. vapour is inhaled deeply. Another disinfectant which is employed in much the same way and in the same proportions is creosote, one of the products obtained from coal tar.

Potassium Iodide.

Potassium iodide is a solid substance which is obtained in the form of white crystals that have an exceedingly salt taste. The dose is from 5 to 20 grains, but in suitable cases as much as a drachm or more may be prescribed at a time. It is the iodide and not the potassium portion of the salt which is the active part of it, and the chief use to which it is put is in the treatment of syphilis in its secondary, and particularly in its tertiary stages. It is not uncommon to prescribe this drug in conjunction with perchloride of mercury, as, for instance, in the following prescription:—

Potassium iodide	10	grains
Liquor hydrargyri perchloridi ...	1	drachm
Syrup of orange	½	drachm
Water	to 1	ounce

Dose: Two tablespoonfuls to be taken in half a tumblerful of water three times a day after meals.

It is not only in syphilitic cases, however, that potassium iodide does good; it is often prescribed in association with other remedies in joint cases, and when there are chronic tuberculous lesions of the lymphatic

glands in the neck. It is also a remedy which is employed in the relief of chronic lead poisoning or plumbism, and there are not a few cases of asthma, bronchitis, pleurisy, and so on, in which it gives relief. It is spoken of as an absorbent, and as such it often does good in the resolution stages of pleurisy or simple peritonitis; and it is the remedy that is relied on mainly in cases of aortic aneurysm. It is also beneficial in cases of high blood-pressure, serving to reduce the latter to a material extent in some instances.

Iodism.

There are some patients, however, who find it extremely difficult to take iodide of potassium on account of the toxic symptoms that it produces. Of these one of the commonest perhaps is in connection with the skin, upon which spots, pustules, and boils like those of severe acne are apt to be produced. It is often found that when these symptoms are troublesome they become less so when the dose of the iodide of potassium is increased rather than diminished; it is indeed an aphorism that if iodides produce trouble, their dose should be doubled. The aphorism, however, is subject to a great many exceptions, for the susceptibility of people to poisoning by iodides varies very much. Another untoward symptom is depression; the patient feels so mournful and sad that he may begin to think that life is not worth living. When this is so, it is not uncommon to replace part of the iodide of potassium with iodide of sodium, iodide of lithium, or iodide of ammonium; unfortunately these alternative drugs do not, as a rule, act as beneficially upon the diseases for which the iodide of potassium is being employed as does the iodide of potassium itself, and therefore when iodide of potassium can be used it is preferable to the iodides of sodium, ammo-

nium, or lithium ; when, however, iodide of potassium cannot be taken it may be replaced, in whole or in part, by one or more of the above. It is also a good thing in many cases to prescribe small doses, such as two or three minims at a time, of liquor arsenicalis in association with the iodides, the arsenic very often preventing both the skin eruption and the feeling of depression. Another drug that may be prescribed along with iodides to prevent depression is the aromatic spirit of ammonia, which has already been discussed.

In a few patients iodides produce a tendency to more or less universal catarrh, the nose and eyes running as though the patient had a bad and persistent cold, whilst similar catarrh may even produce dangerous symptoms in the larynx, trachea, and bronchi. Should this nasal catarrh extend upwards into the sinuses in the frontal bone, a heavy pain above the eyes becomes a very troublesome symptom.

Potassium Bromide.

Potassium bromide is a chemical compound which when pure consists of colourless crystals that are readily soluble in water, the solution tasting very salt. It is a remedy that acts chiefly by depressing the nervous system, so that it is employed not uncommonly as a hypnotic in the relief of simple insomnia. The dose is from 5 to 30 grains. It is worthy of note that it is one of the drugs that is well borne by children, though it should be only upon rare occasions that any hypnotic draught is given to a child.

The other main use of bromide of potassium is in the prevention of epileptic fits. The severity of epilepsy varies enormously in different patients, and it will be found that in some cases quite small doses of the drug—5 grains twice a day for instance—may suffice to prevent the recurrence of the fits ; in other patients, on the

contrary, 30-grain doses repeated even four times a day may fail to do more than reduce the number of the convulsive attacks, failing to obviate them altogether. In the treatment of epilepsy it is important to find out what is the least dose of bromide of potassium that will prevent the fits from recurring. Nearly always the fits will recur whenever the drug is omitted, so that it can scarcely be said to cure epilepsy, though it prevents an epileptic patient from having fits. The remedy has to be continued for years, and, as a rule, with the lapse of time the dose has to be increased gradually.

Bromism.

Bromide of potassium is apt to produce precisely similar toxic symptoms in epileptic patients to those already described under the heading of Iodism—namely, spots and pustules upon the skin, a tendency to great depression, and liability to coryza and catarrh. These ill-effects are to be avoided in the same way as has been described already for iodism—namely, by adding to the mixture either aromatic spirits of ammonia or a small dose of liquor arsenicalis, or both, or by replacing part of the potassium bromide either by sodium bromide or by ammonium bromide. The difficulty is that neither sodium bromide nor ammonium bromide is as effective as potassium bromide in the relief of epilepsy, and therefore it is found that when one would like to replace, say, 10 grains of potassium bromide with one or more of the others, it is necessary to give a larger dose than 10 grains of the latter. If, for instance, one wishes to give 20 grains of potassium bromide to a patient in each dose of a mixture, but finds that the patient cannot take more than 10 grains of potassium bromide without untoward effects, it will be necessary to give, say, 8 grains each of sodium bromide and of ammonium bromide, making 16 grains

in all, to produce the same effects as the 10 grains of potassium bromide which have had to be replaced would have done.

Iodine.

Iodine is one of the products obtained from seaweed, and its chief use in medicine is as an external application to the skin when it is desired to produce counter-irritation for the relief of pain or inflammation in the underlying parts. Thus it may be painted upon the neck for sore throat; it may be painted on the chest for pleurisy; it may be applied over the knee-joint for synovitis, and so on. The chief danger of the application is that, owing to the fact that it does not produce any immediate reaction in the skin, there is a tendency sometimes to paint on too much of it, with the result that an acute inflammation of the skin is produced which may take some little time to get well. The application ought to lead to hyperæmia and local warmth in the skin, but it should stop short of producing an actual blister.

There is an ointment of iodine, containing 4 per cent. of the latter, used for the most part in the treatment of chronic lesions of the skin when there is no breach of the surface; there are certain tuberculous skin affections, for example, that may be cured comparatively quickly by means of this remedy. There are also certain cases of ringworm of the body in which it has been employed successfully, though care should always be taken not to use it when there is any raw surface that may become acutely inflamed.

Internally, iodine in the form of a tincture has sometimes relieved persistent vomiting when other remedies have failed. A very good way to give it in such cases is one drop of the tincture of iodine in a small teaspoonful of water, repeated every quarter of an hour for five or six doses. It is possible that the remedy

acts as a very mild counter-irritant to the mucous membrane of the stomach.

Of recent years iodine has been employed with increasing frequency in surgical practice as an antiseptic. Instead of lysol or carbolic compresses, iodine solution is painted on to the skin over the region that is to be operated upon, and it is found to disinfect the surface rapidly, painlessly, and effectually. Iodine is also used nowadays for the sterilisation of catgut sutures and ligatures.

Potassium Permanganate.

Manganese is one of the metals. It is related in some respects to iron. It is never employed in the metallic form in medicine, but is used chiefly in the shape of permanganate of potash, which has so very strong a purple colour that a grain of the salt will give the characteristic colour of Condy's Fluid to a whole wash-hand-basinful of water. Condy's Fluid contains permanganate of soda, which closely resembles potassium permanganate, whilst zinc permanganate is another similar substance. These salts are used chiefly for their disinfecting and deodorising properties, particularly for vaginal douches, for urethral irrigations, and other similar purposes. An open dish containing potassium permanganate solution may be left in the corner of a room when it is desired to relieve some unavoidable smell, such as may come from a patient suffering from gangrene or fœtid bronchitis, or sloughing cancerous ulceration of the mouth. It is also used by some people as a mouth wash, but it is important to remember how strong a staining substance it is, so that unless the solution used is very weak the teeth may be tinged permanently brown. In just the same way, if the hands are put into a strong solution of potassium permanganate, both the skin and the nails become a

deep brown that will not wash off, and that only wears off with time.

There is one other use for potassium permanganate solution which is very important to know, and that is in connection with poisoning by alkaloids such as strychnine, morphia, or atropine, taken by the mouth. Potassium permanganate has the property of oxidising substances; alkaloids that have been oxidised lose most of their poisoning effects; in cases of poisoning by alkaloids, therefore, it is wise to wash out the stomach with weak potassium permanganate solution in order to oxidise any of the alkaloid that may have remained in the stomach, and thus prevent it from doing any further harm. As a rule the lavage is continued until the potassium permanganate solution comes back the same colour as it goes in, and then 4 or 5 ounces are left in the stomach when the tube is withdrawn.

One further use to which potassium permanganate is frequently put is in the relief of simple amenorrhœa. It is not uncommon for the periods to stop in girls and young women apparently without any cause at all, and in such patients potassium permanganate may be given in doses of from 1 to 3 grains twice or three times a day. The drug has a very unpleasant taste, and therefore it is not ordered in the form of a mixture, but rather in that of a pill made up with kaolin, or in a cachet.

ACIDS.

One of the chief reasons why acids are employed in the treatment of patients is that the gastric juice normally contains two parts per thousand of hydrochloric acid, and it is only in the presence of this acid that the active ferments of the stomach—namely, the pepsin that converts albumin into peptone and the rennin that

coagulates the caseinogen of milk and makes the latter ready for digestion by the pepsin—act efficiently. There are many circumstances which lead to a deficiency in the gastric hydrochloric acid; indeed, almost any ailment or malady which impairs a patient's general health at the same time diminishes the acidity and the activity of the gastric juice. This is so, for instance, in cases of convalescence from acute fevers, in some cases of heart disease, phthisis, anæmia, and so on, and it is one of the potent causes of dyspepsia. Hence there are a great many conditions in which mixtures containing hydrochloric or some other acid are of benefit, both in the actual relief of dyspepsia when it is present, and in accelerating cures in general, by acting as a general tonic. The three acids that are employed most commonly are diluted hydrochloric acid, of which the dose is from 5 to 20 minims; diluted nitro-hydrochloric acid, whose dose is 5 to 20 minims; and diluted sulphuric acid, of which the dose is from 5 to 20 minims. A very good acid tonic and dyspepsia prescription is as follows:—

Liquid extract of nux vomica ...		1 minim
Tincture of gentian with glycerin		1 fluid drachm
Diluted nitro-hydrochloric acid		10 minims
Water	to	1 fluid ounce

Dose: Two tablespoonfuls three times a day between meals, or as directed.

Another use to which diluted sulphuric acid is put in conjunction with tincture of opium is in the treatment of hæmorrhages, particularly hæmoptysis or hæmorrhage from the lungs. A prescription which may be used for this purpose is as follows:—

Tincture of opium		5 minims
Aromatic sulphuric acid	...	10 minims
Syrup of balsam of tolu	...	1 fluid drachm
Water	to	1 fluid ounce

Dose: Two tablespoonfuls to be taken at once and to be repeated in half an hour.

Tartaric acid has been referred to already in connection with effervescing mixtures. Its use along with bicarbonate of soda as a means of raising bread or pastry, in place of the yeast that used formerly to be employed, depends upon the production of thousands of bubbles of carbonic acid gas when the tartaric acid and the bicarbonate of soda interact with one another. The same occurs in mixtures such as Seidlitz powders. It is usual to prescribe exactly that amount of tartaric acid that will precisely neutralise the amount of bicarbonate that is being employed ; 35 grains of tartaric acid neutralise 46 grains of potassium bicarbonate or 36 grains of sodium bicarbonate, or 24½ grains of ammonium carbonate.

Poisoning by Acids.

The solutions of the acids that are employed in the treatment of patients are much diluted for the sake of safety. The self-same acids in concentrated form are some of the strongest corrosives known, and if taken by the mouth they are extremely apt to prove fatal, either as the result of collapse or by corroding the stomach to such an extent that it becomes perforated so that general peritonitis ensues. Even if the patient survives the stage of acute poisoning, there may be so much scarring of the œsophagus or stomach that the narrowing which is produced ultimately closes the tube, and the patient dies of starvation from inability to swallow food unless relieved by operation. The general symptoms are : immediate severe burning pain in the mouth and down the œsophagus and in the stomach, with excoriation and swelling of the lips and tongue, and possibly also of the throat, with consequent great difficulty in swallowing ; vomiting of blood and of black and charred stomach contents and portions of the stomach wall ; extreme prostration, with rapid feeble

pulse, coldness of the hands and feet, pallor of the face with a cold clammy sweat upon the forehead, and general signs of impending death. The treatment is to neutralise the acid at the earliest possible moment, the proper antidote being some form of alkali. In addition to the alkali, however, the patient ought to be given large quantities of water, because when the strong acid comes into contact with the alkali, or indeed even with a small quantity of water, a great deal of heat is produced and there is the danger of absolutely scorching the stomach if the acid is not diluted copiously at the same time that it is neutralised. If there is no alkali to hand, the best possible thing is to give the patient an abundance of plain water. Soapy water is also useful. The plaster of the ceiling contains an alkali in the form of lime, and therefore, failing other things, some of this plaster may be quickly pounded up and stirred in water and given to the patient to drink. Lime water, magnesia, and washing soda are all varieties of alkalies that may be used as antidotes for acids, though in every case it is important to give an abundance of water as well. The stomach is never washed out in these cases because the acid renders the gastric wall so exceedingly tender and thin that, even if it is not perforated by the action of the acid itself, it would surely be so if an indiarubber tube were pushed down into it. At the same time as the antidote is being given it is most important to prevent the patient from dying of collapse, and therefore the nurse can do a great deal in the way of saving life by the appropriate use of hot blankets and hot bottles, and by the preparation of such things as hypodermic syringes and needles, solution of strychnine, and hot coffee enemata, so that these may all be ready by the time the doctor arrives in case he wishes to employ them. It is very likely that morphia may also be required, both for the relief of the patient's intense pain and to

keep the condition of the abdomen as still as possible in order to minimise the chance of perforation.

Boric Acid.

Boric acid is familiar to all nowadays, owing to its use in the relief of inflammation and suppuration in the form of hot boric acid fomentations. In its dry state it is a white powder which is very much more soluble in hot water than in cold. It has a mild antiseptic action, but fomentations made of it act far more by reason of their warmth than by any intrinsic antiseptic properties they may have. It is most important, therefore, to renew them frequently so that they may be kept hot.

Boric acid is employed occasionally as an internal medicine, and not a few foodstuffs, such as butter and so forth, are preserved by means of boric acid or borax, so that a certain amount is taken by many people daily without their realising the fact. Another use for it is in the cleansing of the mouth, notably in infants and children, the preparations employed for this purpose being either glycerine and borax (Glycerinum Acidi Borici) or borax and honey (Mel Boracis). It is also employed in the dry state in various dusting powders for the preservation of the skin, and in the prevention of dermatitis and bedsores; one such powder consists of boric acid, zinc oxide, pure starch, equal parts; this is sometimes referred to as Triple Powder.

Carbolic Acid.

Carbolic acid in its pure form is a crystalline substance that is obtained from coal-tar. It has a characteristic odour, and its burning action when applied to the skin in concentrated form is well known. If the crystals are allowed to be exposed to a moist atmosphere they absorb a certain amount of the moisture

and become liquid; the fluid so obtained is not a solution of carbolic acid in water, but a solution of water in carbolic acid, the proportions being 10 parts of carbolic acid to 1 part of water. When one speaks of pure carbolic acid one generally means this liquefied form of carbolic acid and not the pure crystals. The chief use of it is as an application to some part in which it is desired to prevent suppuration by destroying any microbes that may be present. Owing, however, to the fact that such a very strong acid produces an eschar, like any other corrosive, it is very apt to kill only the superficial micro-organisms, a coagulated scab preventing the carbolic acid from penetrating to the inner micro-organisms any more than if no antiseptic had been employed. It is on this account that pure carbolic acid for the relief or cure of local suppuration has largely gone out of fashion.

When there are conditions of intestinal decomposition or putrefaction, or when the intestines contain micro-organisms which ought not to be there, as in the case of typhoid fever, for example, dysentery, cholera, or ptomaine poisoning, it is often desired to give a remedy that will inhibit the rate of multiplication of these microbes in the bowel. It is clearly impossible to give antiseptic drugs by the mouth in such strength that they will actually destroy the life of the microbes, because strengths that will be sufficient to ensure this would almost certainly kill the patient. It is imporant, however, to remember that whereas relatively large quantities of an antiseptic are required actually to kill the microbes, infinitely smaller quantities suffice to prevent them from multiplying, and if one is able to prevent the microbes from multiplying as fast as they would if they were left to themselves, one is able to do a good deal towards enabling the patient's own tissues to kill off those that remain. Hence, although there have been many who have regarded the so-called anti-

septic treatment of the intestine as useless, there are now many who believe that it is often distinctly beneficial. Amongst the antiseptics that may be employed in this way is carbolic acid. It may be prescribed in doses of from 1 to 3 minims of the liquefied carbolic acid in an acid mixture given by the mouth ; or from 1 to 5 minims of glycerine of carbolic acid which contains 1 part of carbolic acid in 5 parts of glycerine may be used instead. Other drugs that have been used for precisely similar purposes are naphthol, which is given in doses of from 3 to 10 grains, generally in a cachet; sodium sulphocarbolate, a crystalline substance which liberates carbolic acid in the intestines, and which is given in doses of from 5 to 15 grains; creosote, a yellow liquid prepared from coal-tar, and given in doses of from 1 to 5 minim and there are others. The chief difficulty in giving them is that they are apt sometimes to upset the stomach and produce so severe a dyspepsia that their administration has to be stopped. Of all the above remedies, the one most likely to produce dyspepsia is creosote, and the one least likely to do so is glycerine of carbolic acid.

Poisonous Effects of Carbolic Acid.

Carbolic acid is a strong corrosive, and therefore it may produce symptoms precisely similar to those described under the heading of sulphuric and hydrochloric acids. There are two main differences, however, and they are, first, that as carbolic acid exerts an anæsthetising action upon such nerves as it comes in contact with, it is very apt so to numb the gastric mucosa that the patient may not vomit, and therefore the whole of the acid swallowed may remain inside him if active steps are not taken to produce vomiting. Mustard and water or salt and water may be given to him to swallow, or what is probably one of the most

efficient methods of producing vomiting, the back of his throat and fauces may be tickled with a stiff, dry feather. In some cases of carbolic acid poisoning, however, it is remarkably difficult to produce vomiting, even by these means, and then, although carbolic acid is a corrosive, it is necessary under certain circumstances to pass a very soft tube in order that the stomach may be washed out. This would be done, of course, by the doctor, but time might be saved by sending for, and preparing, the tube so as to have everything in readiness for him on arrival. The other point about carbolic acid poisoning is that the patient is more apt to become comatose than he is in the case of other acids.

If the immediate treatment helps to save the patient's life, there is still a certain amount of danger to be passed through on account of the absorption of the carbolic acid and its excretion by the kidneys. The urine is very apt to contain so much carbolic acid or its products that it is either dark green or almost black when passed, or else darkens upon standing exposed to the air. This condition is called carboluria. In order to minimise this, the patient is usually given either diluted sulphuric acid or sulphates in the form of magnesium sulphate, the object being to convert the carbolic acid in the body into a double compound of carbolic and sulphuric acid which is relatively harmless. The liver is the organ which produces this safeguarding change.

Turpentine.

Turpentine is sometimes swallowed accidentally, and it then produces symptoms of acute gastro-intestinal irritation, of which the chief are epigastric pain, vomiting, and collapse. The treatment is to make the patient sick and to wash out the stomach to prevent the patient from being poisoned further. It is important to remember that, in addition to the gastro-

intestinal symptoms, any large amount of turpentine that may have been absorbed is excreted by the urine, and in being so excreted it is very apt to produce acute nephritis; it is also a remarkable fact that the odour of the urine passed by a patient who has taken turpentine in any quantity smells precisely like sweet violets. There are five chief uses to which turpentine is put, and these are, first, as an inhalation for the relief of nasal catarrh, colds, and coughs; secondly, in the form of a mixture either for the relief of a cough or for wind in the stomach; thirdly, in the form of a rectal injection in patients whose intestines are blown up with gas, a condition which is known as meteorism or tympanites; fourthly, as a mixture by the mouth in doses even so large as from 30 minims to 1 drachm suspended in mucilage, and given every few hours in gastro-intestinal hæmorrhage, such as may occur in typhoid fever; and, fifthly, as an external application or embrocation either in the form of Linimentum Terebinthinæ or Linimentum Terebinthinæ Aceticum.

Whenever it is administered by the mouth it is important that a specimen of urine should be examined daily in order that the earliest sign of the drug producing any albuminuria may be detected at once.

Oxalic Acid.

Oxalic acid is never used medicinally. Its chief importance lies in the fact that it is the principal ingredient of salts of lemon, used in removing ink and other spots from garments, and that in this form it is taken not infrequently with suicidal intent. It is an exceedingly poisonous substance, which produces some symptoms of gastro-intestinal irritation, but also acts most potently upon the nervous system, producing coma which in fatal cases ends in death in a few hours. The treatment of the condition consists in converting the soluble oxalic acid into an insoluble salt which cannot

be absorbed. One of the least soluble salts of oxalic acid is calcium oxalate or oxalate of lime; hence the sooner a quantity of lime water, or of the lime derived from the plaster of a ceiling pounded up and given in water, can be administered to the patient, the sooner will the absorption of the oxalic acid stop, and therefore the greater will be the likelihood of the life being saved. Even if the immediate symptoms be relieved, however, oxalic acid is like turpentine and carbolic acid in that the part of it which has been absorbed is very likely indeed to produce acute inflammation of the kidneys, and therefore the patient's urine needs to be examined carefully for albumen for some few days after his apparent recovery before all danger from the poisoning can be said to be passed.

ASTRINGENTS.

Astringents are drugs which tend to dry up the mucous surfaces with which they come in contact, and they are therefore used chiefly in the relief of catarrh and diarrhœa. There are a great many such drugs, but probably the best known are the following: Alum, diluted sulphuric acid, subacetate of lead, gallic acid, tannic acid, copper sulphate, bismuth salts, perchloride of iron, and, to a certain extent, belladonna and opium. Of these, belladonna, opium, bismuth salts, perchloride of iron, and dilute sulphuric acid are described elsewhere; it remains, therefore, to discuss here copper sulphate, subacetate of lead, alum, gallic acid, and tannic acid.

Copper Sulphate.

Copper sulphate is perhaps best known in medicine as one of the chief ingredients of Fehling's Solution, which is used in testing urine for sugar. It is very seldom employed medicinally. Nevertheless, in small doses of between one-eighth of a grain and one grain,

given as a rule in the form of a pill and repeated two, three, or more times daily, it is of great value in checking very severe diarrhœa such as that which may sometimes result from tuberculous ulceration of the intestine. It is resorted to generally when other remedies have failed entirely. The chief thing in connection with the drug is that, while it is an astringent to the bowel, it is apt to upset the stomach and produce nausea or even vomiting. It is wise, therefore, to begin with quite small doses, such as a quarter or even one-eighth of a grain, and to continue with this rather than increase the amount so quickly as to make its continuance impossible by reason of the vomiting thus produced.

Lead Acetate.

Lead acetate is sometimes spoken of as sugar of lead on account of its white crystalline appearance and sweet taste. It is given almost entirely for the relief of diarrhœa or of intestinal hæmorrhage with or without diarrhœa, particularly in conjunction with opium, in the pill known officially as Pilula Plumbi cum Opio, the dose of which is from 2 to 4 grains.

There are other prepartions of lead that are used in medicine, but they are not given internally. Lead plaister, or Emplastrum Plumbi, is used as a basis of several other plaisters for external application, and a well-known lotion is that which is called Goulard Water or Liquor Plumbi Subacetatis Dilutus. This has a sedative effect upon the skin, and it is employed chiefly in conditions of itching and irritation.

Toxic Effects of Lead.

Acute lead poisoning is quite uncommon, but the chronic variety is met with frequently, and it is often referred to as plumbism. It is generally due to the repeated absorption either by the skin or from the

alimentary canal of lead which is derived either from the patient's work or from some contamination of his food, or from some local external application, such as a lotion or a hair-wash. The kind of trades which lead to plumbism are those of painters, plumbers, gas-fitters, boiler-makers, glaziers, pottery workers, printers, and so on. When fresh moorland water is brought through leaden pipes it is apt to become contaminated with lead in a way which does not happen with hard water. Beer, cider, and other drinks may become contaminated similarly. Indeed, the various ways in which chronic lead poisoning may come about are innumerable. The symptoms differ materially in different cases. One very often finds a blue line on the gums if the patient is not in the habit of using a toothbrush very regularly, but this blue line does not occur in those whose teeth are kept absolutely clean. Acute abdominal colic, with or without vomiting, a great tendency to constipation, anæmia, headache, gout, certain paralyses, particularly that which is known as drop wrist, and possibly even much more severe nervous symptoms of a cerebral type, are to be met with in different cases: probably the most constant are the blue line, the colic, the constipation, and the anæmia. The treatment is in the first instance to prevent the patient from absorbing any more lead into the system, and if this has been due to lack of care in washing the hands after manipulating paints or other substances containing lead, a great deal can be done by insisting that the patient not only washes his hands but also changes his external clothes on leaving the place of work. Another precaution that it is most wise to adopt is the drinking of lemonade made with dilute sulphuric acid as well as lemons and sugar, the object being to convert any lead that may have found its way into the stomach into sulphate of

lead, which, being a very insoluble salt, passes through the patient without being absorbed. This sulphuric-acid-lemonade tastes so like the ordinary lemonade that the patient takes it as a beverage with his meals. The drug that is usually prescribed when it is desired to remove lead that has already been absorbed into the system is iodide of potassium, which may be ordered in quite large doses.

Alum.

Alum is a sulphate of aluminium and potassium, and it is obtained as a mineral from the earth. It is used in medicine both externally and internally as an astringent. Thus it makes a very good mouth-wash for septic stomatitis, and it has also been employed as a dusting powder. Given by the mouth in doses of from 5 to 10 grains, it has often been used in the cure of severe diarrhœa, particularly when the latter is associated with intestinal bleeding. Another use to which it has been put is in the relief of the troublesome cough that often persists in children after whooping cough, a useful prescription for a small child being as follows:—

Alum	1 grain
Compound tincture of camphor ...	5 minims
Ipecacuanha wine	2 minims
Camphor water	30 minims
Dill water ... ... to	1 fluid drachm

Dose: a teaspoonful every four hours.

Gallic and Tannic Acids.

Gallic and tannic acids are closely related to one another, the former being obtained from oak-galls and the latter being contained in many vegetable preparations; its presence in tea, for example, is known well enough. Both of them can be prepared in the dry state, and each is a powerful astringent. As an external application there are two well-known

ointments—namely, Unguentum Gallæ and Unguentum Gallæ cum Opio. Both of these are employed in the treatment of such conditions as piles, a little of the application being inserted into the rectum upon the finger. Internally it is perhaps less usual to prescribe tannic or gallic acids themselves than it is to employ one of the many vegetable drugs of which they constitute the chief active principle. Examples of such drugs are catechu, which comes from Singapore; rhatany, or krameria, which comes from Peru; kino, from Malabar; hæmatoxylum, or log-wood, from Honduras and Jamaica; hamamelis, from the United States; and eucalyptus gum, from Australia. There is no need to enter into the individual properties of each of these nor to give details as to doses; it is sufficient to remember that when any of the above are prescribed, it is desired to produce the astringent effect of the tannic acid they contain, particularly in the relief of severe diarrhœa. A prescription for the purpose would seldom contain one active principle only. The following is an instance of a good diarrhœa mixture:—

Prepared chalk	...	...	15 grains
Tragacanth in powder	...	...	2 grains
Refined sugar	...	...	30 grains
Tincture of opium	...	...	5 minims
Ipecacuanha wine	...	...	10 minims
Decoction of logwood	...	to	1 fluid ounce

Dose: Two tablespoonfuls to be repeated as directed.

Opium.

Opium suitably employed is probably one of the greatest boons to mankind; nevertheless, improperly used, it may readily become a curse. The reason for this is that, just as a person may develop into a drunkard by constantly indulging in alcoholic beverages,

so may another person develop what is known as the "opium habit" if the drug is employed carelessly in the beginning. Opium itself is a product of the white poppy, and it contains various different active principles, the best known of which is morphine; and whereas opium itself is more generally given by the mouth, morphine or one of its salts is given by hypodermic injections. Just as opium-eating and opium-smoking may become a habit, so may the taking of injections of morphine become habitual, and so perverted may the habitué's mental system become that he is in some respects almost like an insane person, the condition then being described as morpho-mania, and the person as a morpho-maniac. There is no knowing from what small beginnings this evil may develop, and therefore it is never wise to resort to treatment by opium or morphine without great circumspection. At the same time, it is one's duty to relieve pain when possible, and it is mostly in the relief of pain that morphine and opium are employed.

There are many different preparations of opium—plaisters, lotions, extracts, pills, tinctures, ointments, and suppository. Each of the different preparations contains a definite proportion of opium, and the dosage of each is such that the amount of opium in it lies approximately between $\frac{1}{2}$ grain and 2 grains. Perhaps one of the best-known preparations of opium is the tincture which is also known as laudanum; the dose of this is from 5 to 15 minims for repeated administrations, and from 20 to 30 minims for a single administration. The dose of morphine chloride is from $\frac{1}{8}$ of a grain to $\frac{1}{2}$ a grain, and its best known preparation is probably Liquor Morphinæ Hydrochloridi, which is a 1 per cent. solution of morphine hydrochloride, the dose being from 10 to 60 minims. It may be given by the mouth, especially in conjunction with

bismuth salts, in the relief of gastric ulcer, as in the following mixture:—

Bismuth oxycarbonate	10 grains
Sodium bicarbonate	10 grains
Solution of morphine hydrochloride	10 minims
Compound powder of tragacanth ...	10 grains
Water to	1 fluid ounce

Dose: Two tablespoonfuls thrice daily between meals or oftener if directed.

The salt of morphine that is employed generally for hypodermic injections is the tartrate in the form of Injectio Morphinæ Hypodermica, which is a 5 per cent. solution, the dose for hypodermic use being from 2 to 5 minims. Many hospitals, however, have their own special strengths for the hypodermic solution of morphine, and it is important to know exactly what proportion is being employed when measuring off the number of minims to be injected from the syringe. Thus, 5 minims of the British Pharmacopœial injection contain rather less than a quarter of a grain of morphia; but in hospitals where the solution is purposely made more dilute, it may happen that 5 minims of the injection contain only $\frac{1}{6}$ of a grain, or $\frac{1}{8}$ of a grain, and so on. In other words, the dose of the hypodermic injection should always be calculated according to the amount of morphine it contains, and not solely according to the number of minims of fluid that are being given.

The external uses of opium are familiar to all. The great relief that may be given in cases of sprains and similar instances by the use of hot lead and opium fomentations is well known. Similarly by sprinkling 20 or 30 drops of laudanum on the painful part, and then applying hot water fomentations to the same place—the combination being spoken of as an opium stupe—may serve to relieve pain much more readily than will the hot fomentations by themselves.

Another condition for which opium or morphia is almost specific is in the relief of severe hæmorrhage, such as hæmoptysis or hæmatemesis. It is given sometimes by the bowel in the form of a starch and opium enema, which contains from 2 to 4 ounces of a thin starch solution at body temperature, with the addition of 30 minims of tincture of opium, the enema being given by means of a glass syringe having some four or five inches of rubber tubing attached to its nozzle in order that the enema may reach as far up into the rectum as possible. Such a starch and opium enema is often used for the relief of bleeding in cases of typhoid fever, and sometimes it may be employed similarly in the treatment of intractable diarrhœa.

Diabetes Mellitus, curiously enough, is often very greatly relieved by opium treatment, the drug being given in the form of pills as a rule, in doses of from 1 to 2 or even 3 grains twice or three times a day, according to circumstances. If it is found that the opium upsets the patient by producing nausea and constipation, one of its active principles—namely, codeine—may be employed in its stead with almost equal benefit and without untoward symptoms.

It is sometimes desirable to bring about sleep as quickly as possible in an acute illness, such as lobar pneumonia or acute pericarditis. It may be necessary to give opium or morphia, and yet there may be a fear that the drug will depress the heart or respiratory system to a dangerous extent. When this is so, a very useful remedy is Pulv. Ipecac. Co. (Pulvis Ipecacuanhæ Compositus), which is also known as Dover's Powder. It contains 1 part of opium in 10 of the powder, the dose of the powder itself being from 5 to 15 grains. The small dose of ipecacuanha in Dover's Powder serves to obviate many of the depressing effects of the opium, and the remedy not only produces

refreshing sleep but also promotes the activity of the skin, and may bring about a curative perspiration.

Poisoning by Opium and Morphine.

Not only may a patient to whom opium or morphine has been given too freely develop the chronic symptoms of opium poisoning or morpho-mania, but the drug may also produce acute poisoning, the swallowing of an overdose of laudanum being a familiar way of ending life by suicide. The symptoms are little more than a progressive drowsiness, ending in a sleep which deepens into coma, the latter in turn deepening into death. There is no struggling. The patient may be found comatose, and it may be difficult to tell at once whether the coma is due to drink or apoplexy or to what else. One of the main points in arriving at a diagnosis is the condition of the pupils, for whenever a patient has received an overdose of morphia the pupils become so exceedingly small that they have been described sometimes as like pin-points. The treatment for acute opium poisoning is, in the first place, to produce vomiting, if possible, by one or other of the methods already described, or else to wash out the stomach as quickly as possible in order to prevent the absorption of any more of the poison should any still be present. Of course, it will not be necessary to wash the stomach out if morphia has been taken by hypodermic injection. The fluid used for the lavage is a solution of potassium permanganate, which, as has already been mentioned, serves to oxidise the morphia and render it innocuous. At the same time, if the patient can be roused at all, it is important to try and make him move his limbs, and, if it should be possible for him to walk about, to keep him moving, because by so doing the tissues themselves help to oxidise the poison and minimise the poisonous effects. It may,

however, be impossible to rouse the patient at all, and then the most that can be done is to keep the extremities as hot as possible, to wrap him in hot blankets, to stimulate him by hot coffee enemata, and to prepare a hypodermic syringe and needle and the solution of atropine which will very likely be injected hypodermically by the doctor, because it stimulates the respiratory centres, dilates the pupils, and in other ways behaves as an antagonist to morphine. The dose of atropine sulphate employed will be from $\frac{1}{200}$th to $\frac{1}{100}$th of a grain, according to circumstances, and liquor strychninæ may perhaps be injected at the same time.

Belladonna.

Belladonna receives its name of "Bella donna," or "beautiful lady," because it has often been employed as a means of enhancing beauty owing to its property of dilating the pupil. It is derived from an English plant, the Deadly Nightshade, and its chief active principle is an alkaloid called atropine, the dose of which is from $\frac{1}{200}$th to $\frac{1}{100}$th of a grain. As has just been mentioned, atropine may be injected hypodermically in the treatment of acute opium poisoning. It may also be employed in some cases of colic, and either atropine itself or an analagous substance called homatropine is used in ophthalmic cases in the form of either drops or lamellæ for the purpose of dilating the pupil. Belladonna itself, as distinct from atropine, is employed chiefly in four forms—namely, as a tincture of belladonna, the dose of which is from 5 to 15 minims, which is used particularly in the treatment of bronchial affections and to a less extent in the relief of intestinal colic; secondly, as extract of belladonna, given in pill form for the relief of excessive perspiration, particularly the night sweats of phthisis; thirdly, as belladonna plaister, which is applied externally in the relief

of underlying pain; and, fourthly, as glycerine of belladonna, which is familiar as an application to the breasts in cases in which it is desired to dry up a mother's milk as rapidly as possible. The chief disadvantages of using glycerine of belladonna is that it is very much the reverse of cleanly, staining everything with which it comes in contact.

Toxic Effects of Belladonna.

An overdose of belladonna leads to excessive dryness both of the skin and of the mouth, and at the same time the pupils dilate and there is paralysis of the ciliary muscles of the eyes, so that the patient becomes unable to see near objects, and complains that his eyesight is "going wrong." A still larger dose will produce delirium, in which the patient, though not really conscious of what he is doing, is apt to perform curious movements apparently for a purpose—such, for instance, as the constant repetition of the action of trying to thread an imaginary needle with an imaginary thread, or the constant plucking of imaginary apples from an imaginary tree and putting them into an imaginary basket. Fortunately, there is a strong tendency to recovery, even when the symptoms have been severe, and the treatment is to promote perspiration as much as possible by means of very hot blankets or by a hot mustard bath, to prevent any further access to the drug, and to use eserine or pilocarpine hypodermically as an antidote. There are remarkable differences in patients in regard to their susceptibility to belladonna poisoning, and it is noteworthy that children as a rule can take the drug with greater impunity than can adults. The latter sometimes suffer from an acute red eruption of the skin, spreading even from so mild an application as a belladonna plaister; with the redness there may be so much irritation that it is impossible to continue with the plaister, even though

the latter may be known to relieve the pain for which it has been employed.

One of the ways in which belladonna poisoning takes place in children is by the eating of the large black Deadly Nightshade berries that may have been found growing in the country and which may have been eaten in mistake for cherries; another interesting fact is that, whereas rabbits seem to be able to eat the Deadly Nightshade plant with impunity, individuals who may happen to eat these same rabbits may suffer from belladonna poisoning.

Hyoscyamus, Stramonium, and Hyoscine.

Closely related to belladonna are hyoscyamus, stramonium, and hyoscine. Hyoscyamus is generally employed in the form of the green extract given along with other things in pill form, particularly when it is desired to minimise or prevent any griping or other unpleasant effects that might result from purgative drugs if they were given by themselves. Its use in this way is exemplified in the well-known pill of colocynth and hyoscyamus, the dose of which is from 4 to 8 grains. The colocynth by itself is very apt to produce griping, but when given with the extract of hyoscyamus it is much less liable to do so. Hyoscyamus is the Latin for henbane, which, though not common, is a well-known English wild plant.

Stramonium is also a wild plant, whose English name is the thorn apple. The chief use to which it is put in medicine is in the form of powdered leaves, which are made up into cigarettes, or are powdered and burned in a dish to give off dense fumes, which, inhaled, often give great relief in cases of asthma. One such powder consists of stramonium leaves, cannabis indica, and lobelia, with nitre and a little oil of eucalyptus. There are not a few proprietary asthma powders, such as those which bear the name of Himrod, Bliss,

and so forth, whose composition is somewhat similar. The nitre helps the powder to burn slowly, and the fumes that are given off are inhaled.

Hyoscine, or, rather, its salt, hyoscine hydrobromide, is an alkaloid derived from hyoscyamus; it is given in doses from $\frac{1}{200}$th to $\frac{1}{100}$th of a grain, and nearly always hypodermically. It will be seen from the smallness of the dose how very powerful a remedy it is. It is almost restricted to the treatment of conditions of acute delirium, such as may occur in severe delirium tremens and acute mania.

LAXATIVES AND PURGATIVES.

Amongst the many different classes of drugs there is one big group which includes those which act upon the bowel—laxatives and purgatives. It is very important, however, to realise that, although it is relatively easy to produce an action of the intestine by means of a purge, this is a very different thing from curing constipation. Indeed, there can be no doubt that purgatives are administered far too indiscriminately, and that a great deal of constipation is increased rather than diminished by them, and that it may even actually be produced by them. Just as it is a natural instinct of the brain and body to go to sleep for a regular period in each twenty-four hours, so is it the natural instinct of the large intestine to empty itself periodically once every day. This regular habit should always be encouraged, and if boys and girls learned never to neglect the call of Nature and always tried to have the bowels opened at the same time each day, constipation would be almost non-existent. The difficulty is that, from carelessness and other causes, the action of the bowels may be postponed or responded to irregularly, with the result that, as time goes on, the bowel, brought up irregularly, shows its desire to act irregularly also; some days there will

be an action, other days not. Thereupon those who do not think sufficiently or do not know what they are doing, at once either take or prescribe some purgative dose, such as senna, liquorice, cascara sagrada, castor oil, salts, or even calomel, with the result that the contents of the bowel are driven through, it is true, and there is an apparent relief of the constipation; but the mere fact that there has been an over-action of the bowel to-day makes it all the more likely that there will be no action at all to-morrow and the next day, so that by that time another dose may seem to be required; and so the condition goes on from bad to worse because, instead of encouraging Nature's natural tendency to act once each day, the bowel is forced periodically and left inactive in the intervals. There can be no doubt that a great deal of the chronic constipation of to-day is due to deficiencies of exercise and to the removal from our dietaries of many things which, being indigestible, used to pass through and increase the bulk of the residue, so that there was always an abundance of fæcal matter to be passed; but at the same time there is also little doubt that a great deal of this constipation is accentuated by the abuse of purgatives. The latter should be used with the greatest caution, and a strong dose should never be given when a mild dose would suffice. If the case is merely one of simple constipation, it is better to spend some weeks or months trying to coax back the regular habit by getting the patient to try hard at a regular time each day, at the same time giving him more fluids to drink and some foods with an insoluble residue to eat, than to give laxatives at all.

It should be noticed that the word "indigestible" really has two entirely different meanings. It may be used to denote something which, if eaten, will produce indigestion; in some individuals this applies to such

things as pork, for example. It is not in this sense that the word is employed above, but rather is it used to denote those substances which the juices of the alimentary canal are unable to dissolve, and which therefore pass through undigested. They do not produce indigestion, and yet they are indigestible because they cannot be digested. Examples of these kinds of foodstuffs are the fibre of green vegetables and fruits, portions of husks in porridge, and brown bread, and so on.

We need not go into great detail as to each drug that may be employed in order to bring about an action of the bowels. Suffice it to say that some, such as magnesium sulphate, sodium sulphate—the so-called saline purgatives—act largely by attracting water into the bowel from the blood stream, thus rendering the intestinal contents so fluid that evacuations are produced more readily than is the case with firm, dry residues; others act by increasing the amount of undigested residue, as in the case of many vegetables and foods; others, again, act by increasing the activity of the intestinal muscle, so that with the more vigorous peristalsis the contents are hurried through more rapidly. The latter group includes such things as castor oil, jalap, calomel, colocynth, croton oil, and so forth. Sometimes the intestinal contractions are not only rapid but also painful, so that there is griping at the same time. The milder remedies may be referred to as laxatives, including such things as figs or tamarinds or small doses of castor oil. Mild purgatives would include medium doses of castor oil; rhubarb root; senna, usually given in the form of a confection of senna; Pulv. Glycyrrhizæ Co. (Pulvis Glycyrrhizæ Compositus), or compound liquorice powder; Cascara Sagrada, generally given in pill form in doses from 2 to 8 grains; aloes, given in pill form as an

extract, either by itself or in conjunction with nux vomica or iron, or both; and Aloin, the active principle of aloes, the dose of which is from ½ to 2 grains. Strong laxatives, including jalap, which is usually given in the form of Pulv. Jalapæ Co. (Julvis Jalapæ Compositus, or Compound Jalap Powder), of which the dose is from ½ to 2 drachms; colocynth, which is the dried pulp of an Eastern fruit, and generally given along with hyoscyamus in the form of a pill; scammony, a vegetable root which comes from Asia Minor, generally given along with jalap in the form of Pulv. Scammonii Co. (Pulvis Scammonii Compositus), or Compound Scammony Powder, the dose of which is from 10 to 20 grains; calomel, which is one of the chlorides of mercury, a weak or medium or strong laxative, according as the dose is a small one, such as ½ grain, or a large one, such as 5 grains or more, given in pill form with or without other laxatives, and generally followed next morning by an ordinary saline purge; podophyllum, derived from the root of an American shrub, and given in doses of from ¼ to 1 grain; and croton oil, obtained from the seeds of an East Indian tree, a drug which is one of the most powerful irritants and drastic purgatives known, its use being restricted for the most part to the treatment of acute uræmia, which is one of the most severe complications of Bright's Disease. One minim of the oil is usually sufficient to produce an action of the bowels within half an hour, but it is impossible to give even one drop without precautions, because it is so strong an irritant that it would excoriate the surface of the stomach. The usual plan is to make a little cone of butter on the end of a spatula, to hollow out the butter into a kind of crater, into which a drop of the croton oil is put, the crater then being covered over with a little more butter,

so that when the spatula is put to the back of the patient's throat and the butter wiped off on the back of the tongue and swallowed, the croton oil becomes liberated in quite small quantities at a time as the butter melts in the stomach.

DIURETICS.

A diuretic is a drug which accelerates the passage of water through the kidneys in a way that may be required when it is desired, for instance, to relieve a tendency to stone or gravel, or when the total amount of urine from some cause is very much less than it should be, or when it is desired to remove accumulations of water in other parts of the body, as in some cases of ascites or œdema. The simplest of all means of augmenting the amount of urine passed is by increasing the drinking of water taken by the mouth, particularly if this water is relatively free from salts, as in the case of distilled water. It is probable that many of the cures of stone in the kidney and stone in the bladder that are produced in patients who are sent to special spas, such as Carlsbad or Marienbad, depend upon the great increase in the amount of urine that is passed in consequence of the large amount of fluid that is drunk daily. Plain water has this advantage over certain other diuretics that it does not irritate the kidneys; when the latter are diseased—for instance, in certain conditions of Bright's disease—it may be desired to increase the amount of urine outflow, and yet it may be dangerous to employ potent remedies which may increase the renal inflammation. The remedy to be employed has to be decided upon the merits of each case. Next to water the simplest diuretics are perhaps preparations of broom, buchu, uva ursi or bearberry, cubebs, juniper, and caffein. The use of broom tops has long been familiar in the

country, where a kind of tea is made from the dried young shoots of the broom. Juniper and dwarf elder have been used in the same way as infusions or decoctions, and the way in which caffein in the form of an infusion of tea or coffee may produce rapid diuresis must be familiar to all. When one takes an infusion or decoction, however, it is difficult to graduate the amount of the drug with any degree of accuracy. Caffein itself can be prepared in a crystalline form and given in doses of from 1 to 5 grains as a mixture, or, if it is preferred, one of the salts of this alkaloid may be employed, the most familiar being caffein citrate in doses of from 2 to 10 grains. It acts largely upon the vascular system, and it is partly by dilating the blood-vessels in the kidneys that it accelerates the rate of urine outflow. It is not only upon the kidneys that it acts, for the way in which it can sometimes relieve an ordinary headache or stimulate a person who is weary is well known; a cup of tea is sometimes a wonderful pick-me-up. Alcohol as a drug may act sometimes in much the same way, and if it were not for the after-effects that often accrue from it gin would be a very useful diuretic.

We have referred already to the diuretic action of potassium salts, particularly potassium citrate and potassium acetate.

Copaiba.

There are certain resins which promote the outflow of urine, and amongst these one of the best known is copaiba. It is a vegetable product which comes from the Indies, and it is not merely a diuretic, for it also tends to disinfect the urinary passages, and therefore it may be employed when there is pus in the urine. Its taste is, however, unpleasant. It is usually given in doses of from 5 to 20 minims, which may be administered either in capsules or in suspension

in mucilage. Whenever a patient is receiving medicine in the form of capsules it is important that the motions should be examined carefully lest the capsules should be passing through undissolved; the same applies to tablets, some of which are so compressed that they pass through the whole of the alimentary canal without being broken up. Patients who are taking copaiba are sometimes liable to a skin eruption which, unless one bears it in mind, is so like that of scarlet fever that it may be mistaken for it.

The following drugs act as diuretics chiefly by increasing the force of the circulation and thus driving more blood through the kidneys per minute—namely, digitalis, strophanthus, squills, convallaria or lily of the valley, and strychnine; in the case of each of these the diuretic action is only part of the more general action—namely, that of a cardiac stimulant.

Digitalis.

Digitalis is a drug derived from the leaves of the purple foxglove, and it is one of the most potent remedies in cases of chronic failure of the heart. It may be prescribed in the form of the powdered leaves themselves, the dose being from ½ to 2 grains, as in the following pill, which not only stimulates the heart but also produces an increased outflow of urine:—

Mercury pill	1 grain
Powdered digitalis leaves	1 grain
Powdered squill	1 grain
Extract of hyoscyamus	1 grain

Dose: One or two such pills once, twice, or three times a day as directed.

There is sometimes a tendency to think that a pill must necessarily be a purgative, but this is a mistake, for many drugs that are not purgatives may be given in pill form, the above being an instance in point.

Secondly, digitalis may be prescribed in the form of an infusion, a drachm of the dried leaves being steeped in a pint of boiling water, the dose of the resulting liquid being from 2 to 4 drachms. Many physicians prefer the infusion to any other of the digitalis preparations, but the difficulty is that it has to be made fresh, because it will not keep without decomposing. It is on this account that another preparation—namely, tincture of digitalis—is used more frequently, for it will keep indefinitely; the dose is from 5 to 15 minims.

All these different preparations of digitalis contain various active principles, and sometimes these have been extracted and prescribed in their purified and powdered form in place of preparations of the crude drug. There is no need to remember the names of all the different products however. The chief action of digitalis is to slow the heart's beat and increase its force so that it leads to the heart doing more work with a less expenditure of energy. It is particularly useful in cases of mitral stenosis or mitral regurgitation, and when the pulse is very irregular it tends to make it regular again. It is not only, however, when there is valvular heart disease that digitalis may do much good; in a few patients suffering from chronic bronchitis and emphysema—a malady which causes a strain of the right side of the heart—more benefit may be obtained sometimes from digitalis than from cough-mixtures. The same applies to some patients suffering from Bright's disease, from tobacco heart, from drinker's heart, and even from so entirely different a disease as Graves' disease or exophthalmic goître, in which great rapidity of the heart's action is apt to be a very prominent feature.

There are certain special points about the drug that are noteworthy, and the first of these is that it does not

materially benefit the heart until it has been administered for about four days at least. If the pulse-rate and the amount of urine that is being passed are recorded it will be found that the slowing of the pulse and the increase in the amount of urine outflow take place together about the fourth or fifth day after the administration of full doses of digitalis has been begun. It is clear therefore that digitalis is not of much use in the treatment of conditions of acute heart failure such as result from anæsthetics, from acute febrile diseases such as typhoid fever or pneumonia, or from acute affections of the heart itself such as pericarditis. When immediate stimulation of the heart has to be obtained, strychnine, ether, brandy, adrenalin chloride solution or solution of infundibular extract are all of more use than is digitalis. Whereas the result of all these latter drugs is transient as well as rapid, however, chronic heart-failure cases are benefitted far more by the slower but more sustained effects of digitalis than they are by the other drugs named.

There are certain dangers in the use of digitalis, and one of these is that it may produce serious vomiting. All heart cases are apt to be sick readily because, owing to the errors in the circulation, the gastric juice is comparatively inactive, and therefore dyspepsia is particularly apt to arise; in addition to which both the stomach and the heart are supplied by the same nerves (namely, the vagi) and therefore when either organ is diseased it is very apt to upset the other. Palpitation may be a symptom of dyspepsia, and dyspepsia may be a symptom of heart disease. It is found, however, that the fewer the drugs that are being prescribed at the same time as digitalis, the less is the tendency for vomiting to be produced. It is often prescribed by itself in water therefore. Another point to be on the watch for is an extreme degree of slowing

of the heart when digitalis is given for a long period; the pulse-rate may be slowed down even to forty or thirty per minute, though the slowing is not necessarily accompanied by any untoward symptoms. On the other hand, some patients exhibit an idiosyncrasy which makes them unable to tolerate digitalis at all, the administration of the drug leading to increased rapidity and irregularity of the heart's action, with vomiting, orthopnœa, and increasing cyanosis. In such cases the drug has to be stopped at once, and it may then be necessary to try to obtain the desired effect by means of one of the alternative drugs, particularly strophanthus or squill.

Strophanthus.

Strophanthus is a drug obtained from the seeds of an African plant, and it is usually prescribed in the form of Tincture of Strophanthus, the dose of which is from 5 to 15 minims. Broadly speaking, it has an action very similar to that of digitalis, though upon the whole it is not quite so effective. It is used mainly in the treatment of patients who for one reason or another are unable to take digitalis, for just as it is not quite so effective, so is it less likely to produce toxic effects.

Lily of the Valley.

Lily of the Valley is familiar enough as a flower, but it is less generally appreciated as a drug. It is known in the latter connection as Convallaria, of which the tincture may be prescribed in doses of from 5 to 20 minims. Its action is very similar to that of digitalis and strophanthus, and it is sometimes employed in patients who are unable to take digitalis, for convallaria is much less likely to produce vomiting and other toxic symptoms than digitalis is.

Squill.

Squill or Scilla, is a familiar blue flower in the early spring, and the plant grows from a small bulb which

flourishes best near the sea. It is this bulb which is used in medicine, the most familiar preparation of it being probably Tincture of Squill, whose dose is from 5 to 15 minims. Alternative preparations are Acetum Scillæ, that is to say, an extract of squill in vinegar instead of in the alcohol employed in making the Tincture, the dose being from 10 to 30 minims; Oxymel of Squill, containing honey as well as vinegar; Extract of Squill, the dose being from ½ to 1 drachm; and Syrup of Squill, of which the dose is also from ½ to 1 drachm.

Squills are probably best known as an important ingredient of many cough mixtures. All coughs, from the point of view of treatment, may be divided up, as Dr. F. J. Smith has well pointed out, into those which are useless and those which are useful; those which are useless comprise coughing bouts in which there is no expectoration, and the treatment then is to relieve the cough by means of a linctus or opiate. Useful coughs, on the other hand, are such as lead to the expectoration of phlegm that has been accumulating in the bronchial tubes or in the lungs, and then the treatment should be devoted to increasing the energy of the cough in order that the phlegm may be the more readily removed. Squills belong to the category of stimulant expectorants for the treatment of useful coughs, and they may be prescribed along with other stimulants such as ammonium carbonate, as in the following mixture:—

MISTURA SCILLAE AMMONIATA.

Tincture of Squills	... 10 minims
Compound Tincture of Camphor	... 40 minims
Ammonium Carbonate ...	... 5 grains
Infusion of Senega ...	... to 1 fluid ounce

Dose: Two tablespoonfuls four-hourly if the cough is troublesome.

Besides acting upon the respiratory organs in this way, however, it is important to remember that squills also stimulate the heart, exerting an action upon it and upon the pulse similar to that of digitalis, strophanthus, and lily of the valley; indeed, some observers hold that squills are more potent in their action upon the heart than even digitalis is. It is on this account probably that squills also lead to an increase in the amount of urine outflow, and this diuretic action of the drug is made use of in many conditions, and powdered squill may be prescribed in the form of the pill already mentioned under the heading of digitalis.

Ipecacuanha.

Ipecacuanha is the very finely powdered root of a plant that comes from Brazil. It has many uses, of which four may be mentioned in particular—namely, first that of a stimulant expectorant in the treatment of useful coughs; secondly, in the prevention of the ill-effects of opium when given in combination with the latter as in Dover's powder, which has already been referred to; thirdly, in the tropics especially, in the treatment of acute dysentery; and, fourthly, in the production of vomiting under certain circumstances. Of all these uses the best known in England is that in connection with cough mixtures. Besides the various lozenges in which it is contained it may be given in the form of a mixture containing either Acetum Ipecacuanhæ or ipecacuanha wine, the dose of either being from 10 to 30 minims. It is often prescribed in conjunction with other stimulant expectorants, particularly squills and ammonium carbonate. In the treatment of dysentery the powdered drug itself is given in amounts which vary from 20 grains every four hours to even as much as a drachm or a drachm and a half at a time. How it acts in this disease is not known precisely,

but it is much more useful in the acute stages than it is later when there is actual ulceration. When it is desired to produce vomiting, for instance after the taking of some poison, or, less commonly nowadays than formerly, in the relief of acute bronchitis, ipecacuanha wine is given in quite large doses of from ½ ounce to 6 drachms.

Quinine.

Quinine is an alkaloid or active principle obtained from the bark of the cinchona tree, which was originally discovered in South America, where it was employed as a native remedy for malaria. To such an extent was the bark stripped from the wild trees in that country, however, that the drug had become almost unobtainable at one time. The British Government, realising how important was the supply of quinine for its soldiers and civil servants in the tropics, sent a special expedition under the supervision of Sir Clements Markham to discover whether any of the cinchona trees still remained. Some were found, and, as the result of numerous experiments, it was discovered that they could be transplanted to India and grown there; consequently, there is now an ample supply of the drug.

Its main use is in the treatment of ague and malaria. Quinine sulphate may be given in doses of from 1 to 5 grains or more, whilst the corresponding dose of quinine hydrochloride is from 1 to 10 grains. There are various other preparations of quinine, such for instance as the ammoniated tincture, a teaspoonful of which is a common remedy for an incipient cold. It is itself a bitter substance, and in quite small doses it is employed as a tonic, particularly in Easton's Syrup, though there are many individuals who believe that they become very much upset even by

the very smallest doses of the drug. It is apt to produce headache, dizziness, and buzzing in the ears, and also to upset the digestion.

When it is desired to get a very rapid effect in severe cases of malaria, one of the more soluble salts of quinine, especially the salicylate, is injected hypodermically. There are some who hold that blackwater fever is really due to the quinine used in the treatment of malaria, but there is very little real proof that this view is true, and there can be no doubt that for the cure of malaria quinine is the remedy *par excellence*. Not only does it cure malaria when the latter has been acquired, but by taking prophylactic doses at regular intervals a person who has never had malaria runs much less risk of acquiring it than he does if he has taken no quinine at all. When there is any difficulty in getting the purified alkaloid, or when the latter produces undue headache and digestion disturbances, it is possible to get good effects without any of the undue ill-effects by adminstering the drug in the form of very finely powdered cinchona bark in doses of from $\frac{1}{4}$ to 2 teaspoonfuls either in milk or mashed up with potatoes or bananas, or in some similar way. The reason why quinine is such an excellent remedy for malaria is that the latter is due to a parasite known as the Plasmodium malariæ, and experiments have shown that this micro-organism is killed readily when it comes into contact with even quite small doses of the drug.

Ergot.

Rye is not a very common cereal in the fields of Great Britain, but in certain parts of Germany and elsewhere on the Continent it is grown abundantly. Those who have seen it thus growing will very likely have noticed that attached to the heads

of some of the ripening rye there are curious black excrescences varying in length from half an inch to nearly an inch, and rather less in circumference than a programme-pencil. These black excrescences are produced by a fungus, and they constitute what is known as ergot of rye. Ergot contains several different active principles, some of which may be isolated and used in the purified form, such as ergotinin ; and some of its numerous preparations are used hypodermically ; but the older and better-known preparations are the extract of ergot and the liquid extract of ergot, the dose of the former being from 2 to 8 grains and of the latter from 10 to 30 minims. The extract is generally employed in the form of pills, whilst the liquid extract is given as a mixture.

The main use of the drug is to increase the strength of uterine contractions, and it is employed particularly after child-birth when there is a tendency to uterine inertia with undue hæmorrhage. It is also employed in cases of acute uterine bleeding apart from pregnancy and child-birth ; but as it is a potent drug, its employment always necessitates considerable caution. When one says that it is a potent drug, one should qualify this by saying that a great deal of the ergot upon the market is relatively inert ; and this is a great pity, because when ergot is used at all, especially after child-birth, an immediate and powerful action upon the uterus is required. When the preparation is really of good quality it is potent, and its action can be relied upon.

It is sometimes prescribed in cases of bleeding elsewhere than from the uterus, but upon the whole its action is so much less upon the blood-vessels themselves than upon the muscular coats of the uterus that its main value undoubtedly lies in connection with uterine and not with other forms of bleeding.

Suprarenal Extract.

Having just mentioned a drug that is powerful in checking one form of hæmorrhage, we may next discuss another which has an immense power of producing contraction of small arteries, whereby severe hæmorrhage may sometimes be stopped effectually, provided the remedy can be brought into direct contact with the vessels that are bleeding. This drug is suprarenal extract.

The suprarenal glands are two small organs, one situated upon the upper pole of each kidney. They have no ducts, and for a long time their function was not known; but it has been shown that people who have no suprarenal glands are bound to die. The name of the disease that results from the destruction of both of them by tuberculous or other processes is Addison's disease. It appears that the suprarenal capsules secrete internally into the tissues of the body some substance which is of great importance to the proper maintenance of the circulation. It has been found possible to extract this substance by different processes, and the result is the drug known as Suprarenal Extract, the active principle of which is known as Adrenalin Chloride. If a solution of the latter, of a strength of about one in one thousand, is applied to the mucous membrane of the mouth, for instance, it will be found that the red colour changes to white, owing to the blanching of all the vessels. If there has been undue bleeding from the socket after the extraction of a tooth, an application of Adrenalin Chloride solution will stop this bleeding. Similarly in the case of bleeding from the nose, and so on. The drug, however, does not do good in cases of internal bleeding, such as that which occurs in the lungs in phthisis, because it is not possible then to apply the remedy direct to the bleeding spot.

Not only does suprarenal extract check bleeding by contracting the blood-vessels, but it is also a powerful cardiac stimulant, and its solution is added not infrequently to the normal saline that is perfused into patients after serious operations, such as those for general peritonitis. Another use to which the remedy is put is in the reduction of congestion of mucous membranes. For instance, when the nose is more or less blocked up by the catarrh of a bad cold, the inhalation of Adrenalin Chloride in the form of a spray will often so diminish the turgidity of the parts that the air-way can be re-established and the patient can breathe very much more comfortably than before.

It might be thought that if patients suffering from Addison's disease have no suprarenal glands of their own to produce their internal secretion good might result from giving them suprarenal extract by the mouth. Upon the whole, however, this is not the case, probably because the gastric juice destroys the Adrenalin Chloride before it is absorbed.

Another animal extract which is of immense benefit in certain cases is

Thyroid Extract.

The thyroid gland is situated in the front of the neck, and there are two particular diseases in which this gland is wanting, namely, cretinism—a condition in which the infant is born without the gland and consequently does not develop properly either in body or in mind, and ultimately, unless skilfully treated, remains more or less an idiot—and myxœdema, a disease which affects patients who, though born with normal thyroid glands, subsequently lose them by a process of atrophy. It appears that, although the thyroid gland has no external duct, it, like the suprarenal glands, secretes an active principle into the

internal tissues of the body, and that without this internal secretion all the functions of the body suffer. Chemical analyses have shown that this active principle of the thyroid gland is very rich in iodine and that it can be obtained in a comparatively pure form. Moreover, it is so stable that it is not destroyed by the gastric juice, and therefore it can be given by the mouth. The dose of the dried thyroid gland is from ½ to 10 grains, and it is usually given in the form of a powder or cachet. Another preparation is Liquor Thyroidei, a liquid preparation from sheeps' thyroid glands, the dose being from 5 to 15 minims. A third way of administering the active principle is to prescribe fresh sheeps' thyroid glands themselves. When it is desired to get these from the butcher it may be well to know that many butchers classify as sweetbreads various different organs, including the pancreas, or the sweetbread proper, the salivary glands, the thymus gland, and the thyroid gland. When, therefore, one is explaining to the butcher that one wants the thyroid glands, one will be able to obtain them by asking for the sweetbread from the front of the neck. It is clear that, administered in this form, it must not be too much cooked or else the active principle may be damaged. In the treatment of cretinism or myxœdema patients, even when improvement has come about, it is necessary to continue with the remedy as long as the patient lives. The diseases in question are due to the absence of the thyroid gland. The place of the gland secretion can be supplied by giving the thyroid extract by the mouth. As long as the thyroid extract is being taken the patient may be as well as if the normal thyroid gland were present. Immediately the giving of the latter is stopped, however, the patient relapses, because the body again becomes deficient in the active principle of the thyroid

gland, and therefore the remedy has to be persisted with always.

It will be found in practice that there are many patients, besides those suffering from actual cretinism or myxœdema, who benefit greatly from thyroid extract. One other malady in particular for which it has been employed is obesity, for it is able to reduce fatness in many cases. Nevertheless, there are several dangers attached to the indiscriminate use of the drug for this purpose, and the patient may be much more ill after the use of the drug than if the condition had been left alone. Too much thyroid extract in the body is just as bad as too little, and it is supposed that the symptoms of exophthalmic goître or Graves' disease are really due to the excessive production of thyroid extract, owing to the patient's thyroid gland being over-active. Similar symptoms, particularly those affecting the nervous system, may occur in patients who receive too large a dose or too much of the remedy in repeated doses.

HYPNOTICS.

Hypnotics are drugs which produce sleep. There are a very large number of such drugs, of which the following may be mentioned as perhaps better known than the rest: Opium, morphine, bromides, chloral hydrate, butyl-chloral-hydrate, chloralamide, chloretone, sulphonal, paraldehyde, trional, tetronal, veronal, hyoscine, cannabis indica, and lupulus or hops. Of these we have already discussed elsewhere opium, morphine, bromides, and hyoscine; about the remainder we propose only to give a few words.

The main thing in connection with hypnotics is to avoid their use whenever possible. Natural sleep is always worth a great deal more than artificial sleep. Moreover, there is a very great danger that the habit

of taking some remedy for the production of sleep will grow upon the patient so that presently the drug cannot be omitted; besides which, to be effective, the dose is apt to be increased and increased as time goes on until presently a dangerous point is reached, by reason of which far too many accidents resulting in death occur every year. This refers particularly to such drugs as chloral-hydrate. Nevertheless, especially when the patient is suffering from pain or from some febrile illness, natural sleep may be impossible, and yet the wear and tear may so exhaust the patient's strength that it is absolutely necessary to give some remedy that will produce sleep. As a general rule the best plan is to employ as mild a remedy as possible, though there are many conditions in which nothing short of morphia injections will suffice.

Chloral Hydrate.

Chloral hydrate is a crystalline substance of which the dose is from 5 to 20 grains. It is often given in the form of syrup of chloral hydrate, of which the dose is from ½ to 2 fluid drachms, and it is noteworthy that it is less harmful for young people and children than it is for older patients. It is used mainly for that form of persistent insomnia that results from overwork and worry; but it is always a dangerous drug to begin using because of the habit into which its use is apt to grow.

Chloralamide.

Chloralamide is seldom prescribed as a hypnotic in the treatment of simple insomnia; it is more often employed as an occasional dose in a person who, being ill from some other cause, is unable to get sleep without some assistance. It produces a calm, refreshing sleep without any bad after-effects; it is not very likely to produce the drug habit, and it has no very unpleasant taste. The dose is from 15 to 40 grains, and as it is

not very soluble in water it is usually prescribed as follows: Mix, say, 30 grains of chloralamide in 1½ or 2 teaspoonfuls of good brandy, and when dissolved add two tablespoonfuls of warm water at about body temperature, and if desired a little sugar also, to be taken as a draught at night or on going to bed. It acts relatively quickly, whereas some hypnotics, such as bromides, take so long to produce sleep that the patient very often lies awake in bed and then remains overpowered by drowsiness nearly all the next day.

Chloretone.

Chloretone is similar in its action to chloralamide. It is usually prescribed in doses of from 5 to 20 grains in cachet form, and it has been advocated in cases of sea-sickness, though as a matter of fact there is no drug which prevents the latter in persons who are susceptible to mal de mer.

Paraldehyde.

Paraldehyde is a liquid substance, of which the dose is from ½ to 2 fluid drachms. It has a very burning unpleasant taste, and in some respects this is an advantage because, although it is an efficient hypnotic in simple insomnia, it is not likely to lead to the development of the drug habit. Notwithstanding the nastiness of the drug, however, cases of paraldehyde habit are by no means unknown. To avoid the bad taste it is sometimes prescribed in the form of capsules, but there is always the danger that the gastric juice will not dissolve the latter, so that the capsule is passed with the motions; moreover, as already explained, the fact that the drug has a bad taste is in some respects a good thing.

Sulphonal, Trional, Tetronal, Veronal.

Sulphonal, Trional, Tetronal, and Veronal are all manufactured substances with an action similar to that

of chloralamide, but with a greater liability than the latter to be followed by untoward results. Some patients take these drugs perfectly well, others on the other hand may suffer from toxic symptoms, the most severe of which are delirium, skin eruption, and, especially if large or repeated doses of sulphonal are taken, the passage in the urine of a peculiar derivative of blood pigment known by the cumbrous name of hæmatoporphyrin.

Cannabis Indica.

Cannabis Indica is the same as Indian hemp, which is used more or less like opium in some parts of the world on account of its intoxicating effects when employed either in the form of a drink or smoked as tobacco is smoked. The names of certain Oriental preparations of Indian hemp used are Haschisch, Gunjah, and Bhang. The sleep that is produced is often accompanied by delightful dreams. In smaller doses it has a peculiar effect upon the mind, causing intervals of time to appear extraordinarily long and similarly producing curious illusions as to the size of objects. Thus a person under the influence of Indian hemp may be watching another person walk across the street and it may seem to him as though the act of the street-crossing took hours instead of seconds. The room in which the patient is may seem to be enlarged to an immense size so that the objects in it, the tables and chairs, for instance, may appear to dwindle to lilliputian dimensions, and so on. It is a dangerous drug on account of the effect it may have upon the mind, which, though temporary at first, may in time become serious. Small doses, however, either in the form of Extract of Cannabis Indica in doses of from $\frac{1}{4}$ to 1 grain, or Tincture of Cannabis Indica in doses of from 5 to 15 minims, are sometimes very beneficial in the relief of persistent or recurrent

headache, especially if the latter are accompanied by insomnia.

Lupulus.

Lupulus or Hops, when employed as hypnotics, may be prescribed in the form of an infusion or as a tincture, but more often the hops themselves are sewn into the pillow upon which the patient's head rests at night, sleep being produced by the inhalation of the not unpleasant odour that comes from the pillow. The effect, however, passes off comparatively soon in most cases, even though a fresh supply of hops be utilised at short intervals.

Phenazone, Acetanilide, Phenacetin.

Closely related to the hypnotics are various remedies that have been employed in the relief of headache; indeed, any drug which in a given dose has a hypnotic action will in a smaller dose relieve headache without sending the patient to sleep. Some headache remedies, notably bromide of potassium and chloral-hydrate, have been discussed already, but there remain a group of three remedies which merit special attention. These three are: Phenazone, also known as Antipyrin, the dose being from 5 to 20 grains; Acetanilide, the dose of which is from 1 to 3 grains; and Phenacetin, the dose of which is from 5 to 10 grains. All of these seem to be more beneficial when prescribed in the dry form than when administered as mixtures. They are all crystalline. Phenacetin is tasteless, but the other two have strong and unpleasant tastes. They used to be employed for the relief of pyrexia, but owing to the fact that febrile patients tend to have a weakness of the heart's action, and also to the fact that these three drugs depress the action of the heart, their antipyretic property is now seldom made use of. The drugs are employed chiefly for the relief of simple headache, and sometimes also for the cure of pain in the

peripheral nerves, notably the lightning pains of locomotor ataxia. Of the three the most dangerous is acetanilide, though neither antipyrin nor phenacetin should be taken without great circumspection.

Valerian and Asafœtida.

There are certain ailments which depend not upon any known structural or anatomical change in the nervous system, but upon an error in the way in which the nerves are performing their functions; that is to say, the diseases are functional and not organic. It is important to realise that when a person is suffering from functional nerve-symptoms he is not malingering but is really suffering, and although by will-power he may be able to make his symptoms less, he is not wilfully producing symptoms; he is sometimes quite as ill as if he had an organic disease, such as cancer. These functional maladies of the nervous system are often harder to treat and cure than are organic complaints, yet at the same time, because they seldom kill the patient, they are apt to receive less careful attention than they should. It is no use merely shrugging the shoulders in cases of this kind and saying that there is really nothing the matter with the patient at all. There is nothing *organic* the matter, but the patient is really ill, and it is the duty of physician and nurse alike to try and cure the complaint. Two remedies which seem to be in some respects almost specific in the treatment of some of these cases are valerian and asafœtida. Of these the latter in particular has a most disagreeable smell and taste, and it is very apt indeed to repeat itself from the stomach long after the dose has been swallowed. It has been thought by some that it is on account of the nastiness of the medicine that the patients are benefited by it, but there are many who hold that there is something more than

this in the mode of action of the drug, because it has been found that almost equal benefit is to be obtained when the medicine has been given in capsules or in cachets without any taste sensation being produced at all.

Valerian is a well-known English plant, the drug being obtained from its root. It may be prescribed in the crude form as a powder, but more often the ammoniated tincture of valerian is given in the form of a mixture in doses of ½ to 1 drachm ; or valerianate of zinc in doses of from 1 to 3 grains, repeated three times daily, is given as a pill.

Asafœtida is a gum-resin obtained from an Eastern plant, and it is employed as a rule in the form of a tincture in doses of from ½ to 1 fluid drachm. Neither of these medicines has any known ill-effects.

Nux Vomica.

Nux Vomica itself is a round, flat seed about an inch in diameter ; it is generally known as the Nux Vomica bean. It is exceedingly poisonous, and the active principle in it is the well-known alkaloid, strychnine. The alkaloid itself is prescribed in the form of Liquor Strychninæ Hydrochloridi, which may either be given by the mouth in the form of a mixture in doses of from 2 to 8 minims, or else subcutaneously, in doses of from 1 to 4 minims, given by means of a hypodermic needle and syringe. Besides this there are two extracts of nux vomica and a tincture, the dose of the latter being from 5 to 15 minims.

The chief use of strychnine itself is as a cardiac stimulant, especially in cases of emergency—such, for instance, as when the heart stops beating in a patient who is under an anæsthetic, or in a case of heart disease with sudden or acute dilatation, or, again, in patients suffering from a severe fever, such as lobar

pneumonia or enterica, during which there may be a tendency to acute heart-failure.

The other chief uses to which nux vomica and its preparations are put are as a stomachic in certain cases of indigestion and as a tonic, especially in people who are convalescing from some long illness, and in neurasthenic patients and those in whom the activity of the nervous system is unstable or below par. A fairly well-known prescription which is employed frequently as a tonic, especially in patients who have defective appetites, is the following:—

Liquid Extract of Nux Vomica ...	1 minim
Tincture of Gentian with Glycerin	1 fluid drachm
Diluted Nitro-hydrochloric Acid ...	10 minims
Water ... ... to	1 fluid ounce

The dose of this mixture is two tablespoonfuls to be taken three times a day after food.

Toxic Effects.

Nux Vomica is sometimes employed in the making of vermin killers, rat pastes, and other similar preparations, and it sometimes happens that people take it in one of these forms either accidentally or with suicidal intent. The most marked symptoms of strychnine poisoning are the very violent convulsions that ensue, the whole body and the limbs becoming so extended and rigid that the back is arched backwards into the position which is known as opisthotonos. The condition may simulate tetanus; and just as in tetanus so in strychnine poisoning, the patient unfortunately retains complete consciousness to the very end, and the violent contractions are extremely painful. The chief way of distinguishing between tetanus and strychnine poisoning is to note the condition of the lower jaw, for in tetanus the latter becomes closely clenched in the condition known as lock-jaw or trismus, whereas in strychnine poisoning rigidity of the lower

jaw either does not occur at all or only when the patient is approaching death. The treatment for strychnine poisoning is to minimise the contractions by giving chloroform inhalations, to wash out the stomach under chloroform if the drug was taken by the mouth, and to administer syrup of chloral hydrate in doses of from 1 drachm upwards. Once general convulsions have become marked, however, it is extremely difficult to save a patient who has taken an over-dose of strychnine by the mouth.

Urotropine.

Urotropine is not an officinal remedy, yet it is very valuable and is employed commonly in practice.

It is a solid substance, generally prescribed in tablet form in doses of from 5 to 10 grains repeated three or four times a day, and its chief importance lies in the fact that it is excreted by the kidneys, and also by other glandular structures such as the liver and pancreas, in the shape of formalin. The latter is a well-known antiseptic, and when it is being secreted by the kidneys in the urine it diminishes the rate at which any microbes that may be present in the urine are apt to multiply, and therefore it is a useful remedy for pyuria. It will also minimise the rate of multiplication of microbes that may be causing catarrh in the biliary passages, especially if there is a tendency to gall-stones, and therefore it may be prescribed when there is no pyuria in patients who are liable to gall-stones. It is sometimes said that urotropine acts best when the urine is already acid, and that if the urine be alkaline it is wiser to employ an allied drug called helmitol.

When urotropine is being given it is important to watch the urine daily lest any blood should appear in it, for the drug seems to be able to produce a slight degree of renal inflammation with possible hæmaturia.

The danger of this is slight, however, and the drug may be employed in most pyuric cases without much fear.

Cantharides.

Cantharides is a drug obtained from an insect known as the Spanish Fly. Curiously enough it is a beetle and not a fly, and it comes from Hungary and Russia rather than from Spain. It is about three-quarters of an inch long and of a rather pretty iridescent green hue. Various preparations are made from this bettle, the most important being Liquor Epispasticus, which is used for blistering, and Unguentum Cantharidis, which is often employed as a stimulating ointment to promote the growth of hair in places that have temporarily become bald although the hair bulbs remain. It is used in this way in the treatment of alopecia areata. When it is desired to produce a blister by means of Liquor Epispasticus, a good method is to outline the area to be dealt with by means of vaseline, the latter being used to prevent the blistering fluid from trickling on to the skin outside the area that it is intended to blister. The Liquor Epispasticus is then painted on to the non-vaselined skin by means of a camel-hair brush. To ensure efficient blistering it is generally wise to allow the fluid first painted on to dry for a minute or two and then to paint over it again a second, or similarly even a third, quantity of the liquid. The area is then covered over with gutta-percha tissue smeared with vaseline and some wool, kept on with a bandage. In twelve hours' time the area that has been painted will have risen up in a large bleb containing clear yellow fluid. or if it has not done so it can generally be made to do so by applying ordinary hot boric-acid fomentations which may be left on for three or four hours and repeated if necessary. The blister may

be snipped so that the fluid escapes, and then if it is to be allowed to heal it is dressed with some bland ointment such as one made of boric acid and lard ; or if on the other hand it is to be kept open, it is sometimes dressed with Unguentum Sabinæ or savin ointment, which should be of a pretty green colour. The object of the savin ointment is to keep the blistered surface just raw for a few days so that the one blister will serve instead of fresh ones having to be produced at intervals. Blisters are generally employed for the relief of pain, especially when there is underlying inflammation, as in the case of pericarditis, iritis, pleurisy, or arthritis.

Toxic Effects.

Cantharides, like turpentine, is apt to be absorbed from the surface of the skin in sufficient amount to irritate the kidneys and to produce hæmaturia and acute nephritis, which, although it may be transient, may in some cases develop into chronic Bright's disease. It is on this account that the area which is blistered at any one time should be limited, and that the urine should be examined periodically in order to detect the first traces of albumen or blood in it. Used in the ordinary way for blistering, however, it very seldom happens that untoward effects result.

Colchicum.

Colchicum is derived from the autumn crocus, and its chief use is in the treatment of gout. In many cases its action is almost specific. Of the various preparations employed, the wine, Vinum Colchici, is probably the best known, and it is given in the form of a mixture in doses of from 10 to 30 minims. It is mainly in the acute articular type of gout that it does good, especially in the relief of the acute pains in the big toe and other joints, and also in diminishing the amount

of chalky deposits (sodium biurate) on the fingers and in the ears. It probably does less good when the gout takes the form of nervous, gastric, cardiac, or respiratory attacks. It is important to remember that there are some people who become either so depressed by colchicum, or else have their digestion so upset by it, that they are unable to continue with the remedy, even though it may be doing their gout good. A great many gouty patients, however, are able to take it for even an extended period without any but good results.

ANTHELMINTICS.

Anthelmintics are drugs which are of service in curing patients of worms. There are three chief groups of parasites of this kind that affect the intestinal canal of human beings—namely, thread worms, round worms, and tape worms.

Infusion of Quassia.

Thread worms are quite small, though they may be seen readily with the naked eye, sometimes in hundreds, particularly in the motions of children. They inhabit chiefly the large intestine, and the treatment for them consists first of all in giving a purge to empty the bowel as far as possible and then injecting per anum by means of a Higginson's syringe half a pint or more of warm infusion of quassia. This infusion kills the worms and they come away with the next motion. It is very likely that the injection will need to be repeated for several successive days before the cure is complete.

Male Fern (Filix Mas).

The remedy for tape worms is male fern. This is a well-known English plant, the underground stem of which is made into a fluid extract, of which the dose is from ½ to 2 drachms. Unfortunately, it has a very nauseous taste, which can be overcome only partially

by means of flavouring agents. The main principles of treating a tape-worm case are to put the patient to bed, to empty the bowel completely by means of laxatives, to give only a minimum quantity of milk for one or two days, and then in the early morning before any food is given subsequent to the patient's waking up a draught containing male fern. The latter is administered by the mouth, the patient thereafter remaining at rest in bed for some hours before a dose of castor oil is administered. Water may be given, but no other substance by the mouth until the bowels have acted. The liquid extract of male fern is thus allowed to come into contact with the head of the tape worm, killing it effectually when there is no food about it preventing the drug acting directly upon it. The castor oil drives out the dead worm, and it is most important to examine carefully for the head, which is barely larger than that of a big pin; it is only when this has been found that one can be certain that the patient's worm has been eradicated. Even when the head has not been passed a great length of worm may be found in the evacuation; the patient will then be very disappointed to find that in three months' time he is again passing fragments, the original head having developed into a full-grown tape-worm segments again, the whole of the treatment requiring to be repeated.

Santonin.

Santonin is an organic compound obtained from the dried flowers of a composite plant termed Artemisia Maritima, and it is the drug *par excellence* for the cure of patients suffering from the round worm, Ascaris lumbricoides. It is usually prescribed in doses of from 2 to 5 grains in conjunction with small quantities of calomel. The patients are usually children, and therefore it is not common to give the maximum dose. After

the administration of a purge to empty the bowel, the powder is given in milk or treacle, and it is supposed that instead of actually killing the worm, as is the case with tape worms treated with male fern extract, the santonin drives the round worm from the small intestine into the large and that then they are expelled by the calomel. One has to be careful not to administer an overdose, because santonin has several times proved fatal, the toxic symptoms being chiefly cerebral, particularly coma and convulsions. Short of this there is one peculiar effect that the remedy has in some cases—namely, the production of yellow vision, the patients seeing all things as though they had been painted yellow.

VACCINES AND SERA.

Many microbial infections, such for instance as diphtheria, anthrax, gonococcal infections, and so on, are nowadays being treated by various bacteriological preparations, the two chief varieties of which are sera upon the one hand and vaccines upon the other. The essential difference between these two is best explained perhaps by giving a brief account of the mode of preparation of each.

In order to prepare anti-diphtheritic serum one requires a horse; into this horse increasing doses of the poisonous substances that are produced in cultures of diphtheria bacilli are injected at intervals. The result of each injection is to render the horse more resistant than before to the diphtheria microbe, and this increasing resistance is due to the production of anti-diphtheritic substances in the horse's serum. When a high degree of immunity has thus been reached, blood is withdrawn from one of the horse's veins, usually the jugular, and from the blood so withdrawn the serum is abstracted. It is put up in the well-known phials of

anti-diphtheritic serum. When a patient suffering from diphtheria is treated with subcutaneous injections of this serum he is really receiving ready-formed anti-toxic substances; that is to say, thanks to the horse he is receiving ready-made the antidote which neutralises the poison that is being produced by the diphtheria microbes that are infecting his throat.

Vaccines, on the other hand, consist merely of the sterilised cultures of micro-organisms. Whenever a microbe grows in a culture medium it produces in that medium excretory substances which are inimical to its own growth. Vaccine treatment consists in injecting a solution of these excretory products under the skin of a patient who is suffering from the attacks of the particular kind of microbe in question.

The effect of the injection is not so much to introduce into the patient ready-formed anti-bodies as to supply him with microbial products which stimulate his own tissues in their turn to produce immunising substances. A serum is obtained from an animal immunised by means of a vaccine. A vaccine is a microbial solution which makes the patient immunise himself.

There are only a few diseases that are known to be benefited by sera, although there are a great many different kinds of sera upon the market. The three which are most efficacious are anti-diphtheritic serum, anti-streptococcal serum, and anti-anthrax serum, used in the treatment of diphtheria, erysipelas, and other streptococcal infections, and malignant pustule or anthrax respectively.

Vaccines, on the other hand, are much more numerous, for it is supposed that almost every microbial infection can be benefited by the use of a corresponding vaccine. This means of treatment, however, is comparatively new, and it remains for time to show to what extent the benefits claimed for it will ultimately be maintained.

APPENDIX.

SYMBOLS :—

gr = Granum, a grain.
ʒ = Drachma, a drachm.
℥ = Uncia, an ounce.
♏ = Minimum, a minim.
gtt = Gutta, a drop.
O = Octarius, a pint.
C = Congius, a gallon.

DOMESTIC MEASURES :—

One ordinary	teaspoonful	= 1 fluid drachm.
,,	dessertspoonful	= 2 fluid drachms.
,,	tablespoonful	= half a fluid ounce.
,,	tumblerful	= half a pint, or ten fluid ounces.

FLUID MEASURE :—

60 minims	= 1 drachm.
8 drachms	= 1 ounce.
20 ounces	= 1 pint.

Roughly speaking, one minim in fluid measure is equivalent to one grain in solid measure.

METRIC SYSTEM :—

1 gramme	= 15½ grains (approximately).
1 cubic centimetre	= 17 minims.
5 centimetres	= 2 inches.

COMMON ABBREVIATIONS IN PRESCRIPTIONS :—

A.C. =Ante cibos	=Before food.
Bis ind. =Bis indies	=Twice a day.
Coch. =Cochleare	=A spoonful.
C.M. =Cras mane	=Early to-morrow morning.
Dim =Dimidius	=One-half.
F.L.A. =Fiat lege artis	=Let it be made by the rules of art

COMMON ABBREVIATIONS : (*continued*)

F.M.	=Fiat mistura	=Let a mixture be made.
F.S.A.R.	=Fiat secundum artis regulas	=Let it be made according to the rules of art.
Haust.	=Haustus	=A draught, a single dose of a mixture.
M.	=Misce	=Mix.
Mist.	=Mistura	=A mixture.
O.M.	=Omni mane	=Every morning.
O.N.	=Omni nocte	=Every night.
P.A.	=Partibus affectis	=To the affected parts.
P.C.	=Post cibos	=After food.
P.R.N.	=Pro re nata	=Occasionally, when occasion arises.
Q.S.	=Quantum sufficiat	=As much as is sufficient.
Pt.	=Repetantur	=Let them be repeated.
Ss. or fs	=Semis	=A half.
S.O.S.	=Si opus sit	=If necessary.
Stat.	=Statim	=Immediately.
T.D.S.	=Ter indies sumendum	=To be taken three times a day
Vent. vac.	=Ventriculo Vacuo	=On an empty stomach.

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