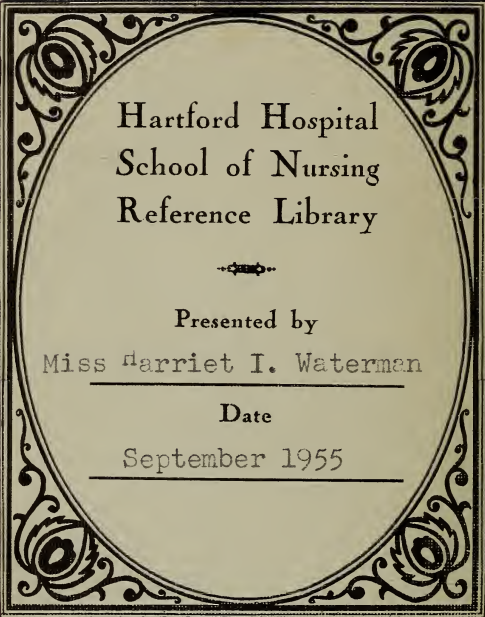


MATERIA MEDICA
FOR NURSES

A decorative flourish consisting of a horizontal line that ends in a small, tight spiral on the left side.



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June 1894.

TEXT-BOOK
OF
MATERIA MEDICA
FOR NURSES

COMPILED BY

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G. P. PUTNAM'S SONS

NEW YORK

LONDON

27 WEST TWENTY-THIRD STREET

24 BEDFORD STREET, STRAND

The Knickerbocker Press

1894

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490
D65

JUN 7 1967

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The Knickerbocker Press, New York
Electrotyped, Printed, and Bound by
G. P. Putnam's Sons

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PREFACE.

THE study of materia medica is made, to some extent, a part of the course in all our training schools for nurses ; but, so far, no text-book has been prepared along the special lines followed in class recitations.

Those special lines are well defined, and are limited. They begin and end with medicines, and do not run into therapeutics. The application of medicine to disease is no part of a nurse's study, and there are therefore some inconveniences met with in using—as text-books—works on materia medica which are written solely for the use of the medical profession.

Large works, containing all the points which a nurse needs to know, contain also an immense amount of matter with which she has nothing to do, and are very expensive ; while those which are more concise usually presuppose a large amount of information, and are, indeed, not intended to be used at the beginning of a course of study, but rather at the end.

It is in the hope of filling this middle place that this text-book has been compiled, and the attempt made to collect from all available sources the scattered points which concern a nurse, and to give them simply and directly. The outlines followed are those of the classes in materia medica as taught in Bellevue Training School for Nurses, and include something of the source and composition of drugs ; their physiological actions ; signs indicating their favorable or unfavorable results ; the symptoms of poisons with their antidotes ; and practical points on administration.

For material I am indebted to the following works :
“Materia Medica and Therapeutics,” by Dr. H. C. Wood ;

“Quiz Compend of Materia Medica,” by Dr. S. O. Potter ; “Materia Medica and Therapeutics,” by Dr. R. Bartholow ; “Lectures on Materia Medica and Therapeutics,” by Dr. Thomson, edited by Dr. Le Fevre ; “Manual of Pharmacology, Therapeutics, and Materia Medica,” by Dr. T. Lauder Brunton ; “Materia Medica and Therapeutics,” by Dr. J. Mitchell Bruce ; and Dr. Farquharson’s “Guide to Therapeutics and Materia Medica,” edited by Dr. Woodbury.

I gratefully acknowledge the kind permission accorded by the authors and publishers of the first five works to make extracts from them. For the use of the two latter I am indebted to the courtesy of Messrs. Lea Brothers. Sincere thanks are due also to Dr. Charles Rice for much kindness in giving assistance and information, and in contributing a table of comparison between minims and drops ; and to Dr. George Dock for revision and corrections and for many practical suggestions. The classification follows that used by Dr. Brunton and Dr. Bruce. The doses are taken from Dr. Wood’s “Materia Medica and Therapeutics.”

INTRODUCTION.

THE broad meaning of medicine (*Medicina*) is "the science and art of healing and curing the sick" (Gould); but aside from this meaning the word is used in a restricted sense, to signify a drug used for the cure or relief of disease. The word drug means "a substance, simple or compound, natural or prepared, single or mixed with other substances, used as a medicine" (Gould); and "Materia Medica" covers the entire list of such substances, with their whole history.

On beginning the study of *Materia Medica* a general knowledge should be acquired of the classification of drugs considered from three standpoints :

I. Their source or derivation.

II. Their physiological actions.

III. Their ultimate forms and appearance as prepared in the pharmacy by definite, standard formulæ, for administration.

I. Both the organic and inorganic worlds furnish material useful for medicine, and in the former both the animal and vegetable kingdoms are represented. The class of inorganic drugs is large, and comprises alkalies, alkaline earths, acids, metals and non-metals, and complex chemical compounds, as the carbon compounds. Among them all are many familiar elements, as lead, iron, etc.

The animal kingdom furnishes but a small quota. The drugs of vegetable origin are by far the most numerous, and are obtained from green and flowering plants, both fresh and dry, fungi, and lichens. The whole plant may be represented or a part only, as the flowers, seeds, fruit,

stems, or roots. The constituents of vegetable drugs are many and varied in character, some of them being of great potency. They are extracted from the plant and isolated in a pure form by elaborate chemical processes, and by means of especially constructed appliances.

The principal ones are as follows : Aromatic, odorous, and bitter principles, albuminous bodies, starches and sugars, glucosides, oils, gums, resins and oleo-resins, and alkaloids. Gums are exudations from the stems of plants. Resins are solid, brittle, non-volatile substances, insoluble in water ; and oleo-resins may be broken up into resins and volatile oils.

The alkaloids are the most important, forming as they do a class of poisons of marked characteristics and great intensity. They are nitrogenous compounds, many of them of deadly power, and are spoken of as the "active principles" of those drugs in which they are found, and to which they lend their own distinctive properties. The name alkaloid is given to them from their similarity in many ways to alkalies.

The other constituents of vegetable drugs are relatively unimportant.

II. In considering drugs in reference to the second division we find them grouped according to the effect they have on the human organism in disease. This mode of classification must be grasped broadly, not by rule. It is impossible to assign fixed and definite places to all medicines from this standpoint, or to draw sharp lines of division. Remembering the complex nature of plants, and that one drug may contain more than one active alkaloid, and a number of the less important substances just named, it is evident that one medicine may have several actions ; and practically it is found that their effects are as scales of varying gradation, and run insensibly into one another. The same drug that in small doses acts as a beneficent agent, may in large ones be an overwhelming poison. One given to quiet the nervous system may also constipate ; another given for purgation may seriously reduce the strength of the heart ; another given to strengthen the heart may also increase the flow of urine,

so that classification may well be sometimes a little puzzling.

It will dispel bewilderment to remember that the most important and prominent characteristic of a drug is usually taken as its representative quality, the others being for the time ignored.

Individual peculiarities have much to do in modifying the physiological actions of drugs. The more highly strung nervous organizations respond more quickly, as a rule, to the actions of drugs than do those of coarser fibre, and more quickly show evidence of over-dosing and mild poisoning. Among these temperaments are found many examples of what is called "idiosyncrasy"—that is, an increased susceptibility to the effects of a drug which entirely forbids its use, and for which no reason can be discovered.

Custom makes a decided difference, and the action of a medicine is more energetic with one unused to it. With frequent repetition comes "toleration," when the system accommodates itself to the drug, and larger doses can be taken with relatively less effect. Beyond this point comes "habit," when the system not only tolerates but craves the drug in ever increasing quantities, and with the result of a progressive degradation of the will power, as is most strikingly shown in the ascendancy of alcohol and opium over the individual.

"Accumulation" and "cumulative action" of drugs are expressions often met and are self-explanatory up to a certain point. While it might be difficult to explain the exact processes in the body tissues by which drugs are stored up or accumulate in them, it is, fortunately, sufficient for practical purposes to know that a number of drugs do become apparently fixed in the tissues, and that many others accumulate by being given more rapidly than they can be excreted.

Age is an important factor to consider. Strong drugs, and especially those that act on the brain, are given with much care to children and to the aged. The condition of the stomach is another point to consider. Medicines act more rapidly on an empty stomach, and any irritating

properties they may have are then more marked. Given with or soon after food the action is more gentle and slow. The kinds of food taken are to be thought of, and any which might neutralize the medicine should be put off for a safe interval. In giving medicines to produce sleep, all conditions favorable to sleep must first be secured. The good effect of many a hypnotic is lost through the failure to provide darkness, warmth, and quiet before giving it.

In general the effects of medicines are classed as primary and secondary, immediate or remote. By the primary or immediate action is meant the first definite result of the drug, and subsequent changes which are brought about by this first result are termed the secondary or remote effects, viz., if a diuretic is administered to a dropsical patient a copious flow of urine soon occurs as the primary effect. As a result of increased urination fluid is largely abstracted from the body tissues, and the consequent diminution of the dropsy is the secondary effect. The classes of medicine according to their physiological actions are arranged alphabetically as follows :

Antispasmodics.—Those which relieve convulsions and spasmodic pains (Gould).

Anæsthetics.—Those which produce a state of insensibility to pain. They may be (*a*) general, as ether ; or (*b*) local, as cocaine.

Astringents.—Those which tend to contract the tissues, thus checking secretions.

Alteratives.—A rather vague term, not universally approved, applied to certain drugs which have an unexplainable power over the nutritive processes.

Anodyne, Analgesics.—Those which give relief from pain.

Antiperiodics.—Those which break up the rhythmical character of some manifestations of disease, as chills in ague.

Antipyretics.—Those which reduce fever.

Antacids.—Those which counteract acidity.

Anthelmintics.—Those used to expel (vermifuge) or kill (vermicide) intestinal parasites.

Absorbents.—Those which produce absorption and exudation of diseased tissue (Gould).

Carminatives are slightly stimulant, and expel gas from the stomach and intestines.

Cardiac Stimulants.—Those which strengthen the heart's action.

Cardiac Depressants.—Those which weaken the heart's action.

Cathartics, Purgatives.—Those which produce evacuation of the bowels. They are subdivided as follows: laxatives, or aperients, those of gentle action, among which are fruits and some vegetables; drastic cathartics, those of severe action causing griping; hydragogue cathartics, those which remove water freely from the intestines. Some of the drastics belong to this class, and all salines. Saline cathartics produce a copious flow of serum from the intestinal walls into the canal. The blood serum being of one degree of alkalinity and the salts a much stronger solution, an active exchange takes place until the two are equalized. It was formerly taught that salts should be given in a large quantity of water, but Dr. Hay teaches giving them in saturated solution, and states that it is not the amount of water in the canal, but in the tissues that is of importance, and that purgation may be prevented by withholding water from the diet for a day or two.

Diluents.—Those which dilute the secretions of organs.

Diaphoretics.—Those which increase the action of the skin and produce perspiration.

Diuretics.—Those which increase the flow of urine.

Depresso-Motors.—Those which lessen the activity of the spinal cord and motor centres (Gould).

Excito-Motors.—Those which increase the activity of the spinal cord and motor centres (Gould).

Emetics.—Those which produce emesis or vomiting: (a) Local emetics, those that act directly on the nerves of the mucous membrane of the stomach, and (b) systemic emetics, those that act on the vomiting centres in the medulla.

Expectorants.—Those which increase bronchial secretions.

Emmenagogues.—Those which stimulate the menstrual flow.

Epispastics, Escharotics.—Those which produce blisters and sloughing.

Emollients and Demulcents.—Those which have a softening action on skin or mucous membranes.

Hypnotics.—Those which produce sleep, but have no power over pain. All anodynes are also hypnotics, but all hypnotics are not anodynes.

Narcotics.—Those which have intensified anodyne and hypnotic power, producing a condition of stupor.

Rubefaciants.—Those which redden the skin by distending the capillaries. Rubefaciants, epispastics, and escharotics must be classified loosely, as many drugs have all three actions, according to the length of time and severity of application. Nitrate of silver is an escharotic which does not belong to the other two classes.

Sedatives.—Those which have a soothing effect by lowering functional activity (Gould).

Stomachics.—Stimulants exciting the functional activity of the stomach.

Sialagogues.—Those which produce an increased flow of saliva.

Tonics.—Those which promote nutrition and give tone to the system.

III. The preparation of medicines from the crude drug is carried on in drug mills and pharmacies by many processes of great nicety and by exact formulæ which place them, when completed, in distinct classes, each class differing from all others in one or more particulars. To standardize the preparations of drugs, each country has its *Pharmacopeia*, or authorized publication containing the list of such drugs and their preparations as are declared official or (official) for that country. Abroad the national *Pharmacopeias* are established by law. In this country, representatives of the medical and pharmaceutical professions together formulate the *U. S. P.*, and appoint a committee to revise it every ten years.

Dispensatories are private unofficial publications—commentaries on the *Pharmacopeia*, treating with much detail not only those official drugs contained in it, but unofficial ones, and their preparations also. The *Dispensatory* gives

doses, but the *Pharmacopeia* does not. The classes of preparations of the *U. S. P.* are as follows, a few being omitted as unimportant :

LIQUID PREPARATIONS.

Decoctions, *Decocta*.
 Infusions, *Infusa*.
 Solutions, *Liquores*.
 Waters, *Aqua*.
 Tinctures, *Tinctura*.
 Fluid extracts, *Extracta fluida*.
 Spirits, *Spiritus*.
 Wines, *Vina*.
 Mixtures, *Mistura*.
 Vinegars, *Aceta*.
 Oleates, *Oleata*.
 Oleo-resins, *Oleoresina*.
 Glycerites, *Glycerita*.
 Syrups, *Syrupi*.
 Mucilages, *Mucilagines*.
 Liniments, *Linimenta*.

SOLID PREPARATIONS.

Abstracts, *Abstracta*.
 Extracts, *Extracta*.
 Resins, *Resina*.
 Cerates, *Cerata*.
 Confections, *Confectiones*.
 Pills, *Pilula*.
 Powders, *Pulveres*.
 Papers, *Charta*.
 Ointments, *Unguenta*.
 Plasters, *Emplastra*.
 Lozenges, *Trochisci*.
 Suppositories, *Suppositoria*.

LIQUID PREPARATIONS.

Decoctions.—Made by boiling the drug in water. A method used for hard fibrous or wood plants. There are but two official decoctions.

Infusions.—Made by treating a vegetable drug with either hot or cold water without boiling. Five official.

Solutions.—Preparations of non-volatile drugs dissolved in water. Fifteen official.

Tinctures.—Preparations of non-volatile substances (except one, iodine) dissolved in alcohol.

Fluid Extracts.—Concentrated tinctures or alcoholic extracts of definite strength. One c.c. of a fluid extract represents 1 gramme of the drug; or, 1 minim represents 1 grain, approximately. Seventy-five official.

Spirits.—Solutions of volatile substances in alcohol. Twenty-two official.

Wines.—Preparations made with a basis of wine. Fourteen official.

Mixtures.—Watery preparations holding an insoluble substance, finely subdivided, in suspension. Emulsions

belong to this class, an oil being suspended in the mixture. Eleven official.

Vinegars.—Preparations made with vinegar or dilute acetic acid.

Oleates.—Preparations made with oleic acid. Two official.

Oleo-resins.—Preparations containing a mixture of natural oils and resins extracted from vegetable substances by the action of ether. They are the most concentrated of liquid preparations. Six official.

Glycerites.—Preparations made with a basis of glycerine. Two official.

Syrups.—Preparations made with sugar and water, or sometimes alcohol or vinegar. Simple syrup is sugar and water. Thirty-four official.

Mucilages.—Preparations of soluble gummy substances dissolved in water. They spoil very quickly. Five official.

Liniments.—Preparations for external application with friction. They have usually a lead solution as a basis, and have an oily or soapy character. Ten official.

SOLID PREPARATIONS.

Abstracts.—Dry powdered preparations representing twice the strength of the crude drug.

Extracts.—Semi-solid preparations, made partly by evaporation and partly by dissolving. Thirty-two official.

Resins.—Peculiar substances soluble in alcohol and insoluble in water. Obtained from saturated tinctures by precipitating with water. It is the resinous constituent which causes the thick precipitate seen when compound tinctures are diluted with water. Such preparations are better diluted with weak wine. Four official.

Cerates.—Preparations made for inunction with white wax or lead. Eight official.

Confections.—Medicinal substances prepared with a mass of sugar and honey. Two official.

Pills.—Fifteen official. Need no general description.

Powders.—Nine official. Need no general description.

Papers.—Papers impregnated with medicinal substances. Three official, two of which are for vesication. The word “charta,” also means the small papers in which powders are done up, or, by inference, the powder itself.

Ointments.—Preparations with a basis of vaseline or lard to be used as an inunction. Twenty-six official.

Plasters.—Medicinal substances mixed with usually a lead preparation or Burgundy pitch spread upon coarse muslin, and adherent at the body temperature to the skin. Seventeen official.

Lozenges.—There are sixteen official.

Suppositories.—Slender cone-shaped appliances for insertion into the rectum. The basis is usually cocoa butter.

We find the metallic poisons, as prepared for medicinal use, usually in solution, after being changed in form by the action of various other chemical agents. Among tinctures, on the other hand, are found many of those vegetable drugs from which are obtained the powerful alkaloids. But if the pure alkaloids alone are desired, as they are insoluble in water and only partly so in alcohol, they must be treated as the metals are, and combined with an acid to make them ready for ingestion. In this combination both metals and alkaloids form what are called “salts”—being perfectly soluble in water yet retaining all their medicinal qualities. Thus one reads of the “salts” of iron, the “salts” of strychnia, etc. Various acids are used, but the most common one is sulphuric acid, as it is cheap. These salts are then finally prepared for use in solution, and distinguished from each other by the name of the acid used—*e.g.*, “the solution of the sulphate of morphia,” the “hydrochlorate of cocaine,” etc.

As solutions are made in varying strengths the face of the bottle is always carefully marked either with the percentage or with the amount to the drachm.

A saturated solution is one that cannot be made any stronger. The water holds in solution all that it can dissolve, and any additional solid material would be deposited as a sediment. All saturated solutions are

not of the same strength, as water dissolves different solids in different proportions. Solutions decompose very readily. The appearance of a fungus shows when decomposition has occurred.

Almost all preparations of drugs are injured by age except whiskey, brandy, etc. Tinctures and fluid extracts become stronger by reason of evaporation of their alcohol. Infusions lose their strength. Many preparations are injured by light and air, as the silver solutions, and others are unstable as to composition.

Medicinal agents may be applied : (1) to the skin in various ways, viz., by inunction, as oils, liniments, and ointments rubbed into the skin ; by simple contact without rubbing, as medicated baths, cooling or sedative mixtures, blisters, plasters, powders, etc., and by painting, as iodine ; (2) to mucous membranes, as gargles, insufflations, sprays, and douches ; (3) to wounds and diseased tissue, as antiseptic powders, ointments, and solutions ; or they may be administered (4) by inhalation, as fumes or vapor ; (5) by hypodermic injection into the subcutaneous tissues ; (6) by the mouth, or by the rectum, into the alimentary canal.

By the first three ways, the effects produced are, generally speaking, local (though in many instances the local impression may be deepened into a general one) and results are slow.

Inhalation is a rapid mode of impressing the system, but only a few drugs are fitted for use in this way.

Drugs given hypodermically act most promptly, because they go directly into the blood current, and are diffused through the tissues in a short time. Only highly concentrated or powerful agents which are active in small bulk can be given in this way ; and of these, many, otherwise available, are forbidden on account of their irritant properties.

Medicines are most often given by way of the alimentary canal, and the rectum is used when for any reason it is not desirable to use the stomach.

Having entered the circulation by whatever route, a drug is carried by the blood to the tissues, and is finally

eliminated, or cast off as waste product, by the excretory organs.

As the methods of administering medicines, giving hypodermic injections, and otherwise applying drugs are fully discussed in nursing text-books, they will not be touched on here. The measurements commonly used in this country are the minim— ℥ , the fluid drachm— ʒ , and the fluid ounce— ʒ , or half ounce— s .

The minim is not by any means the exact equivalent of a drop, nor are all drops alike. A medicine ordered in minims must not be measured by drops, nor one ordered in drachms, by a teaspoon.

It is hardly necessary to say that the nurse should always know what she is giving, and in what proportions. It is therefore essential that she should learn to read prescriptions, to recognize the most important ingredient or ingredients contained therein, and to find out by arithmetical process the exact amount of such ingredients contained in a given dose.

TEXT-BOOK OF MATERIA MEDICA FOR NURSES

PART I.

THE INORGANIC MATERIA MEDICA.

THE ALKALIES AND ALKALINE EARTHS.

THE word "alkali" is formed from two Arabic words, "al," meaning "the," and "kali," the name of a plant from the ashes of which soda was obtained.

Chemically, an alkali is one of a class of caustic bases, the term "base" being given to the principal element of a compound. The chief characteristics of an alkali are comparatively well known: it unites with oils and fats to form soaps; neutralizes acids and forms with them fresh compounds known as salts, which possess properties differing from those of either constituent; turns red litmus paper blue; and is soluble in water.

Those alkalies which are obtained in a solid state, viz., soda and potash, are termed "fixed," while ammonia, by reason of its gaseous nature, is called a "volatile" alkali.

An **alkaloid** is an alkaline principle found in the tissues of plants or animals; more soluble in alcohol than in water, and having a definite composition as regards the proportions of its chemical elements. This composition is different from that of an alkali. An alkaloid also unites with acids to form salts, and these salts have

the same physiological and therapeutic actions as the alkaloid.

Potassium (Potash).

There are three great natural sources from which potash and its salts are derived, viz. : 1. Wood ashes. 2. Argol, the deposit left in wine-casks during the fermentation of grape-juice. 3. Beds of saline earths, found chiefly in India, but also to some extent in other countries.

Physiological Actions.

Potassium depresses the muscular, nervous, and cardiac tissues. Given long or in concentrated doses it destroys muscle and nerve tissue and nerve-centres.

It is extremely diffusible, and is rapidly excreted, principally by the kidneys, but also to some extent by the salivary, mammary, and intestinal glands, and by the skin.

In the living organism it is found chiefly in the blood corpuscles and muscles.

Being so quickly removed from the body, the danger to the tissues, even from large doses, is comparatively slight, except when there is disease of the excretory organs, or when it is given for a long time, and under these circumstances a dyscrasia or unhealthy condition results, characterized by impoverishment and excessive fluidity of the blood.

Symptoms of Poisoning.

In poisoning by the salts of potash there is violent inflammation of the alimentary canal ; intense burning pain about the epigastrium ; nausea and vomiting, sometimes of bloody mucus ; and profuse and watery, sometimes dysenteric, stools. With these there are the symptoms of depression of the general system : a weak, rapid pulse ; shrunken face ; cold skin ; coma ; and insensibility. There is sometimes paralysis of the lower limbs, and death may occur with great suddenness.

Treatment of Poisoning.

In potash poisoning dilute vinegar, lemon juice, and cider are given as antidotes; the stomach and bowels are emptied, and oils, with bland demulcent drinks, such as gum tragacanth, barley water, flaxseed tea, milk, white of egg, or gruel, given to relieve the irritation of the mucous membrane, and stimulants to sustain the heart.

Preparations of Potassium.**Potassii Carbonas.****Carbonate of Potash.**

The potash of commerce occurs in the form of fused, stony masses, of variegated color. Purified so as to form pearlash, it has a bluish-white color. Further purified, it becomes a white crystalline powder, which liquefies on exposure to the air by absorbing moisture from it. Dose, gr. ii.-x.

Potassii Bicarbonas.**Bicarbonate of Potash.**

Saleratus.—Made by passing carbonic-acid gas through a solution of the carbonate of potash in distilled water, and re-crystallizing. It is not deliquescent¹ nor corrosive, nor as irritating as the carbonate; otherwise their qualities are the same. They are **antacid stomachics** and mild **diuretics**; stimulants of the liver; **expectorants**, and have some slight **diaphoretic** action.

In small doses on an empty stomach they promote the formation of gastric juice by increasing the diffusion of the blood constituents from which the gastric juice is formed. Large doses irritate the stomach, and, taken during digestion, decompose the gastric juice.

These salts are given before or after meals according to the effect desired. The alkalinizing action on the stomach and kidneys is more pronounced when they are

¹ Melting by absorbing moisture from the air.

taken during digestion. They must be well diluted, in mucilaginous or sweetened water. Dose, gr. v. - 3 i.

Liquor Potassii.

Solution of Potash.

Made by boiling slaked lime in a solution of the carbonate of potash. Dose, ℥ ii.-xv. (= gtt. ii.-xv.), well diluted with sweetened water or mucilage.

Potassa.

Caustic Potash.

Made from liquor potassii by boiling down and running into moulds. Grayish-white pencils, hard but very deliquescent.

Caustic potash is very powerfully **corrosive**. When applied to the skin it melts slowly, destroying the tissues by its affinity for moisture and power of dissolving albumin. Its application is very painful and great care is required to avoid injury to the surrounding tissues. It differs from nitrate of silver in extending its action far below the surface; for this reason it is used in cases which require deep-reaching action. The healing process takes place more slowly after the application of caustic potash than after that of any escharotic in use. A grayish slough is formed, with inflammation of the parts near by. The slough remains for a time varying from six to twelve days, when it separates, leaving a rather indolent ulcerated surface.

In using caustic potash the surrounding tissues should be protected by adhesive plaster, having a hole cut in it the size of the spot to be cauterized. The surface of the plaster is oiled, but the oil must not touch the skin. After sufficient action has been obtained, and the plaster removed, the spot may be washed with dilute vinegar.

In cases of poisoning by caustic potash, the corrosive action is seen about the lips and fauces in bloody oozing, sloughs of mucous membrane, and vomiting of shreds of sloughing and bloody tissue. Deformity of the mouth and contraction of the œsophagus and of the cardiac and

pyloric orifices may remain after recovery, interfering mechanically with nutrition, and resulting in death after periods of time varying from six weeks to one or two years.

Potassii Citras.
Citrate of Potash.

Made by neutralizing citric acid with carbonate of potash and evaporating. The least unpleasant of all the preparations of potash except the tartrates. It has **diuretic** and **refrigerant diaphoretic** action. In the blood it is decomposed, and is excreted by the urine in the form of alkaline carbonate. Dose, gr. v.—3 ss., well diluted.

Potassii Acetas.
Acetate of Potash.

Made by saturating acetic acid with bicarbonate of potash, evaporating, and solidifying.

It is **antacid**, strongly **diuretic**, and, in large doses, mildly **cathartic**. It increases the flow of urine and diminishes the secretion of urea and uric acid. Dose, gr. x.—3 i., largely diluted.

Potassii Chloras.
Chlorate of Potash.

Made by passing chlorine gas into a mixture of carbonate or chloride of potash and slaked lime; boiling, evaporating, and re-crystallizing. Soluble in 16 parts of cold and $2\frac{1}{2}$ parts of boiling water.

Physiological Action.

Chlorate of potash acts as a stimulant to mucous membranes and ulcerated surfaces, and its use as an application for sore throat is familiar. In medicinal doses it has no marked effect upon the system, but taken continuously it is very irritating to the kidneys and causes chronic nephritis or inflammation of those organs.

This fact is not very generally understood among non-professional people, and chlorate of potash is used to excess by numbers of persons, without the authority of a physician, under the impression that it is perfectly harmless. A nurse has many opportunities of observing habits of this kind and should use all her influence to discourage them. Chlorate of potash is eliminated unchanged by the urine.

Symptoms of Poisoning.

Taken in sufficient quantities chlorate of potash is a powerful poison and has often caused death. The symptoms may be acute or subacute. In the former case there are violent vomiting, profuse diarrhoea, and great dyspnoea and cyanosis. After death, which occurs from heart failure, the blood is of a chocolate color. In subacute cases there are severe gastro-intestinal symptoms; vomiting of blackish-green matters and swelling of the liver and spleen. The urine is albuminous, diminished, and sometimes suppressed. Its color is dark, reddish brown, or black, and under the microscope the detritus of red blood corpuscles, which had choked the tubules of the kidney, may be seen. The nervous symptoms are headache, loss of appetite, great pains in the abdomen and other parts of the body, marked abdominal tenderness, tonic and clonic cramps, a peculiar stiffness of the extremities, delirium, and coma. Small ecchymoses¹ sometimes appear on the surface of the body, and there is frequently a general jaundice. In some cases there is a fatal relapse after the patient seems in a fair way to recover. The smallest poisonous dose is not known, but in one case death was caused by a little over $\frac{3}{4}$ ss. A child one year old died from $\frac{3}{4}$ i. given in a night, and a child of three years from $\frac{3}{4}$ iii. In one case death took place a week after taking $\frac{3}{4}$ i.

Dose, gr. x.-xxx., well diluted.

¹ Discolored spots caused by the escape of blood into the tissues.

Potassii Ferrocyanidum.**Ferrocyanide of Potash.**

Made by fusing animal substances with carbonate of potash and iron ; with various further processes. Used for testing, and to make hydrocyanic acid and cyanide of potash.

Potassii Cyanidum.**Cyanide of Potassium.**

Made by heating together the ferrocyanide and carbonate of potash. It has the odor of hydrocyanic acid and similar though somewhat alkaline taste. It is soluble in water. When taken into the stomach the acids there convert it into hydrocyanic acid.

Physiological Actions.

The physiological, therapeutic, and toxic effects of this salt are like those of hydrocyanic acid. Death, however, does not occur so soon, and insensibility is sometimes not manifested for several minutes. Cases of poisoning have occurred from inhalation of the vapor ; also from absorption through the hands, among photographers. There is, usually, little time to employ treatment. A weak solution of sulphate of iron has the effect of decomposing the poison and converts it into Prussian blue. Cold affusions and other treatment, the same as used for hydrocyanic-acid poisoning, may be tried. Death has been caused by gr. v.

A solution of cyanide of potash, in the strength of 2 to 4 grains in $\frac{3}{4}$ i. of water, will remove the stains of nitrate of silver.

Dose, gr. $\frac{1}{10}$ — $\frac{1}{2}$.

Potassii Bitartras.**Bitartrate of Potash.****Cream Tartar.**

Made from argol, and from lees of wine by purification and evaporation. White crystalline masses of pleasant acid taste, not readily soluble in water, requiring for

solution in cold water about 180 parts, or more. An active **diuretic** and **hydragogue**¹ **cathartic**. It is agreeably given as "cream of tartar lemonade." The quantity ordered is dissolved in hot water, and when cool, the clear solution is poured off, flavored with lemon juice, and sweetened to taste. In excessive doses it will produce gastro-intestinal troubles, and one case of poisoning is recorded after taking over $\frac{3}{4}$ ss.

Potassii Nitras.

Nitrate of Potash.

Saltpetre.

Obtained for medicinal use chiefly by purification of native nitre found in beds of saline earths in India. It is also found in saltpetre caves in the United States, and is manufactured artificially in nitre beds formed of animal and vegetable matter, wood ashes, and calcareous² earth; and, finally, is obtained from old plaster rubbish.

Nitre is **refrigerant**, **diaphoretic**, **diuretic**, and in large doses **laxative**. In excessive or concentrated doses it may act as a fatal poison, producing gastro-enteritis and derangement of the nervous system.

Symptoms of Poisoning.

Burning pain in throat and stomach; bloody stools; syncope; collapse, and death, sometimes preceded by convulsions. Death has been caused by $\frac{3}{4}$ i., but when in weak solution much larger quantities may be safely taken than would cause death if concentrated. There is no known antidote. Mucilaginous drinks should be given, vomiting freely promoted, and the stomach-pump used.

Dose, gr. ii.-x. well diluted with barley water or other demulcent.

Potassii et Sodii Tartras.

Tartrate of Potassium and Sodium.

Rochelle Salt.

Made by adding carbonate of soda to a solution of bitartrate of potash. A mild saline **purgative**, less effi-

¹ Producing watery evacuations.

² Containing lime.

cient but less offensive to the taste than Epsom salt. It is given very hot or very cold, in a saturated solution. If given in hot water, the addition of tr. ginger, gtt.x.-xv., makes it more agreeable to the taste. If cold, it may be given in seltzer or carbonated water. It should be given early in the day and on an empty stomach.

Sodium (Soda).

There are four natural sources of the officinal salts of sodium and their preparations, viz. :

1. Sodium, a metallic element.
2. Chloride of sodium, or common salt, obtained from sea-water by evaporation and from salt mines.
3. Nitrate of sodium, found native in Chili and purified by crystallization from water.
4. Borax ; a native product found in various localities.

Physiological Actions.

The salts of sodium are absorbed into the blood and excreted from it more slowly than the salts of potassium, and for this reason the action of soda upon the alimentary canal is stronger than that of potash. It is **diuretic**, but not as strongly so as potash; **antacid**, and **purgative**. It is less depressing than potash and more easily borne by the stomach. The sodium salts are taken into the organism in large quantities with food, especially vegetables and fruits, and are the chief source of the natural alkalinity of the blood. Sodium is excreted by all the mucous surfaces, by the kidneys, the liver, and, possibly, by the skin.

Sodii Chloridum. Chloride of Sodium. Common Salt.

Salt performs a very important part in the human economy. It exists normally in the blood in the proportion of 4 to 1000, and is very abundant in various normal secretions. Active tissue changes are promoted by the presence of salt. It stimulates the desire for food, and

aids in its thorough alteration and absorption. It is the natural antiseptic of the blood ; aids osmosis,¹ and keeps the fibrin and albumin of the blood in solution. Water alone is injurious to cut tissues, but a weak solution of salt makes it non-irritant. During the course of an inflammation chloride of sodium, being needed for its solvent action, accumulates in the inflamed area, disappearing temporarily from the urine. This is notably the case in pneumonia, and the return of the chloride to the urine marks a favorable change in the condition of the patient. In substance or in strong solution it is irritating to cut surfaces, mucous membranes, muscle and nerve tissue. Taken into the stomach in large quantities it causes vomiting, and when absorbed in excess of the needs of the system it causes the nervous irritation which produces the sensation of thirst, and which is relieved by taking enough water to dissolve the salt and carry it away to be excreted by the kidneys. Salt dissolves in $2\frac{3}{4}$ parts of water.

In convalescence patients often crave some salty article of food which, being indigestible, must be denied them, but the need of the system which is thus expressed, may be satisfied by giving salt in another way.

In feeding babies and young children a pinch of salt should always be added to the milk, as its action opposes the formation of hard curds in the milk.

Salt water in strong solution is an **anthelmintic**.²

Sodii Carbonas. Carbonate of Soda.

Sal Soda. Washing Soda.

Made chiefly from common salt, and from the sulphate of sodium. Transparent colorless crystals, soluble in two parts of water. Its effects are similar to those of the carbonate of potassium, but it is rarely used medicinally. In large quantities it is an **irritant poison** for which oils and acids are the antidotes. It is an excellent material for cleaning glass, china, and wood. Poured in

¹ The force by which fluids pass through moist membranes.

² A remedy which kills or expels intestinal worms.

strong solution into drains and water-pipes it carries away grease. It will remove the stains made by bichloride of mercury on china and glass.

Sodii Carbonas Exsiccatus.

Dry Carbonate of Soda.

The powdered carbonate is used externally as in an ointment; strength ʒi. to ʒi., with laudanum; or, in solution, is added to the bath.

Sodii Bicarbonas.

Bicarbonate of Soda.

Prepared by saturating the carbonate with carbonic-acid gas. Soluble in 12 parts water (saturated solution). Bicarbonate of soda has a soothing action in burns, eruptions, and irritation of the skin. Dose, as an antacid, gr. x.—xx. It is pleasantly administered in carbonated water—Seltzer or Vichy.

Pulvis Effervescens Compositus.

Compound Effervescing Powder.

Seidlitz Powder.

Seidlitz powder is put up in two packets, a white paper containing gr. xxv. of tartaric acid (the acid of grapes), and a blue one containing gr. xl. of bicarbonate of soda and gr. cxx. or ʒii. of Rochelle salt. They are dissolved separately in very cold water, the acid in one or two ounces, and the salt in five or six. They are then poured together and taken after the first escape of gas, while still effervescing. It is hardly necessary to say that they should not be mixed at a distance from the patient, but at his side and at the precise moment when he is ready to take the dose. The glass must be large, to allow for the effervescence, and it is well to have a saucer under it, to avoid the annoyance of having it effervesce over the top and sides. The powders must be kept dry. Exposed to the air they become damp and lose their effervescing quality. Seidlitz powder is **refrigerant** and **laxative**, and should be given in the morning on an

empty stomach. One powder is usually sufficient for a dose, acting in from three to six hours.

Sodii Boras. Borate of Soda.

Borax.

Borax is found as a native product in several localities. It is also artificially made by combining native boric acid with soda. On the skin it acts as a soap—removing the epidermis. Added to “hard” water, it softens it pleasantly for bathing purposes, and is useful in many local and external applications by means of its cleansing properties.

Lithium.

Lithium is obtained from several minerals, and traces of it are found in certain mineral waters.

Lithium salts have strong alkaline properties, and act on the human organism as do the other members of the group. It is stated that lithium salts alkalinize the urine more decidedly even than salts of potassium.

Preparations.

Lithii Carbonas. Carbonate of Lithium. Dose, gr. ii.—x.

Lithii Citras. Citrate of Lithium. Dose, gr. v.—x.

Lithii Benzoas. Benzoate of Lithium. Dose, gr. ii.—xv.

Lithii Salicylas. Salicylate of Lithium. Dose, gr. v.—xv.

Ammonia (Ammonia).

Ammonia is a gaseous compound of hydrogen and nitrogen; colorless, irrespirable, highly irritant, of strong alkaline reaction and pungent odor. It is obtained in the manufacture of coal gas, and occurs as a result of the decay of organic substances.

Physiological Actions.

Applied to the skin, ammonia is a powerful irritant, causing redness, blistering, and sloughing. Inhaled, it causes severe irritation of the air-passages, with sneezing,

disturbed respirations, flow of water from the eyes and nose, and quickened pulse. Ammonia acts as a general **stimulant** to the heart and nervous system, especially the spinal cord and respiratory centre. Being rapidly diffused, its action is prompt but somewhat transitory. It is excreted by the kidneys and mucous membranes.

Symptoms of Poisoning.

In large amount ammonia is a **corrosive** poison, producing violent abdominal pain, vomiting and purging of bloody matters, with convulsions, collapse, and death. Consciousness may remain until the last, or coma may precede death. In some cases death has taken place within five minutes, having been caused probably by œdema of the larynx. The symptoms come on at once in poisoning by ammonia.

Treatment of Poisoning.

Dilute vinegar or lemon juice are given to counteract the alkali; oils and bland liquids to soothe the mucous membrane, which is corroded. Heat favors the action of ammonia, and cold antagonizes it; therefore, in poisoning by ammonia plenty of cold fresh air should be admitted, if possible, and cold applications made to the head. The feet must be kept warm.

Preparations of Ammonia.

Ammonii Chloridum.

Chloride of Ammonia.

Sal Ammoniac.

Made by neutralizing ammoniacal gas liquor with hydrochloric acid, evaporating, and purifying. The action of chloride of ammonia on the skin is **soothing** rather than irritating, as applied in lotions. It has a **cooling** effect, and is a **tonic** to the sensory nerves, and reduces local external inflammation. It has a **stimulant** action on the liver; is **diuretic** and **diaphoretic**, and, like other preparations of ammonia, a **stimulant ex-**

pectorant. The taste is very nauseous, resembling sea-water.

Dose, gr. v.-xx., well diluted with cold water.

Ammoniæ Carbonas.

Carbonate of Ammonia.

Made by subliming a mixture of chloride of ammonia and carbonate of calcium. A very active and quickly diffusible **stimulant** to the heart and respiration, and an **expectorant**, acting in the latter capacity by liquefying the bronchial secretions, which are thus more easily raised, and the air-cells kept free. In large doses (gr. xxx.) carbonate of ammonia acts as an **emetic**. It has a nauseous taste, is very pungent, and must be well diluted. It may be given in milk.

Dose, gr. v.-x.

Aqua Ammoniæ Fortior.

Strong Water of Ammonia.

Made by heating chloride of ammonia with slaked lime and collecting the gaseous product in water. It has a strength of 26 per cent., and has been used as an application to the bites of poisonous animals or serpents. It may be used as a **vesicant**, but its action is apt to be more severe than is desirable. It acts more quickly than cantharides, and does not affect the urinary organs.

Aqua Ammoniæ.

Water of Ammonia.

Hartshorn.

A solution of the gas in water, 10 per cent. in strength. It may be used externally as a **counter-irritant**. Applied in dilute solution to the bites made by insects, it relieves the sting. Taken internally, it is a general **stimulant** and **antacid**.

Dose, ℥ v.-xxv. (℥ x. = gtt. x.). largely diluted.

Spiritus Ammoniæ Aromaticus.

Aromatic Spirit of Ammonia.

Sal Volatile.

Contains aqua ammoniæ, and 4 per cent. of the carbonate, with oil of nutmeg, of lemon, and of lavender;

alcohol and water. It is an antacid and stomachic, overcoming a feeling of nausea, and a general stimulant. It is not unpleasant.

Dose, ʒ ss.—ʒ i. (℥ x. = gtt. xxv.), well diluted in milk or water.

Liquor Ammoniaë Acetatis.

Solution of the Acetate of Ammonia.

Spirit of Mindererus.

Made from carbonate of ammonia and acetic acid. It is more active than the other preparations, as a **diaphoretic**, especially if the body be kept warm. If the skin be kept cool, its **diuretic** action is more pronounced. It is also a **nervous stimulant**. Dose, ʒ i.—ʒ iv., well diluted with water.

Linimentum Ammoniaë.

Liniment of Ammonia.

A mixture of 30 parts aqua ammoniaë with 70 parts cotton-seed oil.

Raspail's Sedative Water.

A mixture of aqua ammoniaë, chloride of sodium, and camphorated spirits of wine, with water. For sponge baths; **cooling** and **sedative**.

Calcium (Lime).

Lime is obtained from four sources: 1. Chalk. 2. Marble. 3. Native sulphate, or plaster-of-Paris. 4. Bone-ash. Lime is an exceedingly important constituent of the body, being found, in the form of solution of phosphate of lime, in every animal tissue and fluid. It gives solidity to bones, and accumulates wherever rapid tissue changes are taking place. The preparations of lime are **antacid** and slightly **astringent**. Locally they are **sedative** to mucous membrane. Lime is a valuable **antidote** in poisoning by oxalic acid, chloride of zinc, and the mineral acids. It can always be obtained for this purpose in the form of wall-plaster or whitewash.

Preparations of Calcium.

Calx.

Lime.

Made from chalk or limestone by calcining (purifying and rendering friable by the action of heat). In this state it has the form of compact white masses, which readily absorb water, crack, evolve heat, and fall into powder. It is then called *calcii hydras*, slaked lime, or quick-lime. If it should come in contact with the eye it should be washed out with a solution of sugar.

Liquor Calcis.

Lime-Water.

Lime-water is a saturated solution of lime containing about $\frac{3}{4}$ of a grain to $\frac{7}{8}$ i. of water. It is made by washing slaked lime and shaking it up in distilled water, preferably, though ordinary water may be used. After it settles, the water is poured off from the sediment and strained. It is colorless, inodorous, and has a disagreeable alkaline taste. By exposure to the air it absorbs carbonic acid, and should therefore always be kept well corked. Lime-water acts as a **gastric sedative**, and added to milk prevents its curdling in large lumps. The ordinary proportion is lime-water $\frac{7}{8}$ ss. to milk $\frac{7}{8}$ v., increased, according to circumstances to $\frac{1}{3}$ or even $\frac{1}{2}$ lime-water. Lime-water is slightly **constipating**.

Syrupus Calcis.

Syrup of Lime.

Five parts of lime to one hundred parts syrup. Dose, 3 i.

Linimentum Calcis.

Carron Oil.

A mixture of lime-water and olive oil or linseed oil, in equal parts, for external use. It is an excellent application for burns, and has the merit of cheapness.

Creta Præparata.
Prepared Chalk.

Made from chalk by a cleansing and drying process. A smooth white powder, insoluble in water, and of **as-tringent** action. Externally, it is used as a dusting-powder. When taken internally it may be administered in glycerine or syrup. Dose, gr. v.—3 i.

Mistura Cretæ.
Chalk Mixture.

Contains prepared chalk gr. xxx. to $\frac{3}{4}$ i., and is an **astringent**. Dose, 3 i.— $\frac{3}{4}$ ss.

Magnesium (Magnesia).

The officinal preparations of magnesia are all derived, directly or indirectly, from the sulphate.

Physiological Actions.

Magnesia, in the form of the oxide and carbonates, forms insoluble and comparatively harmless compounds with the mineral acids. It is therefore used as an antidote for these poisons, the oxide being preferable, and to be very freely given.

Magnesia has **antacid**, **purgative**, and **diuretic** qualities. Entering the circulation, it increases the alkalinity of the plasma, and is partly excreted by the kidneys, rendering the urine more abundant and less acid.

Preparations of Magnesium.

Magnesii Sulphas.
Sulphate of Magnesia.
Epsom Salt.

Made from dolomite, or magnesian limestone, by solution in sulphuric acid and purification. A quickly acting **hydragogue cathartic**, easily borne by the stomach, though of nauseous taste. Ordinary laxative doses act in a few hours. Large doses ($\frac{3}{4}$ i.—ii.) produce a result

almost immediately, and cause griping and abdominal distension. It should be given well diluted and on an empty stomach. It is soluble in $2\frac{1}{2}$ parts of water. Dose, $\frac{z}{3}$ ss., in carbonated, Seltzer, or Vichy water.

Liquor Magnesii Citratis.

Citrate of Magnesia.

In small does a **laxative**, in large ones **cathartic**, acting in from four to six hours. It is effervescent, and should be kept cold and taken at the moment it is poured out. If the whole amount is not taken at once the bottle should be stood on the corked end or laid on its side. Dose, $\frac{z}{3}$ iv.-vii.

Magnesii Citras Granulatus.

Granular Citrate of Magnesia.

A white coarse-grained salt of refreshing taste, very soluble and effervescent, acting in the same way as the liquor.

Dose, 3 i.-iv. stirred up in cold water.

Cerium (Cerium).

A metal of which the oxalate only is used.

Cerii Oxalas.

Oxalate of Cerium.

A white granular powder, insoluble in water, alcohol, or ether. It is a **gastric sedative**, and is given dry on the tongue. Dose, gr. v.-xx.

THE METALS.

Plumbum (Lead).

Lead is found native in small masses. It is a dull, whitish metal with a tint of blue, and is not given in its native state, medicinally, but in the form of salts.

Physiological Actions.

The special property of the lead salts is **astringency**, and they are, in consequence, **sedative**, **anti-phlogistic**,¹ and **hæmostatic**.²

Used in dilute solutions externally as applications to ulcers, mucous surfaces, etc., they precipitate the albuminous fluids which cover the surface, contract the small blood-vessels, and harden the tissues of the young growing cells. Applied in concentrated solutions, they are **irritant**, causing inflammation, or increasing it. Taken internally, their action is first evident as a peculiar astringent taste, with a dry feeling of the throat. In the stomach and intestines the same action is shown. Lead dries the secretions, contracts the vessels, and checks peristaltic action, thus causing constipation.

It is changed by the intestinal juices into an albuminate, and so enters the blood. It is rapidly deposited in the tissues, especially in the central nervous system, the kidneys, liver, and bones. It is excreted, but slowly, in the bile, the urine, and perspiration; also by the mammary glands. It diminishes the excretion of uric acid by the kidneys.

Poisoning by Lead.

Acute lead poisoning is rare, and will be spoken of in connection with the acetate. Chronic poisoning is quite common, the poison being introduced into the system in one or more of the following ways: By absorption through the unbroken skin, as in the case of painters, glaziers, etc.—the fine particles of metal which are rubbed off and adhere to the skin being changed by its secretions into soluble salts which are readily absorbed; by absorption through ulcers, wounds, etc., from the excessive application of ointments; by the use of food put up in cans soldered with lead, cooking utensils made of painted wood or imperfectly burnt pottery, and by eating buns, cake, etc., colored with chromate of lead; by the

¹ Opposed to inflammation.

² Checking hemorrhage.

habit of biting silk thread adulterated with lead ; by sleeping or working in newly painted rooms, and by the poisoning of a water supply from lead pipes. This does not occur with "hard" water—viz., that containing salts of lime, as an insoluble coating is then deposited on the lining of the pipes ; but with pure, or "soft" water, the lead is slowly dissolved in the form of a carbonate. The first symptoms of poisoning are : A feeling of pain, with a sense of sinking in the region of the navel ; loss of appetite, thirst, and dryness of the mouth and throat, with a metallic astringent taste ; pale face and skin generally ; fetor of the breath ; constipation ; emaciation and wasting of the muscles, especially those of the arms ; swelling of the joints, and rheumatic pains. Colic is a very pronounced symptom, sometimes coming on very suddenly, sometimes after several days' illness. The pain is intense and varies in character, sometimes being sharp, sometimes dull, or, again, "twisting," and seems to centre about the umbilicus. This fact of its being localized differentiates it from hepatic colic, which goes through to the back, and from renal colic, which radiates along the line of the ureters. The abdominal walls are violently retracted and rigid, and neuralgic pains seize the abdominal muscles and shoot along those of the thorax and extremities, especially the flexors. The skin and conjunctivæ sometimes become jaundiced, and the urine tinged with bile.

A very striking feature of lead poisoning, occurring both in acute and chronic cases, is the dark slate-colored line on the gums along the margin of the incisor teeth. It is said to be more marked in those cases where the tooth-brush is not used.

The chronic nervous symptoms of lead poisoning may be developed after the first attack of colic, or they may come on without marked abdominal disturbance. The most common and noticeable one is the paralysis of the extensor muscles of the forearms, causing what is termed "wrist-drop." With this there is sometimes either partial or complete anæsthesia of the affected members.

Paralysis of the laryngeal muscles sometimes occurs, resulting in aphonia.¹ The pulse is incompressible and tense, full, and infrequent. There may be anæsthesia of the optic nerve, as a result of the direct action of lead, or dimness of sight may result from the albuminuria, which is often present; and, finally, there may be a condition of cerebral disturbance known as "encephalopathia saturnina," or lead encephalopathy, beginning with headache, and characterized by delirium, stupor, epileptiform convulsions, and coma. Death may follow, although severe cases have been known to recover. Death may also result from the gradual failure of nutrition, or from an extension of paralysis to the muscles of respiration.

Treatment of Poisoning.

In treating chronic lead poisoning, large doses of purgatives are given. Iodide of potash aids in elimination of the poison, and baths of sulphide of potash are also used for this purpose. Workers in lead may guard against poisoning by personal cleanliness, which is of great importance, by the use of sulphuric-acid lemonade, and milk, as a food, in large quantities.

Preparations of Lead.

Oxide of Lead.

Litharge.

Made by roasting lead in a current of air.

Plumbi Acetas.

Acetate of Lead.

Sugar of Lead.

Made by the action of acetic acid on litharge. This is the only preparation of lead given internally. Acute poisoning has been caused by the acetate of lead, although, as it acts as an emetic, it is rarely fatal. The symptoms appear in from half an hour to two hours after taking it, and are essentially the same as described

¹ Loss of the voice.

under chronic poisoning. Recovery may take place within a few days, although symptoms recur, occasionally, after a long interval. The fatal dose is between $\frac{z}{3}$ i. and ii. The treatment consists of large doses of Glauber's and Epsom salts; castor oil; emetics, if vomiting is not already excited; opium; and albuminous drinks freely given.

Dose, gr. ii.-v., always in pill.

Liquor Plumbi Subacetatis.

Solution of Subacetate of Lead.

Goulard's Extract.

Used only externally. It should be diluted, in a strength of $\frac{z}{3}$ i.-iv. to O i. of water.

Ceratum Plumbi Subacetatis.

Goulard's Cerate.

Composed of white wax, olive oil, camphor, and Goulard's extract. For external use.

Emplastron Plumbi.

Lead Plaster.

Diachylon Plaster.

Made by boiling litharge with olive oil. It is the basis of most officinal plasters.

Argentum (Silver).

The metal silver itself is not used in medicine, and its preparations are not numerous. The properties of silver will be described under its most important salt.

Argenti Nitras.

Nitrate of Silver.

Prepared by dissolving silver in nitric acid.

Physiological Actions.

Nitrate of silver has locally a **caustic** or **corrosive** action. It combines with the albumin of the tissues,

forming a superficial slough. It has a strong metallic and styptic¹ taste, and in the stomach produces a feeling of warmth. It is decomposed by the gastric juice, and, therefore, does not act as an irritant to the stomach, unless taken in poisonous doses. Silver enters the blood as an albuminate, and, if continued for some time, a part of it remains permanently in the connective tissues, staining them a dull slate-gray, which cannot be removed. This tinge first appears as a line along the gums and teeth, and on the mucous membrane inside the lips and cheeks. In small doses silver is **astrigent** and **anti-spasmodic**, **stimulates** secretion and nutritive processes, and is a **nerve tonic**. Long continued it disorders digestion, and produces a general waste of tissue, albuminuria, rapid and irregular heart action, disturbed respiration, and nervous symptoms, viz. : tetanic convulsions, loss of the power of co-ordination, and paralysis.

Symptoms of Poisoning.

In toxic doses silver causes gastro-enteritis, and the **antidote** is common salt, given very freely in solution. It forms an insoluble chloride, and also acts as an emetic.

Preparations of Silver.

Dose of the nitrate, gr. $\frac{1}{4}$ – $\frac{1}{2}$, in pill, given after meals, unless otherwise ordered. Nitrate of silver is quickly decomposed, if in solution, by organic matter and by the action of light, and is for that reason kept in dark-colored bottles, and should never be left uncorked. With tannin it forms an explosive compound.

Argenti Nitras Fusus.

Fused Nitrate of Silver.

Lunar Caustic.

Made by evaporating nitrate of silver and forming it in pencil-shaped moulds. It is used externally as a caustic.

¹ Dry and astrigent.

It is not deliquescent ; its action is superficial and does not extend beyond the point touched ; and the slough formed is rapidly healed. In applying nitrate of silver the pencil should always be washed in an antiseptic solution before and after using, and especially before it is put away, carefully dried.

Argenti et Potassii Nitras.

Nitrate of Silver and Potash.

Mitigated Stick.

Made with equal parts of nitrate of silver and nitrate of potash. For local use externally, and is used as an application to the eyelids.

Argenti Oxidum.

Oxide of Silver.

A brown powder, almost insoluble in water. With creasote and the chlorides it forms an explosive compound. It has a milder action than the nitrate. Dose, gr. ss.-ii. in pill.

Zincum (Zinc).

There are two sources of the salts and preparations of zinc, viz.: The metal, zinc, and the native carbonate, calamine.

Physiological Actions.

The salts of zinc are, in their stronger forms, **caustic** ; in weaker forms, **astringent** and **antiphlogistic**. The activity of the different preparations is in proportion to their solubility and diffusibility. Applied to a broken surface or mucous membrane, the salts of zinc harden the albuminous secretions, check the growth of new cells, and contract the vessels, though in a lesser degree than do lead and silver. The salts of zinc, in the blood, take the form of albuminates. They enter the circulation slowly, do not have the tendency to accumulate and remain fixed in the tissues as do lead, mercury, and copper, and are much more rapidly excreted. They are eliminated by the liver, kidneys, intestinal and mammary glands.

Symptoms of Poisoning.

If the use of zinc be long continued there may result a series of symptoms similar to those of lead-poisoning, though less severe—viz., wasting of the tissues and loss of strength ; pallor ; muscular weakness and trembling ; colic ; fetid breath and constipation ; feeble mind ; and paralysis.

Treatment of Poisoning.

In cases of acute poisoning by zinc salts the antidotes are lime-water, tannin, in the form of strong tea, carbonate of sodium or potassium, soap-suds, and mucilaginous drinks, milk, etc. Vomiting should be encouraged and, if necessary, the stomach washed out.

Preparations of Zinc.**Zinci Chloridum.****Chloride of Zinc.**

Made by dissolving zinc which has been melted and poured into cold water, in dilute hydrochloric acid, and boiling. It then goes through several purifying processes. A whitish gray, deliquescent substance, soft, like wax, and with very **corrosive** and **irritant** action. It is used as a **caustic** and acts powerfully, causing destruction of the part, with severe pain, followed by sloughing which heals slowly. An impure solution known as Burnett's fluid, containing 200 grains to $\frac{3}{4}$ i. of water, is sold as a disinfectant and has caused numerous cases of poisoning. The symptoms, which are those of severe gastro-enteritis and collapse, come on immediately, and death may result in a few hours, or be delayed for several days.

Zinci Sulphas.¹**Sulphate of Zinc.****White Vitriol.**

Made by dissolving zinc in dilute sulphuric acid, and crystallizing. Soluble in water. In small doses sulphate

¹ Zinc solution for the disinfection of white clothing. Sulphate of zinc, $\frac{3}{4}$ ii. Common salt, $\frac{3}{4}$ iv. Water, 1 gallon. Soak clothes for 4 to 6 hours, boil, and wash.

of zinc has **tonic** and **astrigent** properties. Continued long in medicinal doses it may cause ulceration of the mucous membrane of the alimentary canal. Sulphate of zinc is a specific **emetic**. It acts promptly, and entirely by its local irritant action, not being absorbed, and causing no flow of secretions. It is not constitutionally depressing, and causes but little nausea either before or after the act of vomiting.

Dose (medicinal), gr. $\frac{1}{10}$ —i.

Dose (emetic), gr. xv.—xx. largely diluted with warm water, and given every fifteen minutes until vomiting occurs.

Zinci Oxidum.

Oxide of Zinc.

A yellowish white powder, insoluble in water, and used principally to dust over the skin as an **astrigent**. Sometimes used as an astrigent internally.

Dose, gr. ss.—v.

Unguentum Zinci Oxidum.

Zinc Ointment.

Made of oxide of zinc, usually twenty parts, to benzoated lard—eighty parts.

Cuprum (Copper).

The action of copper is very similar to that of silver and zinc. Metallic copper is inert. The salts are not absorbed by the unbroken skin, but applied to mucous membranes and exposed tissues they are **caustic**, **stimulant**, and **astrigent**. Internally in small doses they have the two latter, and also **tonic**, qualities; and in large doses act on the stomach as irritants, causing **vomiting**, and on the intestines as **irritant purgatives**. Copper salts enter the blood very slowly, and are eliminated by the saliva, bile, fæces, and urine.

Preparations of Copper.

Cupri Sulphas.

Sulphate of Copper.

Blue Vitriol, Bluestone.

Made by heating copper with sulphuric acid, dissolving, evaporating, and crystallizing.

Externally it is used as an **escharotic**, and internally as a **tonic** and **astringent**.

Symptoms of Poisoning.

In cases of acute poisoning by blue vitriol, as much as $\frac{7}{8}$ ss. or upwards, will produce the following symptoms, which come on in a few minutes: A strong metallic taste in the mouth; nausea, and vomiting of bluish or greenish liquids; a feeling of constriction in the throat; a distended abdomen; colicky pains in the stomach and bowels; diarrhœa and tenesmus. These symptoms are fully developed in one or two hours: then follow rapid and difficult breathing; small, quick pulse; great thirst; cold perspiration; weakness, giddiness, stupor, coma, convulsions, and paralysis. Death may occur in a few hours, or delay several days.

Treatment of Poisoning.

Albumin, as white of egg, milk, wheat flour, should be given, and then, as the albuminate of copper is not entirely harmless, the stomach should be well washed out with plenty of warm water. Stomach-pump used if necessary. The chemical antidote is ferrocyanide of potassium, but with this, too, emesis should follow promptly.

Dose (medicinal), gr. $\frac{1}{16}$ – $\frac{1}{4}$.

Dose (emetic), gr. vi.–xii.

Cupri Acetas.

Acetate of Copper.

Not often given internally, but used sometimes as a local application. Verdigris is an impure subacetate.

The acute forms of poisoning by these salts resemble the poisoning by the sulphate, and the treatment is the same.

Copper poisoning, acute and chronic, may result from the use of *dirty* copper dishes and cooking utensils, and from cooking acid fruits in copper. Chronic poisoning is also caused by the inhalation of the fumes of copper, as in certain occupations, and by the adulteration of certain articles of food, as pickles, which are sometimes colored green with copper. Chronic poisoning presents the same symptoms as the acute form, but in a lesser degree, and death may result from exhaustion.

Alumen (Alum).

Alum has a crystalline form and taste which is both acid and sweetish, and also astringent. It is soluble in water, but insoluble in alcohol.

Physiological Actions.

Alum is an **astrigent** and **styptic**. In doses of ʒi. it is an irritant but non-depressing **emetic**, and in large doses a **purgative**. Taken into the mouth, the flow of saliva is first increased by alum, and afterwards diminished, as it hardens the albumin of the secretions and contracts the capillaries.

The same effect is shown on the mucous membrane of the stomach. Alum is absorbed into the blood, notwithstanding its power of coagulating albumin, and checks capillary hemorrhage by constricting the vessels. Alum should always be given alone, and it is to be remembered that it has a very injurious action on the teeth.

Symptoms of Poisoning.

In large doses alum produces gastro-enteritis, with frothing at the mouth. The treatment consists in pro-

moting vomiting and washing out the stomach, giving hydrate of magnesia in large quantities, or a weak solution of carbonate of ammonia at intervals. Death has been caused in eight hours in an adult by $\frac{z}{3}$ ii. of alum.

Preparations of Alum.

Aluminis Sulphas.

Sulphate of Alum.

Should be given diluted and with a glass tube. Dose, gr. x.-xx.

Alumen Exsiccatum.

Dried Alum.

Alum which has been deprived of its water by heat, and powdered. Combined with alcohol (in which it is insoluble), in the proportion of 3 i.-iv. to alcohol $\frac{z}{3}$ v.-vi., it is used to harden the skin, as a preventive of bed-sores.

Ferrum (Iron).

All the salts and preparations of iron are made directly or indirectly from the metal.

Physiological Actions.

Iron is the most important of the mineral **tonics**, and may be more properly described as a food rather than as a medicine, being one of the most essential constituents of the red blood corpuscles. It exists normally in the blood in the proportion of 1 part iron to 230 parts red corpuscles, and in a state of health enough iron is taken with various kinds of food, to supply the demand. Beef especially, as an article of diet, provides iron, as it contains 1 part iron to 194 parts red corpuscles.

Iron has been called the great respiratory food. In the lungs it takes up oxygen from the inspired air, and carries it to all the tissues. No function of the body can be carried on without oxygen; the muscular system especially is dependent for its perfect activity on the

presence of oxygen, and muscular power is in direct proportion to the efficiency of the respirations.

The feeling of tone and energy, both bodily and mental, which belongs to perfect health, comes from an ample supply of oxygen, and it is in this primary way that iron acts as a **tonic**; **stimulates** and **strengthens** the **heart, nerves, and muscles**; **raises** the **temperature** of the body and **increases** the **appetite**.

It is not absorbed by the unbroken skin, but on exposed tissue and mucous surfaces its action is **astrigent**, coagulating the albumin of tissue and plasma, diminishing the circulation by compression of the vessels, and arresting hemorrhage. Iron is thus classed as a **styptic** or **hæmostatic**.

Taken internally there is an astrigent taste, and the tongue and teeth are darkened by a sulphide which is deposited as a result of decomposition. If given in excess or on an empty stomach it decomposes the digestive fluid, and acts as an irritant and astrigent upon the mucous membrane.

The digestion or absorption of iron takes place partly in the stomach and partly in the intestines, and depends upon the presence, in normal quantities, of the gastric and intestinal juices.

Iron has sometimes an **irritant** action on the bladder; its astringency in the alimentary canal causes constipation; and it is said that it decreases the secretion of milk in nursing women. An excess of iron is eliminated from the system in almost every possible way, but principally by the fæces, which it colors black by forming a sulphide.

The local irritant action of iron explains why it is always given well diluted and after meals.

Incidental Effects.

In administering a course of iron any one or more of the following symptoms may be noticed, indicating an excess in the system: Frontal headache, slight disturbances of the digestion, irritation of the stomach or of the bladder, a feeling of weight at the epigastrium, con-

stipation, a feverish condition. An acne of the face and chest is sometimes produced by iron, and the reduced iron causes eructations of gas.

It is very important to remember that all preparations of iron stain clothing, carpets,—in fact every thing touched, and that the stains are with difficulty removed. Silver spoons should never be used for iron, but if they have been used, the stain will come off if rubbed with aqua ammoniæ undiluted. Oxalic acid will take the stains out of muslin or linen.

Preparations of Iron.

(*Saline Combinations.*)

Tinctura Ferri Chloridi.

Tr. of Chloride of Iron.

Muriated Tincture of Iron.

Made from the sesquichloride of iron, hydrochloric acid, and alcohol, and contains hydrochloric ether as a result of the reaction of the acid and alcohol. It is red-dish-yellow in color, and has peculiar properties. It is the most frequently used of all the preparations of iron. It is **astrigent**, **irritating**, and somewhat **corrosive**. It has **diuretic** and **antispasmodic** qualities, owing probably to the ether, and is **antiseptic** by virtue of the chlorine and iron ; **tonic**, as are all iron preparations.

Tr. of iron should never be given at the same time with tea, or with other medicines containing tannin, as an ink-like combination results. It should not be added to whiskey, but may be well given in milk, being dropped in at the moment when it is to be taken. Iron attacks the teeth, unless properly diluted, and should always be given through a glass tube. When the throat is gargled with iron, the teeth should be brushed after each application, or washed off with salt water.

Dose, ℥ ii.-xv. (℥ x. = gtt. xxv.), half an hour after meals, in a tumblerful of water.

Mistura Ferri et Ammoniaë Acetatis.

Mixture of Acetate of Iron and Ammonia.

Basham's Mixture.

Composed of tr. of iron, dilute acetic acid, solution of acetate of ammonia, elixir of orange, syrup, and water.

Dose, $\frac{3}{4}$ ss.-i., well diluted.

Syrupus Ferri Iodide.

Syrup of Iodide of Iron.

Has iodine, iron, and syrup, and exerts a special action on nutrition by means of the iodine.

Dose, \mathbb{N} v.-xl. (\mathbb{N} x. = gtt. xiii.), largely diluted.

Liquor Ferri Acetatis.

Solution of Acetate of Iron.

Dose, \mathbb{N} ii.-x. (\mathbb{N} x. = gtt. x.).

Tinctura Ferri Acetatis.

Tr. of Acetate of Iron.

Contains solution of acetate of iron, alcohol, and acetic ether. Dose, \mathbb{N} xx.-3 i.

Mistura Ferri Compositus.

Compound Mixture of Iron.

Griffith's Mixture.

Contains sulphate of iron, carbonate of potassium, and myrrh. Dose, $\frac{3}{4}$ i.-ii.

Ferri et Quininaë Citras.

Citrate of Iron and Quinine.

Contains 12 per cent. of quinine. Dose, gr. v.

Ferri et Strychninaë Citras.

Citrate of Iron and Strychnine.

Contains 1 per cent. of strychnine. Dose, gr. iii.-v.

Ferri Iodidum Saccharatum.
Saccharated Iodide of Iron.

Dose, gr. i.-v.

Ferri Lactas.
Lactate of Iron.

Dose, gr. i.-v.

Liquor Ferri Subsulphatis.
Monsel's Solution of Subsulphate of Iron.

Sulphate of iron, sulphuric and nitric acids are constituents of Monsel's solution. It has a deep red color and the consistency of syrup. It is an active **styptic**, but it is rather uncertain in its action, sometimes causing severe sloughing, and is not much used.

Blaud's Pills.

Contain sulphate of iron and carbonate of potassium in equal parts. Dose, pil. i.

(*Metallic State.*)

Ferrum Reductum.
Reduced Iron.
Quevenne's Iron.

A tasteless iron-gray powder. Dose, gr. ss.-ii. in pill.

(*Antidotes to Arsenic.*)

Ferri Oxidum Hydratum.
Hydrated Sesquioxide of Iron.

As an antidote to arsenic this preparation of iron must be fresh, and may be quickly prepared by adding to several ounces of the tr. ferri chlor. enough aqua ammoniæ or carbonate of sodium to form a precipitate, which will appear almost instantly. Continue adding the alkali until no more of the precipitate falls; then turn it into a piece of muslin or a fine strainer and wash it well by letting cold water run freely through it, until all

traces of the soda or ammonia are removed. Stir up a tablespoonful of the precipitate in milk or water, and give it, repeating as often as necessary. It is harmless ; and about 8 grains of it are required to neutralize 1 grain of the poison.

Ferri Oxidum Hydratum cum Magnesia.
Hydrated Oxide of Iron with Magnesia.

Made by precipitating the solution of the tersulphate of iron by magnesia. It is said to be the best antidote for arsenic.

Monsel's solution or the tincture of the chloride of iron may be used instead of the tersulphate.

Dialyzed Iron.

An antidote to arsenic ; also given medicinally. It is said that it does not blacken the teeth nor constipate.

Manganese (Manganese).

Manganese is found native in the form of the black oxide.

Physiological Actions.

Manganese is found in the human body associated with iron. They are found together in the blood, hair, and bile, the proportion in the blood being 1 part of manganese to 20 of iron. The preparations of manganese are gastro-intestinal **irritants**. In small doses they **aid digestion** and **promote appetite**. They enter the blood probably as albuminates. Used in excess they lower the heart action, diminish the pulse rate, and cause loss of muscular power and paralysis.

The action of manganese on the tissues, blood, and excretory organs is not clearly defined. It is supposed that the salts are decomposed before being absorbed, except when in poisonous doses.

Preparations of Manganese.

Mangani Oxidum Nigrum.

Black Oxide of Manganese.

Once considered a hæmatinic,¹ but now believed to be inert. It has been used as an emmenagogue. Dose, gr. ii.-x., in pill or powder.

Potassii Permanganas.

Permanganate of Potash.

Made from the black oxide of manganese, chlorate of potash, and a solution of caustic potash, by a very elaborate chemical process. It has the form of dark-purple slender prisms, inodorous, with an astringent sweet taste ; soluble in 16 parts of water.

Permanganate of potash in the pure state is **irritant** and **caustic**. In solution it is **stimulating** and **healing**. In the latter form it gives out oxygen in the form of ozone, and changes into hydrated peroxide of manganese, losing its purple color and becoming brown. This change does not occur with the crystals.

This oxidizing power gives it special attributes as an **antiseptic, disinfectant, and deodorant**.

The strength necessary to destroy bacteria and prevent their reproduction is 1 in 150. It is rapid and thorough in action, is not poisonous in solution of ordinary strength, and the change of color shows when its power is exhausted. It is very expensive, and this is a drawback to its use.

Given internally, the dose, gr. ss.-ii., is freely diluted with distilled water ; or, if given in pellets, boiled or filtered water should be given with it to dilute it after being swallowed. It should be given on an empty stomach.

Mangani Sulphas.

Sulphate of Manganese.

In full doses an **emetic** and **cathartic**, with action on the liver, as is shown by the bile discharged after purgative doses. Dose, gr. ii.-v.

¹ An agent that increases the number of red blood corpuscles.

Liquor Potassii Permanganatis.

Solution of Permanganate of Potash.

Condy's Fluid.—A solution containing gr. ii. to 3 i. used as a disinfectant and deodorant.

Hydrargyrum (Mercury).

Quicksilver.

Mercury is obtained from cinnabar by roasting and distilling with lime. It is a silver-white metal, liquid, and giving off vapor at ordinary temperatures, and capable of being entirely volatilized by heat. All the different preparations are derived directly or indirectly from the metal itself.

Physiological Actions.

In the metallic form mercury is inert, large amounts of the pure metal having been swallowed and discharged from the intestines without poisoning or injury ; but in the form of vapor, or any of its preparations, it is very readily absorbed by the pulmonary and other mucous membranes, by the alimentary canal, and by the skin and tissues, either whole or broken. The constitutional effects may be reached in any one or all of these ways.

All mercurials are **antiseptic** and **disinfectant**.

The local action of mercury in moderate strength, either externally or internally, is **astringent, antiphlogistic, and stimulant**. In large or concentrated doses it is irritant to the stomach and intestines, and in some forms is a locally acting **purgative**.

In various pathological conditions of the system mercury exerts an influence as an **alterative**, through some power over nutrition which is not perfectly understood.

Mercury is excreted by the saliva, perspiration, milk, urine, and bile.

Symptoms of Poisoning.

The mildest evidences of over-doses of mercury are : slight fetor of the breath and soreness if the teeth are

knocked together or struck; a metallic taste next appears. After this comes salivation, an abnormal amount of fluid being poured out from the salivary glands, and small ulcers appear on the lips, gums, and tongue. A feeling of constriction of the throat, which is found among the symptoms of acute poisoning, has been caused in some susceptible persons by a single medicinal dose of mercury.

When its use is continued beyond this point salivation increases. The gums become swollen and spongy, and bleed easily. The tongue swells, sometimes protruding from the mouth. The teeth are loosened, and a dark line is seen at their upper margin. In some cases ulceration of the soft parts and necrosis of the jaw-bones result. In pronounced chronic poisoning, in addition to these symptoms, there are abdominal pains, nausea, vomiting, and diarrhœa, anæmia, emaciation and general weakness; aching pains in the bones and joints; loss of hair; a trembling or shaking palsy; and paralysis, with a brown tint of the skin. In some cases there is wrist-drop. Chronic poisoning may be caused indirectly by exposure to the metal or its fumes, as in various occupations, and it may come on very suddenly.

Acute poisoning will be described under corrosive sublimate.

Preparations of Mercury.

Hydrargyri Chloridum Corrosivum.

Corrosive Sublimate; Mercuric Chloride.

Bichloride of Mercury.—In English books called the **Perchloride**. Made by subliming bisulphate of mercury with chloride of sodium. Soluble in 16 parts of cold water. It is a powerful germicide under certain conditions, and is ordinarily used as a disinfectant solution for the skin, for dressings, etc., in a strength of 1-1000. It is not an efficient disinfectant in the case of stools, or bloody or purulent discharges, as it hardens albumin, thus forming a protective shell within which germs retain perfectly their vitality.

White materials are stained yellow by bichloride of mercury, and it is not always desirable therefore as a disinfectant for clothing.¹

The external use of bichloride of mercury as in dressing surgical and obstetrical cases, may produce symptoms of poisoning which must not be overlooked. Among the latter class of cases an eruption of small pimples appears about the buttocks and may extend down the limbs. Sore gums, fetid breath, and salivation may follow. The eruption should always be reported as soon as noticed. In chronic poisoning by this preparation there is more tendency to abdominal pains, diarrhœa, and colic.

Internally in small over-doses it causes nausea, burning in the stomach, colicky abdominal pain, and diarrhœa; or, these symptoms may not be prominent and a sore ulcerated mouth may show the toxic action. In poisonous doses it is a violent irritant and caustic, and the symptoms appear in a few moments—viz., a metallic taste, the mucous lining of the mouth sometimes glazed and white, vomiting of mucus and blood, dysenteric purging, tenesmus, and cramps, with fetid breath. Violent abdominal pain is sometimes, not always, present. The urine is diminished, may contain blood and albumin, may be suppressed. In the course of two or three hours there is collapse, with small, quick, irregular pulse, pinched, anxious face, cold extremities, syncope, convulsions, coma, and death.

The smallest fatal dose is not absolutely certain, but may be put at 3 to 5 grains. Death usually takes place in from 1 to 5 days, but may be earlier or later than this. On recovery the convalescence is long and tedious.

The antidote is albumin, milk, gluten (flour), or, best of all, the white of egg, in proportion of 1 egg to 4 grains of the poison. More than this is said to redissolve the mercury.

Vomiting should be promptly induced and actively kept up for a time after taking the antidote.

¹ For this purpose the solution of salt and sulphate of zinc is better. See zinc.

Dose, gr. $\frac{1}{50}$ – $\frac{1}{20}$, well diluted and given after meals. All other non-purgative preparations are, as a rule, taken after meals also.

Hydrargyri Chloridum Mite.
Mild Chloride of Mercury.

Calomel.—Made by subliming sulphate of mercury and chloride of sodium. A white, insoluble powder, used as a *cathartic* and indirect *cholagogue*.¹

It increases the amount of bile evacuated from the intestines without directly increasing the amount secreted by the liver. In the ordinary routine of digestion part of the bile in the intestines is re-absorbed and carried back to the liver; but by the action of calomel this is all expelled from the body, the result being that the next quantity secreted must all be newly formed, out of fresh materials.

Salivation occurs more frequently from the use of calomel than from other mercurials except blue pill, and it has an insidious harmful effect on the teeth, tending to retract the gums and expose the unprotected roots. Being tasteless and insoluble, it is best given dry on the tongue, with some water after it. It is slow in its action, requiring from 8 to 12 hours if given alone. Salty food should not be taken after calomel, as alkaline chlorides change it into bichloride. Acids also are often forbidden, though this is not now considered very important.

Children bear relatively larger doses of calomel than do adults. Dose, gr. $\frac{1}{12}$ –gr. x.

Massa Hydrargyri.
Blue Mass.

Made by combining mercury in the metallic state with honey or other inert substances. It contains one third its weight of the metal, and is used, like calomel, as a **purgative**, but is milder. Each pill contains usually from 3 to 5 grains of the mass, equalling gr. i.– $1\frac{3}{4}$ of metal. Dose, gr. i.–x.

¹ A purgative which acts also on the liver.

Hydrargyrum cum Creta.**Mercury with Chalk.**

A gray powder, similar in its properties and strength, to blue mass. It may be placed dry on the tongue or mixed with glycerine. Dose, gr. i.-x. The mercurial purgatives are abused by numbers of persons who prescribe for themselves. They should never be taken without authority, and it is also to be remembered that many quack purgative medicines, "liver pills," etc., contain mercury in uncertain quantities, and are harmful.

Unguentum Hydrargyri.**Mercurial Ointment.**

Composed of compound tr. of benzoin and 50 per cent. of mercury.

Mercury, besides being given internally, is used in the form of vapor baths and inunctions. There are many preparations, and with all of them constitutional symptoms are likely to appear, and must always be watched for.

It is of great importance that the diet of persons taking mercury should be ample and nutritious.

Mercurial ointments should be rubbed in with a piece of flannel; nurses have been salivated by using their hands for this purpose.

Arsenium (Arsenic).

Metallic arsenic is inert, and is not used in medicine.

Acidum Arseniosum.**Arsenious Acid.****White Arsenic; Arsenic.**

Obtained principally as a secondary product in the roasting of cobalt ores. It is not a true acid, but an anhydride, or acid deprived of its water. All the preparations of arsenic are derived from white arsenic.

Physiological Actions.

Arsenic in concentrated form applied to the tissues causes inflammation, followed by ulceration and sloughing. It has therefore been used as an **escharotic**,¹ but

¹ Any substance whose action produces sloughing.

its action is very painful and is attended with danger, as arsenic is readily absorbed from broken skin, ulcers, and mucous membrane, unless there is enough inflammation to throw it off; it being understood that when an inflammatory process is going on, the absorptive capacity of that part is checked.

In the stomach in medicinal doses arsenic does not combine with the albuminous contents of the organ, but remains unchanged and acts directly on the mucous membrane, stimulating the nerves and vessels, causing a sense of heat and hunger, and promoting the gastric functions.

Arsenic enters all organs and tissues, increases tissue changes and the vital activity of the whole system. It does not combine with the tissues, and is excreted chiefly by the urine, and also by the skin, liver, and intestines. Arsenic is therefore, in medicinal doses, a **stomachic** and general **tonic**, increasing the appetite and improving digestion and general nutrition.

It stimulates the secretions, peristaltic action, the brain, heart, and respiratory centre.

Symptoms of Poisoning.

In giving arsenic, the first signs which indicate over-dosing are: a slight puffiness about the eyelids, without redness, and noticeable first in the early morning, disappearing later; an itching of the eyelids; tingling or itching of the fingers, abdominal pain or soreness. Increasing symptoms of over-dosing are: a metallic taste, nausea, vomiting, diarrhoea, and sometimes dysenteric stools, with tenesmus; an irritable and feeble heart action; palpitations and oppressed breathing; eczema and other skin eruptions; trembling and stiffness of the joints; and albuminuria.

In acute poisoning the symptoms are of two varieties, gastro-intestinal and cerebral. The former is much more common, and is marked by a burning pain at the epigastrium, radiating over the abdomen; violent and uncontrollable vomiting of matter, first mucous, then bilious, and finally serous; intense thirst and dryness of the

mouth and throat ; stools bloody and offensive, sometimes involuntary ; strangury ; sometimes bloody urine, or suppression ; great restlessness and agitation ; dyspnoea ; a rapid, weak, intermittent pulse ; cold breath ; shrunken face ; cold and clammy skin, and final collapse, consciousness being retained until death occurs. In the cerebral form there is sudden and deep insensibility, ending in death, without intestinal symptoms. Occasionally there is a combination of both sets of symptoms ; also they may vary according to the form and dose in which the poison has been taken. The time in which they come on is usually from half an hour to an hour after taking the poison, and death has occurred in a few hours, but the average length of time is about twenty-five. It often happens that recovery is made from the first effects, with death from exhaustion or secondary causes many days, or even weeks, after.

The fatal dose for an adult may be put at from 2 to 4 grains.

Treatment of Poisoning.

In treating poisoning by arsenic, if vomiting has not already been caused by the poison, emetics should be given : a tablespoonful of mustard in a glass of warm water, followed by large quantities of mucilaginous and albuminous drinks, such as flaxseed tea, milk, with white of egg, etc. The antidotes, hydrated sesquioxide of iron and hydrated magnesia, have been described under iron and may be given in water, a tablespoonful at a time, every few minutes while necessary. Castor-oil should be given to clear the bowels. If the poison has been taken in solution the antidotes will precipitate it in an insoluble form, but no confidence can be placed in them if the powder has been taken, as rat-poison (often used in suicidal cases). The early and complete removal of the poison by emetics and purgatives is then the only real hope. The urine must be watched, as suppression may occur, and, while the patient lives, a daily specimen saved for examination.

Arsenic is not accumulative, and is an **irritant, not a corrosive** poison. After death the stomach and intestines are found to be deeply reddened and inflamed, but not ulcerated. The post-mortem appearances, as well as many of the symptoms, resemble those of cholera very strongly. Chronic poisoning is caused by the inhalation of arsenical fumes, by the use of wall-papers and clothing dyed with materials containing arsenic, and by eating adulterated candy and other articles of food.

Preparations of Arsenic.

Acidum Arseniosum.

Arsenious Acid.

Dose, gr. $\frac{1}{50}$ - $\frac{1}{10}$, well diluted and given after meals.

Liquor Acidi Arseniosi.

Solution of Arsenious Acid.

Contains arsenious acid 1 part in 100, and hydrochloric acid 1 part in 200.

Dose, ℥ ii.-x. (℥ x. = gtt. x.), well diluted and given after meals.

Liquor Potassii Arsenitis.

Solution of Arseniate of Potash.

Fowler's Solution of Arsenic.—Contains tr. of lavender and arsenious acid and bicarbonate of potassium, 1 part of each in 100. Five minims represent gr. $\frac{1}{24}$.

Dose, ℥ ii.-x. (℥ x. = gtt. x.), well diluted and given soon after meals.

Liquor Sodii Arsenitis.

Solution of Arseniate of Soda.

Pearson's Solution.—A much weaker solution than Fowler's, containing in $\frac{3}{4}$ i. gr. iv. of the arseniate of soda.

Dose, ℥ ii.-xv. (℥ x. = gtt. x.); after meals.

Arsenii Iodidum.

Iodide of Arsenic.

Dose, gr. $\frac{1}{30}$ — $\frac{1}{10}$.

Cupri Arsenis.

Paris Green.

Is not used medicinally, but is often taken as a means of suicide.

Donovan's Solution.—Contains iodide of arsenic and red iodine of mercury, but is now seldom used.

It may be repeated in conclusion that all preparations of arsenic should be given well diluted, and soon after meals, to avoid the local irritant action on the stomach; and that it is necessary to keep close watch for the constitutional symptoms, which may at first be so unobtrusive as to escape notice.

Antimonium (Antimony).

The metal itself (stibium) is not officinal, all preparations being derived from black antimony, which is obtained from siliceous matter, purified and powdered.

Antimonii et Potassii Tartras.

Tartrate of Antimony and Potash.

Tartar Emetic.—Made by boiling cream of tartar and water with oxide of antimony.

Tartar emetic, applied to the skin, is a strong **counter irritant**, and excites an eruption closely resembling that of smallpox, viz., small papules, becoming vesicular and finally pustular. It is now but little used in this way. Internally it is **irritant**, and, as an **emetic** its action is partly direct—that is, acting immediately on the walls of the stomach, and partly indirect, or acting on the nerve-centre in the medulla which controls vomiting. Tartar emetic causes nausea and depression both before and after the act of vomiting, and is therefore not well suited to cases where rapid action with as little depression as possible is required, as in poisoning.

In small continued doses the local action of tartar emetic is apt to produce loss of appetite, nausea, diarrhœa, and pain. In the tissues antimony has an **alterative** action, the special results being an increase of the waste products of the body, with a lessening of oxygenation, and fatty degeneration of the organs.

Tartar emetic depresses the circulation even in small doses, the first effect visible after a therapeutic dose being a diminution of the pulse and increase of perspiration.

With a continuance of the medicine the pulse becomes weakened, soft, and compressible, infrequent and irregular, and fainting may occur. Respiration is weakened, inspiration being shortened, and expiration lengthened.

The nervous system is depressed, a feeling of languor, sleepiness, and lassitude being produced by a moderate dose. It affects the muscular system so powerfully that before chloroform came into use tartar emetic was employed to produce muscular relaxation in the reduction of dislocations, etc., and the depressed state so brought about lasted for six or eight days in spite of heart stimulants.

Emetic doses cause great muscular weakness, tremors, and aching of the muscles, loss of power to stand, with free perspiration and an increase of saliva.

Antimony is excreted by all the mucous surfaces, the liver, kidneys, and skin.

Its excretion by the bile shows it to be a **hepatic stimulant**; in passing through the kidneys it acts as a **diuretic**, and through the skin as a **diaphoretic**.

The characteristic pustular eruption is sometimes caused by its internal use.

Symptoms of Poisoning.

The symptoms of poisoning are very like those of the collapse of cholera, viz. : shrunken features, cold surface and breath; great epigastric pain, vomiting, and purging; small, rapid, soft, and irregular pulse; cyanosis; syncope; cramps of the lower extremities; insensibility to

stimulants ; intense prostration ; delirium ; tetanic spasms in some cases, or aphonia.

The quantity of tartar emetic which will destroy life is not definitely known. The smallest fatal dose recorded is $\frac{3}{4}$ of a grain in the case of a child ; gr. ii. has caused death in an adult, while doses have been recovered from, ranging from gr. xx. to $\frac{3}{2}$ i. It is probable that, under ordinary circumstances favoring the action of the poison, gr. x. or xv. would destroy life, if taken at once, or a smaller quantity, if divided. The symptoms come on rapidly, and death may occur in a few hours, or days, or may be delayed for several weeks.

Treatment of Poisoning.

The antidote is tannic acid ; or substances containing it, as strong tea. Opium, and alcoholic stimulants, with demulcent drinks, are given.

Dose of tartar emetic, gr. $\frac{1}{2}$ -i., diluted.

Vinum Antimonii.

Wine of Antimony.

Contains of tartar emetic gr. ii. to $\frac{3}{2}$ i.

This preparation decomposes on being kept, and a fungoid growth takes place in it which unfits it for use.

Dose, ℥ v. (℥ x. = gtt. xii.)- 3 ss.

Syrupus Scillæ Compositus.

Compound Syrup of Squill.

Contains squill, senega, phosphate of lime, and dilute alcohol, with tartar emetic, about gr. $\frac{3}{4}$ to $\frac{3}{2}$ i. Syrup of squill is sometimes used as a domestic remedy for children, without a physician's order, and as tartar emetic is not a safe medicine for children, its unauthorized use has sometimes had fatal effects, and should always be strongly discouraged.

Bismuthum (Bismuth.)

A crystalline metal, impure in its crude state, and containing arsenic as one of the impurities. It goes through various chemical processes by way of purification.

Physiological Actions.

Externally and internally bismuth acts as a mild **sedative** and **astringent**. It is useful as a dry application in the first stages of bed-sores, as a dressing for burns and blisters, and may be satisfactorily used on small fresh wounds. It is given internally as an astringent, and in large quantities colors the fæces black or dark-gray.

Bismuthi Subnitras.**Subnitrate of Bismuth.**

A heavy white powder, odorless and almost tasteless, insoluble in water. The easiest way to give it is mixed in a little glycerine and diluted with milk or water ; or it may be given in wine.

Dose, gr. v.—3 i.

*NON-METALLIC ELEMENTS.***Phosphor (Phosphorus).**

A non-metallic element made from bones, by treating bone-ash with sulphuric acid and water. It is a semi-transparent, almost colorless, wax-like solid, with a peculiar garlic odor : it is luminous in the dark, is insoluble in water, and soluble in ether and in oils.

Phosphorus is a constituent of the most important tissues of the body, especially of the nervous system, where it exists as phosphorized fats. In the bones it is present as phosphate of calcium, magnesium, and sodium. It is contained in various articles of food, especially in fish and vegetables.

Physiological Actions.

In small doses phosphorus acts as a **tonic** and **alterative**, and stimulates the nutritive processes, especially in the case of the nervous and bony tissues. Given for a considerable length of time in small doses it affects the structure of bone, and makes the spongy portion firm and compact. The heart is stimulated by medicinal doses of phosphorus, and the temperature slightly raised.

Full doses given for a long time disturb the stomach, producing eructations of gas (phosphide of hydrogen), and depress the heart. Perspiration and urine are increased by phosphorus, and the latter becomes reddish and has the odor of violets.

Symptoms of Poisoning.

Phosphorus is an irritant poison, and the symptoms vary somewhat according to the state in which it is taken, appearing more quickly after taking a solution in oil; or the paste used as a vermin killer, than after match heads or ordinary phosphorus have been used. In the latter case the symptoms do not come on at once; some hours usually—sometimes one or two days—intervening before they show themselves. Then epigastric pain and burning begin, with a burning sensation in the throat, a taste of garlic in the mouth, and an odor of garlic to the breath; great thirst, nausea, and vomiting. During the first eight or ten hours the vomited matters have a garlic odor and are luminous in the dark, and if purging occurs, the fæcal matters are sometimes luminous, as is also the urine. Vomiting sometimes continues through the whole of the attack, but usually stops about the second or third day. Jaundice is a characteristic but not an invariable symptom. It appears from the third to the fifth day, and with it vomiting may reappear, exuded blood giving a peculiar appearance which is described as “coffee-ground.” There is great prostration, with a small, frequent, almost imperceptible pulse, and cold skin. The mind may remain clear, or there may be noisy delirium. Sometimes convulsions occur, or paralysis. Death may take place suddenly from collapse and paralysis of the heart, but more commonly the patient dies comatose from gradual failure of respiration and circulation. The time at which death occurs varies from a few hours to several weeks, the average time being several days or a week.

The fatal dose is stated to be between gr. $\frac{3}{4}$ and ii., though it may vary according to circumstances, and large quantities have been recovered from.

Treatment of Poisoning.

The chemical antidote is the crude French acid turpentine, which is given in doses of 3 ss. every fifteen minutes. After the poison has entered the blood there is no known antidote, and therefore, emetics and purgatives are of the greatest importance. Sulphate of copper is the emetic used, and forms an insoluble compound, phosphide of copper. It is given in dilute solution, gr. ii. at a time, every five minutes until vomiting is caused, and after that in small doses, gr. $\frac{1}{2}$, every twenty minutes as long as ordered. Hydrated magnesia may be used as a purgative. Mucilaginous and albuminous drinks are given, and all oils and fats carefully avoided, both in medicine and nourishment, as they dissolve phosphorus and hasten its absorption.

Chronic phosphorus poisoning is found among artisans who are exposed to the fumes, and is especially characterized by necrosis of the jaw. This form of poisoning is not as common now, since improved ways of making matches have been introduced, as it once was.

Preparations of Phosphorus.**Oleum Phosphoratum.****Phosphorated Oil.**

Contains stronger ether, oil of almond, with phosphorus in a strength of 1 in 100. One minim equals gr. $\frac{1}{113}$ of phosphorus.

Dose, ℥ i.-iii. (℥ x. = gtt. xv).

Pilulæ Phosphori.**Pills of Phosphorus.**

Each contains gr. $\frac{1}{100}$ of phosphorus.

Zinci Phosphidum.**Phosphide of Zinc.**

Gr. i. contains nearly gr. $\frac{1}{4}$ of phosphorus. It is an irritant preparation. Dose, gr. $\frac{1}{50}$ – $\frac{1}{30}$.

Calcii	}	Hypophosphis.
Ferri		
Potassii		
Sodii		

Dose, gr. x.—3 ss.

Syrupus Hypophosphitum.

Syrup of Hypophosphites.

Contains hypophosphite of lime, about gr. iii. to 3 i., and of soda and potash each about gr. i. to 3 i., with citric acid, spirits of lemon, and sugar.

Dose, 3 i.—3 ii., diluted.

Chlorum (Chlorine).

Chlorine is a greenish-yellow gas, belonging to the halogen group of elements. The title "halogen" is derived from the Greek word meaning sea, and is so given because the most important members of the group are obtained directly or indirectly from the ocean—viz. : chlorine, obtained from sea-salt ; bromine, from sea-water ; and iodine, from sea-weed.

Chlorine itself is not officinal, but is represented in medicine by several of its compounds ; also by hydrochloric acid and chlorinated lime, by which it is furnished. Chlorine is irrespirable, and of strong penetrating odor. It is soluble in water, in the proportion of two parts gas to one part water. If inhaled in any quantity it irritates the lining of the air-passages, causes spasm of the glottis, and narcotizes the brain.

It is a most powerful **disinfectant, antiseptic, and deodorant**, its great activity in these respects being due to its affinity for hydrogen, by which it decomposes compounds containing hydrogen, and sets oxygen free in its most active state, as ozone. It is not used in disinfecting clothing, as it destroys the color and texture of fabrics, nor the person, as it cannot be breathed in a strength sufficient to destroy germs. For disinfecting rooms it may be prepared as follows : Mix equal parts

of common salt and black oxide of manganese. To a tablespoonful of this powder, in a saucer, add a tablespoonful ($\frac{3}{4}$ ss.) of strong sulphuric acid diluted one third with water. In cold weather the saucer should be heated. This will produce enough chlorine to disinfect a room thirty-two feet square.

Calx Chlorata.

Chlorinated Lime.

Made by the action of chlorine on slaked lime, containing 25 per cent. chlorine. Its action as a **disinfectant** is that of chlorine, and when so used it should be perfectly fresh or it is valueless. To test it, dissolve a little in water; if the solution is clear, it is good, but if it has lost its chlorine the solution will be turbid and milky.

Liquor Sodæ Chloratæ.

Solution of Chlorinated Soda.

Labarraque's Solution.

Contains hypochlorite and chloride of sodium. A greenish-yellow liquid, with sharp salty taste and very slight odor of chlorine. It is a good preparation for cleansing purposes in sick-rooms, wards, etc., in weak solution. In full strength it removes stains from glass. Medicine droppers, douche nozzles, and other small articles which are hard to clean may be soaked in it until the stains come away. It is sometimes given internally, in half a tumblerful of sweetened milk or water.

The antidote, in case of poisoning by any of the chlorine compounds, is albumin; white of egg, milk, and flour. Dose, $\frac{3}{4}$ ss.-ii.

Bromum (Bromine).

A liquid element obtained from sea-water and from certain mineral springs. A dark, brownish-red, very

volatile liquid, of strong and suffocating odor. When brought into contact with organic matter it oxidizes and destroys it with great rapidity. Its local action is, therefore, powerfully **irritant** and **escharotic**. It is also a **deodorant** and **antiseptic**. It is never given internally, alone, but has been used as a caustic, and the vapor has been used medicinally.

Preparations of Bromine.

Potassii Bromidum.

Bromide of Potassium.

Prepared by adding a solution of pure carbonate of potash to a solution of bromide of iron, filtering, and evaporating. Colorless crystals, soluble in $1\frac{6}{10}$ parts water.

Physiological Actions.

Bromide of potash lessens cerebral activity, and the tendency to "emotionalism"; diminishes the sensibility and irritability of the mind in various nervous states; such, for instance, as result from excessive mental strain, anxiety, or intellectual work; and produces a condition of anæmia of the brain such as is found in natural sleep. It is thus an **indirect hypnotic**, not acting like opium, or chloral, but inducing sleep by bringing about a physiological condition favorable to its advent. Bromide of potash is depressing to the heart and respirations, both being slowed and weakened by its action. The spinal centres, spinal nerves, and the muscles are all depressed, and the temperature somewhat lowered, though not to any marked extent. Bromide of potassium contains 66 per cent. of bromine.

Dose, gr. x.-lx.

Ammonii Bromidum.

Bromide of Ammonium.

Prepared by precipitating the freshly made solution of bromide of iron with aqua ammoniæ. The salt remain-

ing in solution is crystallized and powdered. It is soluble in $1\frac{1}{2}$ parts of water. The effects and uses of bromide of ammonia are very like those of the bromide of potash, and it is said to be, in addition, slightly **stimulating**. It is not much used.

Dose, gr. x.-lx.

Sodii Bromidum.

Bromide of Sodium.

Colorless crystals, soluble in $1\frac{2}{10}$ parts of water, and containing 78 per cent. of bromine. It resembles bromide of potash, and has very much the same qualities. It is considered less depressing than bromide of potash, and the least toxic of all the bromide preparations. There is a variety of opinions as to its hypnotic power compared with bromide of potash.

Dose, 3 ss.-ii.

Lithii Bromidum.

Bromide of Lithium.

A granular, very soluble salt, containing 92 per cent. of bromine. In addition to the hypnotic power of the bromides in general it is said to have some **tonic** and **diuretic** action.

Dose, gr. v.-xx.

Incidental Effects.

In giving a course of the bromides it is very essential that the state of the digestion and of the bowels be carefully watched, and the latter strictly regulated, for the accumulation of an excess of bromine in the system causes a series of symptoms known as "bromism." The first is usually a salty taste in the mouth, with salivation and fetid breath. Next come drowsiness, heaviness, and sluggishness of intellect, loss of memory, partial aphasia, depressed spirits, a staggering gait, dull, listless expression, sluggish pupils, and sometimes an infrequency of winking.

One of the marked features of bromism is the appearance of eruptions of the skin, in great variety, and of varying severity. All manner of skin lesions have been described, as resulting from the use of bromine, even to one resembling that of smallpox. The most common is a simple acne or eruption of pimples. It sometimes occurs early, or after the use of small doses, yet is not always among the first symptoms.

The bromides are excreted by the kidneys chiefly, also by the salivary and mammary glands, the skin, and all mucous surfaces. They are rapidly diffused, appearing in the secretions a few moments after being taken.

Iodum (Iodine).

Iodine is a non-metallic element of bluish color, derived chiefly from the ashes of sea-weeds; not readily soluble in water; soluble in ether, alcohol, and glycerine. It is never given internally in crude form.

Physiological Actions.

Applied externally iodine is an **irritant** and **vesicant**, and stains the skin yellow, or, in repeated applications, deep brown. It causes some pain, with a feeling of warmth, and desquamation may follow its use. It is absorbed into the blood partly through the skin and partly in the form of vapor.

The vapor of iodine, like that of chlorine but in a feebler degree, decomposes sulphuretted and phosphuretted compounds, and is, therefore, **antiseptic** and **disinfectant**. Internally iodine excites a sensation of heat and burning in the stomach. In sufficient quantity it is an irritant poison, causing inflammation of the lining of the stomach, severe pain in the abdomen, vomiting, and purging. The matters vomited have a yellow color, except when farinaceous food has been taken; in this case they are blue or purplish. The amount of iodine necessary to produce toxic symptoms varies with constitutional peculiarities and with the kind and amount of food in the stomach. Death has been caused in twenty-

four hours by ʒi. The antidote is starch or flour stirred up in water, and emetics should be given afterwards.

Iodine is rapidly excreted, appearing in the urine, the perspiration, saliva, bile, milk, and mucous secretions, especially of the air-passages.

Preparations of Iodine.

Potassii Iodidum.

Iodide of Potassium.

Made by dissolving iodine in liquor potassæ, evaporating, and treating the residue with wood charcoal.

Iodide of potash is extremely diffusible and enters the blood with great rapidity. It acts in a general way as a **tonic** and **stimulant** to nutrition, accelerates tissue-changes, and increases the excretion of waste products. It has some slight **diuretic** action, and has the power of dislodging from the tissues various poisonous metallic substances, notably lead and mercury.

The lymphatic glands are reduced in size by iodide of potash, and, like mercury, it has over some forms of disease a marked and positive influence, not thoroughly explainable. Its action in these cases is called "specific" or "alterative."

Incidental Effects.

In giving any of the iodides, and especially the iodide of potash, the peculiar set of symptoms known as "iodism" must be carefully watched for. There is first an inflammation of the mucous membrane of the head resembling acute coryza, or catarrh; running at the eyes and nose, salivation, swelling of the eyelids, sneezing, and frontal headache; sore-throat, hoarseness, and trouble in swallowing, with a feeling of general wretchedness, and rise in temperature.

There are also several varieties of eruptions which may appear, said to be more likely to occur in the case of patients with diseased kidneys. The most common is an

eruption of acne on the face, shoulders, and thighs, and eczema is also frequent.

Debility and pains in the joints are sometimes noticed, and in some cases digestive disturbances result, with nausea and diarrhœa.

The solution of I in I ($\text{℥ i.} = \text{gr. i.}$), is best given in milk; or it may be given in cinnamon water, or the compound syrup of sarsaparilla, to disguise the unpleasant taste. It is often ordered with bichloride of mercury, and they may be given together, but if it is not ordered in combination it should never be added to any other medicine, but given alone.

By largely diluting it and giving it on an empty stomach, symptoms of iodism are in a measure avoided.

Dose, gr. v.-3 i.

Liquor Iodi Compositus.

Lugol's Compound Solution of Iodine.

Composed of iodine and iodide of potash. Twenty minims contain gr. i. of iodine.

Dose, ℥ v.-xv. ($\text{℥ x.} = \text{gtt. x.}$), well diluted.

Sodii Iodidum. Dose, gr. v.-xx.

Zinci Iodidum. Dose, gr. ss.-ii.

Arsenii Iodidum. Dose, gr. $\frac{1}{20}$ - $\frac{1}{10}$.

Ammonii Iodidum. Dose, gr. iii.-v.

Tinctura Iodi.

Tincture of Iodine.

Contains 8 parts iodine and 92 parts alcohol. It is used externally as a counter-irritant; applied with a camel's-hair brush, and in one or more coats as ordered. Each coat must dry separately. It cannot be diluted with water, as the iodine precipitates in water. If extreme burning follows the application and it is desirable to wash it off, alcohol, or ether, or a solution of iodide of potash will remove it.

Unguentum Iodi.
Iodine Ointment.

Contains 4 parts in 100 of iodine, with one part of iodide of potash, and benzoinated lard.

Iodoformum.
Iodoform.

Iodide of Formyl.—Iodoform is made by heating iodine with carbonate of potassium, alcohol, and water, and allowing the crystalline deposit to settle. It consists of small, bright-yellow, lustrous crystalline scales, with a very strong and clinging odor, and sweetish taste. It contains about 97 per cent. of iodine, and is freely soluble in oils, ether, and chloroform.

Iodoform was discovered in 1822, but was not used for some years. At various times since then its qualities have been referred to in medical articles, and within the last few years it has become very popular as an **antisepic** in surgical dressings,—so much so that its use has been carried to excess and its reputation greatly exaggerated. Various cases of poisoning had the effect of checking its too lavish use, and its limitations as well as its powers are now more clearly known.

It is no longer considered one of the most active germicides, as was claimed for a time, yet it has properties sufficient to give it a secure place in surgery. It prevents or arrests decomposition, promotes union and cicatrization in wounds, and is a **deodorizer**. It is not irritating, but acts rather as a **local anodyne**. In a wound treated with iodoform the secretion is lessened, and is serous rather than purulent in character. In cases of poisoning by absorption through a wounded surface, the following symptoms may occur :

Rise of temperature as high as 104° F., or higher. This may be the only symptom ; or with it there may be headache, a rapid and compressible pulse, and loss of appetite, the symptoms going off as soon as the iodoform is discontinued. Iodine is found in the urine in iodoform poisoning. More serious effects are : a grave de-

pression of the system, and anxious melancholia; a restless mental condition, with very weak and rapid pulse, perhaps reaching 180; drowsiness, delirium, and collapse. Death sometimes occurs quickly, even though the application be stopped. The amount capable of causing fatal poisoning has been recorded as varying from 500 grains upwards. In using iodoform the extent of exposed surface through which absorption may take place is of more importance than the actual amount applied, which may not all be absorbed.

Iodoform is sometimes given internally, in pill or capsule. Dose, gr. i.-ii.

Unguentum Iodoformum.

Iodoform Ointment.

Iodoform 10 parts, and benzoinated lard 90 parts.

Iodol.

Iodol is a new substance which has been chemically produced in the attempt to make an equivalent for iodoform, which should have its qualities without the unpleasant odor. It is obtained by the action of iodine on certain constituents of mineral oil, and contains about 85 per cent. iodine. It is a yellowish-brown powder, which darkens on exposure to light. It is odorless, soluble in alcohol, ether, and chloroform; insoluble in water. It is said to be as efficiently **antiseptic** and **disinfectant** as iodoform, having the same **deodorant** and **anæsthetic** properties, but it is not much used.

Iodized Phenol.

A mixture of iodine and carbolic acid, for external use.

Sulphur (Brimstone).

Sulphur is found native in volcanic districts as crude sulphur, and in combination with metals, as sulphides.

Physiological Actions.

Sulphur is used externally for its action on the skin. It has no local action of its own, but by contact with the

products of the skin it changes into sulphuretted hydrogen and sulphides, which are active substances. In this form it is a **vascular stimulant**, a **nerve sedative**, a stimulant to the skin, and a **diaphoretic**.

Taken internally it acts as a laxative, increasing peristalsis, and it has also probably some power of influencing nutrition.

If taken for a long time it impairs the blood and causes emaciation, anæmia, trembling, and debility. It forms sulphuretted hydrogen in the intestines, giving an unpleasant odor to the fæces, and the same disagreeable odor is imparted to the perspiration, by the excretion of sulphur through the skin. Silver jewelry worn by a patient taking sulphur becomes discolored by the excretions of the skin.

Preparations of Sulphur.

Sulphur Sublimatum.

Sublimed Sulphur.

Flowers of Sulphur.—Prepared from crude sulphur (which compressed into molds forms the roll sulphur used in fumigating) by subliming. A yellow powder, tasteless, and odorless until heated, and insoluble in water. It always contains a little sulphuric acid and is only used in making other preparations.

Sulphur Lotum.

Washed Sulphur.

Sublimed sulphur washed with aqua ammoniæ and freed from acid. The action is **laxative**. It is given in powder mixed with simple syrup or molasses. Dose, ʒ i.—iii., given at night.

Sulphur Precipitatum.

Precipitated Sulphur.

Dose, ʒ i.—iii.

Potassa Sulphurata.

Liver of Sulphur.

Made by fusing sublimed sulphur with carbonate of potash. Solid greenish pieces, alkaline, and of very acrid

taste ; soluble in water, making an orange-colored solution. Locally applied, the sulphuret of potash is an **irritant**, and taken internally is a violent **corrosive poison**. It is used in ointments and in giving sulphur baths ; in the latter case in a strength of from $\frac{2}{3}$ i.-vi., to 30 gallons of water. The bath may last from twenty minutes to two hours, and has a generally **stimulating** effect.

A papular eruption and eczema sometimes follow the use of sulphur.

Calx Sulphurata. Sulphurated Lime.

Contains 36 per cent. of sulphate of calcium. Dose, gr. $\frac{1}{10}$ — $\frac{1}{2}$.

Unguentum Sulphuris.

Sulphur in strength of 3 parts in 10, with benzoinated lard.

Ichthyol.

A preparation obtained from a bitumen¹ found in the Tyrol, and supposed to be the residue of extinct fishes. It contains 10 per cent of sulphur and is not irritating to the skin. It is used externally in an ointment of 10-20 per cent. strength.

Carbo (Carbon).

Charcoal.

Charcoal is obtained from the combustion of bones,—carbo animalis, animal charcoal, or bone black—and of wood—carbo ligni, wood charcoal.

Charcoal absorbs and condenses many gases and vapors, coloring matters, alkaloids, and other substances in quantities many times greater than its own bulk ; and when exposed to the air it thus increases rapidly in weight.

¹ An inflammable mineral substance.

For this reason, when intended for medicinal purposes it must be kept carefully covered in well stopped bottles.

Externally it is used as an **absorbent** and **deodorant** and internally as a **carminative**. It may be given between two slices of bread and butter or mixed with wine. Charcoal does not enter the system but is entirely expelled by the bowels. Dose, ʒ i.— $\frac{2}{3}$ i.

Peroxide of Hydrogen.

A combination of water and oxygen, used as an **anti-septic** and **disinfectant**, as it has strong oxydizing powers. It is, however, readily decomposed, losing its strength and antiseptic power.

INORGANIC ACIDS.

Acidum Sulphuricum (Sulphuric Acid).

Oil of Vitriol.

Sulphuric acid is made from the gas which is produced by the combustion of sulphur, by hydration on the action of steam. It is a colorless, oily-looking, intensely acid liquid, containing 2 per cent. water. On exposure to the air it absorbs moisture and becomes less dense.

Physiological Actions.

Sulphuric acid is a powerful **corrosive**, and abstracts water from animal and vegetable tissue, leaving carbon. It thus blackens organic matter while destroying its texture.

Concentrated and mixed in a paste with charcoal, sulphuric acid has been used as an **escharotic**. Diluted, its special action both externally and internally is that of an **astringent**.

Symptoms of Poisoning.

When swallowed in concentrated form it corrodes the alimentary canal, causing acute pain of the mouth, throat, and epigastrium. The tongue and lining of the mouth are whitened, like parchment, afterwards turning brown, while brown or blackened spots appear on the lips.

There are : violent vomiting, of tarry matters often, cold extremities, and clammy skin ; profuse and bloody salivation, suppressed voice, and feeble pulse. The face expresses great suffering and anxiety. The mind is clear. The matters at first vomited are acid, and, if they fall on colored articles of dress the color is taken out, and the texture destroyed ; while on black material brown spots are produced, with an edge of red.

There is sometimes perforation of the stomach or intestines. The symptoms come on immediately after the act of swallowing, and death may result in a few hours, but usually delays for from 18 to 24 hours ; occurring, finally, very suddenly. The smallest fatal dose recorded is ʒ i. Usually $\frac{3}{4}$ i. or more has been taken.

Antidotes.

The antidotes are chalk, magnesia, whitewash, or soap. They should be mixed in milk or water and given freely.

Preparations.

Acidum Sulphuricum Dilutum.

Dilute Sulphuric Acid.

Has a strength of 10 per cent. of the acid.

Dose, ℥ x.-xxx. (℥ x. = gtt. x.)

Acidum Sulphuricum Aromaticum.

Aromatic Sulphuric Acid.

Contains alcohol and aromatics, and acid in a strength of 20 per cent. Both these preparations should be given well diluted, and through a glass tube, to save the teeth from injury.

Dose, ℥ x.-xx. (℥ x. gtt. xxiv.).

Acidum Nitricum (Nitric Acid).

Aqua Fortis.

Nitric acid is prepared from nitre by distillation with water and sulphuric acid. A colorless, intensely acid, fuming liquid, containing 70 per cent. acid, the rest water.

Physiological Actions.

It is a very powerful **caustic**, and if used in this way the sound tissues should be protected by a coating of oil or soap, or sheet-lint wet in a solution of bicarbonate of soda, and the spot cauterized be washed with warm soap-suds after sufficient effect has been obtained.

Taken internally in medicinal doses it has **stimulant** and **astringent** properties.

Poisoning and Antidotes.

In concentrated form nitric acid is an exceedingly **corrosive** poison, even more violent than sulphuric acid. Like the latter, it destroys the membrane lining the mouth, œsophagus, and stomach. The symptoms are the same, except that nitric acid stains the tissues yellow instead of black. They come on with the same severity, and immediately. The antidotes are the same, and death occurs on an average in half a day, or a day.

Preparations.**Acidum Nitricum Dilutum.****Dilute Nitric Acid.**

Has a strength of 1 part to 6. It must be well diluted and given through a glass tube.

Dose, ℥ x. (℥ x. = gtt. x.).

Acidum Hydrochloricum.**Hydrochloric or Muriatic Acid.**

Hydrochloric acid is obtained by the action of sulphuric acid on chloride of sodium, and solution of the fumes in water until it has a strength of about 30 per cent. An almost colorless, very acid liquid, with pungent odor. It is one of the natural acids of the stomach, and acts as a **tonic** on the glands of the alimentary canal, increasing the normal secretions. Its astringent properties are not marked. In concentrated form it is a corrosive poison, not as powerful as nitric or sulphuric acids. The symptoms and treatment are like the two others.

Acidum Hydrochloricum Dilutum.**Dilute Hydrochloric Acid.**

Has a strength of $\frac{z}{iv}$ of the acid to one pint.

Dose, \mathfrak{M} x.-xxx. (\mathfrak{M} x. = gtt. x.), well diluted and given after meals.

Acidum Nitro-Hydrochloricum.**Nitro-Hydrochloric Acid.**

Made by mixing three parts of nitric with five parts of hydrochloric acid. An orange-colored liquid, changing color in time, and more rapidly on exposure to light, to a light yellow. In medicinal doses the physiological effects are : stimulation of the liver specially, and also of the other glands of the alimentary canal. Besides being given internally, it is used in local applications to the liver, and in baths. In the former case, for stupes, the strength is 3 i.-iii. to O . i. of water ; and in the latter, $\frac{z}{i}$ i. to C . i. In poisonous doses the effects are the same as the other mineral acids. The stains it produces are yellow. The same antidotes are used as given before.

In giving any of the mineral acids, the first symptoms of intolerance are : griping pains and diarrhœa, with strongly acid urine. These points are to be remembered, as well as the necessity for protecting the teeth.

Acidum Nitro-Hydrochloricum Dilutum.

Dose, \mathfrak{M} v.-xx. (\mathfrak{M} x. = gtt. x.), well diluted and given through a glass tube.

Acidum Phosphoricum.**Phosphoric Acid.**

A colorless, odorless liquid, made by boiling phosphorus with nitric acid and water, and having a strength of 66 per cent. It is very acid, but does not corrode the tissues. Its physiological effects are unimportant—mildly **tonic** and **astringent**.

Acidum Phosphoricum Dilutum.

Dose, ℥ xv.—3 ss. (℥ x. = gtt. x.), well diluted.

Acidum Sulphurosum.**Sulphurous Acid.**

Made by heating sulphuric acid with charcoal. Sulphurous-acid gas results, and is dissolved in water, constituting 5 per cent. of the solution. A colorless liquid with pungent sulphurous odor. Sulphurous acid is a **disinfectant**, being very efficient in destroying low forms of life. There are several preparations combining the alkalis with sulphurous acid, which, however, are seldom used.

Sulphurous-acid gas is used in disinfecting rooms, by the combustion of roll sulphur. It should not be relied on to the exclusion of thorough cleansing, which is all-important. The fumes will tarnish metals, and turn black clothes a rusty green.

Acidum Boricum.**Boric or Boracic Acid.**

Made by the action of sulphuric acid on borax, or by purification of native boric acid, which is a compound of the element boron with oxygen, and is obtained from certain mineral springs in Italy. White, pearly, glistening crystals, soluble in 25 parts of cold and 3 parts of hot water. The saturated solution has a strength of 4 per cent.

Physiological Actions.

Boric acid is **antiseptic**, **disinfectant**, and **deodorant**, destroying low organisms, and stopping fermentation and putrefactive changes.

It is not irritating externally, but rather the reverse, and when applied to wounds prevents suppuration. Internally, in large doses, it is a **gastro-intestinal irritant**, and poisoning has been caused by washing out

internal cavities with a 5 per cent. solution. The symptoms were: nausea, vomiting, hiccough, disturbed respirations, rapid, feeble pulse, erythema and ecchymosis, subnormal temperature, and collapse.

As a wash for babies' eyes and mouths, the saturated solution is diluted one half with water.

It is used as the basis of a variety of mouth washes for the sick. It constitutes the largest part of Thiersch powder, used in making an antiseptic solution. (See salicylic acid.)

Unguentum Acidi Borici.

Contains white wax, paraffin, almond oil, and boric acid.

THE ORGANIC ACIDS.

Acidum Aceticum (Acetic Acid).

Prepared from wood by destructive distillation and purification. A colorless liquid, with pungent odor and strong acid taste; strength 33 per cent.; the rest water.

Glacial acetic acid has 99 parts acetic acid to 1 of water, and crystallizes at a temperature below 60°. It is not officinal.

Acidum Aceticum Dilutum.

Has a strength of 1 part acid to 7 parts water.

Acetum.

Vinegar.

An organic liquid containing acetic acid. It corresponds nearly in strength with the dilute acid. Vinegar is obtained from various vegetables and fruits by a process of fermentation known as the acetous or sour, as distinguished from the vinous fermentation and others.

Acetous fermentation may be induced in all liquids capable of undergoing vinous fermentation.

The best vinegar is made from cider. It is often adulterated with sulphuric acid.

Locally used acetic acid is a **caustic**. It is best applied with a glass rod, or a splinter of wood and needs to be applied with care to avoid injuring the surrounding parts.

Diluted and applied to the skin, it is **stimulant, astringent, and refrigerant**, and in the form of vinegar is sometimes added to baths for the reduction of temperature.

Internally it has a stimulating effect on the appetite and digestion; increases the secretion from the intestines, and the flow of urine. It does not neutralize the alkalinity of the blood, but decomposes there, and combines with part of the alkali of the plasma, forming a carbonate, and in this form passes out of the body, unless given in excess, when the excess escapes unchanged from the kidneys. In the alimentary canal the acid acts directly on its contents, and is given in the form of vinegar as an antidote for poisoning by alkalies.

In concentrated doses acetic acid is a **corrosive** poison, and has caused death in one case known.

The symptoms are like those of the mineral acids, and the treatment is the same, consisting in giving alkalies and their carbonates; warm soapsuds, and milk.

Acidum Citricum (Citric Acid).

Citric acid is obtained from the juice of the lemon, *citrus limonum*, or of the lime, *citrus bergamia*, by neutralizing the boiling juice with chalk, and putting it through various processes. It is very soluble in water, and gr. xx. in 3 ss. of water makes a solution resembling lemon juice in strength and acidity.

Citric acid, like the other free acids, acts directly on the contents of the alimentary canal, neutralizing alkalies.

It is **stimulant**; relieves thirst and promotes appetite; increases the flow of the saliva and of the gastric juice; and, indirectly, the action of the kidneys and skin; hot lemonade especially being a diaphoretic.

It is slightly **laxative**, and counteracts a tendency to torpidity of the liver. The juice of half a lemon, mixed

with that of an orange, is a satisfactory laxative drink in many cases. It is best taken before breakfast.

In malarial countries lemon-juice is freely used as an article of food, and among sailors and soldiers it is used as a prophylactic¹ against scurvy.

Citric acid has no action on the sound skin; it is but slightly irritating in large quantities internally, and is not poisonous.

It may not be out of place here to refer to a popular error regarding a point of diet: that is, that a nursing woman may not drink lemonade because it will "sour the milk," and "give the baby colic." A nurse will probably often be appealed to on this subject. Her knowledge of the chemical facts: that citric acid is decomposed in the blood, forming a neutral salt; that it does not reach the tissues as an acid, but passes out of the body as a carbonate, will at once decide the question.

Acidum Tartaricum (Tartaric Acid).

Tartaric acid is the acid of the grape, and is made from acid tartrate of potassium by a process similar to that used with citric acid.

Its local action upon abraded surfaces, mucous membranes, or even the unbroken skin, is that of a decided **irritant**. Taken internally it is **diuretic** and slightly **laxative**, and somewhat depressing to the heart.

Tartaric acid does not enter the tissues as an acid, but is decomposed in the blood, and passes out of the body as a carbonate.

Poisoning and Antidotes.

In large doses it is an irritant poison, causing burning pain of the œsophagus and stomach, vomiting, and gastro-intestinal inflammation, which may prove fatal. A dose of $\frac{3}{i}$ has caused death in nine days. The alkalis, magnesia, lime, soapsuds, or the alkaline carbonates are antidotes.

Dose, gr. x.-xx., freely diluted.

¹ A preventive.

Acidum Lacticum (Lactic Acid).

Lactic acid is found in sour milk. It is also produced by the action of a special ferment on sugar, and is one of the normal constituents of the gastric juice. It is a pale-yellow, syrupy, inodorous liquid, with acid taste.

Lactic acid **aids digestion** and **promotes appetite**. It is credited with the power of dissolving fibrinous exudations, but its use as an application is very painful. Flatulence and epigastric pain result from its too free administration.

It enters the blood as alkaline lactates, is decomposed, and excreted by the urine as carbonic acid.

Acidum Lacticum Dilutum.

Dilute Lactic Acid.

Consists of 15 parts acid to 85 parts water. Dose, $\frac{3}{4}$ ss.-ii., well diluted.

Acidum Hydrocyanicum.

Hydrocyanic or Prussic Acid.

The pure anhydrous¹ acid is a colorless, transparent, volatile, and inflammable liquid, so poisonous that its fumes alone will cause death.

Its discoverer, Scheele, is supposed to have died from inhaling it. It is not officinal, and is only kept in laboratories. It is found in nature in a number of vegetable substances, viz., peach kernels, bitter almonds, wild cherry, cherry laurel, etc.

Acidum Hydrocyanicum.

Dilute Hydrocyanic Acid.

Made by distilling aqueous solutions of ferro-cyanide of potassium and sulphuric acid, and diluting the product with the water to the required strength. A

¹ Without water.

colorless, watery liquid, containing 2 parts of the pure acid to 98 parts of alcohol and water. Its reaction is faintly acid; the taste and odor, like those of peach kernels and bitter almonds. Under the influence of light it has a tendency to decompose, and should be kept in dark-colored, well-stopped bottles.

Physiological Actions.

Applied to the skin the acid **depresses** the **sensory** nerves and causes numbness. It is therefore used for various local purposes, largely diluted, but should never be applied to an abraded surface, as, being readily absorbed, poisoning might result.

It enters the blood very rapidly, especially through the lungs, enters the tissues promptly, and acts chiefly on the nervous structures as a **sedative** and **depressant**. The respiratory centre is especially affected, the respirations weakened and slowed. The vaso-motor centre is stimulated temporarily, and then quickly depressed. The cardiac centre is also depressed, though it is the last to be affected. The sedative action of the drug is not confined altogether to the nerve-centres, but is shown also on the muscular structure of the heart. The motor nerves and muscles are weakened by hydrocyanic acid, the enfeebling action extending downward.

It is very rapidly eliminated from the system, probably by the lungs. This is not, however, a settled point. When taken in medicinal doses hydrocyanic acid causes a feeling of sleepiness. The first peculiar effects are: a bitter taste, an increased flow of saliva, and a feeling of irritation and constriction of the throat. These effects pass off in half an hour or, at most, an hour.

When the dose is rather larger than medicinal, viz., about ℥ xxx. of the weak acid, there may be noticed: nausea, transient giddiness, faintness, a feeble pulse, and general muscular weakness. Sometimes there is vomiting, or foaming and frothing at the mouth, with a suffused or bloated appearance of the face and prominent eyes.

Symptoms of Poisoning.

The inhalation of the vapor, short of a fatal quantity, causes giddiness, faintness, embarrassed breathing, a weak, small pulse, and even coma and insensibility, followed by recovery.

If death results from small doses, there are commonly present tetanic spasms, lockjaw, and involuntary evacuations.

Prussic acid is one of the most powerful poisons known, and after a toxic dose the symptoms come on instantly, and death may result in a few moments. Among its most marked effects are the insensibility and loss of muscular power, which are produced much more rapidly than by any other poison.

There is usually loss of consciousness in a few seconds; the eyes are protruding and shining, the pupils dilated and irresponsive to light; the limbs relaxed and covered with clammy sweat; the pulse imperceptible; respiration very slow and convulsive, sometimes stertorous, sometimes gasping, or sobbing, the act of expiration being long and forced, with a pause afterwards during which the patient seems dead.

There is usually an odor of the acid on the breath. When the poisonous dose is small, yet still fatal, there are often convulsions, spasmodic clinching of the fingers, and contraction of the toes.

The smallest fatal dose recorded was an amount equivalent to gr. $\frac{1}{10}$ of pure acid. This caused death in twenty minutes. Probably the average fatal dose is about gr. i. of pure acid, and the average time of death from two to ten minutes. It is not an accumulative poison.

Treatment of Poisoning.

There is no chemical antidote which acts quickly enough to be of any service. Cold-water affusions to the head and spine, and artificial respirations, are of more service than any thing else, and should be persevered in, especially the latter, as long as there is any

sign of breathing ; as, if the tendency to death from apnœa be combated until the influence of the poison begins to pass off, life may be saved. The stomach may be emptied by emetics or the stomach-pump ; inhalations of ammonia and chlorine water given ; and injections hypodermically of ammonia, ether, and alcoholic stimulants.

Dose of dilute acid, ℥ i.-iii. (℥ i. = gtt. i.).

Acidum Oxalicum (Oxalic Acid).

Oxalic acid is never used in medicine, but, as a poison, it has caused accidental death so often that it will be included here. There are two forms of oxalic acid : one, the simple acid, which is found in sorrel and several other vegetable substances ; the other, the article known as essential salt of lemon, one of the most violent of the corrosive poisons, and often mistaken for Epsom salt.

Symptoms of Poisoning.

A hot acrid taste, and burning in the throat and stomach ; intense abdominal pain, and vomiting of greenish, brown, or bloody mucus of very acid reaction ; livid, cold skin ; small, irregular pulse ; unconsciousness, stupor, and collapse. In some cases the gastric symptoms predominate, in others the nervous symptoms, as convulsions, numbness, paralysis, and stupor.

The smallest fatal dose known is ʒi. An ounce usually proves fatal, and the symptoms appear immediately. Death may occur within a few minutes, or may be delayed more than a week, and then take place from starvation resulting from the injuries to the intestinal canal.

Treatment of Poisoning.

The immediate administration of an antidote is of the greatest importance. Neither potash nor soda can be used, as their oxalates are poisonous ; but lime or chalk are perfect antidotes, and can be given as precipitated chalk or saccharated solution of lime, or they may

be scraped off the wall, whitewashed fences, or ceilings, stirred up in milk, and freely administered. Emetics, followed by the soothing and demulcent drinks usual in the after-treatment of irritant poisons, are employed, and stimulants, with external warmth.

THE CARBON COMPOUNDS.

Alcohol.

Alcohol is a product which results from a process of fermentation in substances containing grape-sugar—called the vinous fermentation in distinction from the acetous or vinegar-forming process.

At a temperature of 80° F., the presence and growth of the fermenting body (a low vegetable organism called the yeast-plant) converts a solution of grape-sugar into alcohol and carbonic acid. Starchy substances yield alcohol, starch being convertible into grape-sugar. From these vinous or fermented liquors alcohol is obtained by repeated distillation. It is also made synthetically,¹ by shaking olefiant gas (a gas composed of carbon and hydrogen, which is generally present in coal gas, oil gas, and other gaseous mixtures produced by the action of heat on organic substances) with strong sulphuric acid, diluting and distilling. Alcohol is a colorless, volatile liquid, of strong pungent odor and burning taste; it is inflammable, burning without smoke and with a blue flame, evaporates on exposure to the air, is vaporized by heat, and unites readily with water in all proportions.

There are three important alcohols or varieties of alcohol, viz.:

1. **Alcohol Ethylicum, Ethyl Hydrate, Grain Spirit.** This is the alcohol of common language.

2. **Alcohol Amylicum, Amyl Hydrate, Potato Spirit,** called fusel oil, and obtained also as an impurity in the production of ethylic alcohol by continuing the distillation after the pure spirit has ceased to come away. Amylic alcohol is not inflammable.

¹ By uniting elements into a compound.

3. **Alcohol Methylicum, Methyl Hydrate, Wood Spirit.** Wood spirit is inflammable, and is cheaper than alcohol.

Physiological Actions.

Alcohol is locally **antiseptic** and **disinfectant**, **cooling**, and **astringent**. Internally, in medicinal doses it is pre-eminently a **heart stimulant**, and, in a lesser degree, a **diuretic**, **diaphoretic**, and **anti-pyretic**.

Under certain conditions, it is a food; under still others, a poison.

When rubbed into the skin, as for the prevention of bed-sores, it disinfects and hardens it, checks the activity of the sweat glands, and irritates the cutaneous nerves, causing redness, heat, and local anæsthesia. Applied and allowed to evaporate, as in sponge baths, it has a cooling action. Coming in contact with an abraded surface it is very painful. It is absorbed by the unbroken skin. In the stomach it produces a sense of warmth, and, in moderate amount, stimulates the mucous membrane and dilates the small vessels, with the result that the blood supply is increased and the gastric secretions correspondingly abundant.

When used in doses sufficient to give this result simply, alcohol is evidently favorable to digestion, but in larger quantities it has another and unfavorable action, namely, that of precipitating the pepsin of the stomach.

Overdoses produce this result; a small quantity, diluted as it is by the gastric fluids, has not sufficient power to act on the pepsin to any marked degree. If alcohol is constantly used to excess, an abnormal secretion of mucus—gastric catarrh—results, with various evidences of dyspepsia, viz. : loss of appetite, acidity of stomach, heartburn and pyrosis, nausea, and morning vomiting.

Other evidences of the alcohol habit are : constipation; pain on pressure over the stomach; brown, dry tongue with red tip; chronic pharyngitis; fat, flabby, soft hands.

Sleep, for the first part of the night, is sound, but is disturbed in the early morning, after which wakefulness remains, or broken sleep with bad dreams.

Confirmed drinkers age fast. The skin becomes dry, and feels waxy, soft, and unhealthy. The mind becomes sluggish and weak, and cirrhosis of the liver and kidneys, phthisis, epilepsy, paraplegia, insanity, and other disorders are among the sequels of alcoholism.

Symptoms of Poisoning.

A steady course of alcohol in excess, without taking food, will result in delirium tremens. Acute alcoholic poisoning presents the following symptoms: a short period of excitement, followed by coma; respirations irregular, sometimes sighing but usually stertorous; pupils either dilated or contracted, usually the former; face flushed; pulse hard, rapid, and strong.

Acute alcoholic poisoning may be mistaken for opium poisoning, apoplexy, and compression of the brain.

Death results from paralysis of the heart and respirations. The time at which death may occur varies from a few minutes to several days.

The smallest known fatal dose was between $\frac{7}{3}$ iii.-iv. of brandy swallowed by a child of seven years.

Treatment of Poisoning.

The treatment consists in emptying the stomach; the application of heat to the extremities and cold affusions to the head; the inhalation of ammonia, and the use of electricity applied to the respiratory muscles.

Physiological Actions (Continued).

Alcohol enters the blood unchanged or as aldehyde,¹ and reaches the tissues and organs, a small portion being changed into acetic and carbonic acids. In its passage through the tissues it is oxydized, if given in moderate amount, and changed into carbonic acid and water, like other carbo-hydrates,—thus becoming a food or source of heat and force.

¹ Alcohol deprived of a certain proportion of its hydrogen.

In a healthy adult, $\frac{3}{4}$ iss. of absolute alcohol can be thus oxydized in twenty-four hours, and supplies to the organism as much heat and energy as is contained in the same amount of cod-liver oil or in about $\frac{3}{4}$ ix. of beef.

Beyond this, in health, it becomes injurious, and is eliminated by the kidneys, skin, and lungs; though in different morbid states large—even excessive—quantities can be safely taken.

Children and old people bear alcohol well.

Although alcohol is itself oxydized, it interferes with the oxidation of other substances, thus saving the tissues from wear and retarding the process of waste.

This, joined to its stimulating action on the circulation and on the nervous system, gives it the power of sustaining life for a time, under the strain of acute exhausting disease, or during a period of temporary inability to take sufficient food.

Its stimulant effect is shown on the heart by an increase in the strength of the contraction or systole. The pulse becomes strong and regular, full, and compressible. If it had, before, been rapid and weak, it will, under the favorable influence of alcohol, become reduced in frequency to near the normal; but, if over-stimulated, this shortening of the period of rest will in time exhaust the heart.

In giving alcohol as a medicine, it is important to be able to recognize the first evidences of over-stimulation as given by the pulse.

The "whiskey pulse" as it is called, is unnaturally strong, full, frequent, and bounding.

On the brain and nervous system alcohol acts as a stimulant, up to a certain point; beyond that, as a depressant and narcotic.

On the circulation and bodily heat its action would, at first sight, seem to be contradictory. The sense of warmth given by a dose of alcohol seems incompatible with the well proved facts that the bodily heat is, on the whole, lowered by alcohol, and that the power of resistance to cold is weakened by its use.

The physiological explanation is, that the blood-vessels

are dilated by the stimulus of alcohol,—the blood rushes to the surface to fill the superficial vessels, and a feeling of warmth results, which, in a warm or moderately cool atmosphere, remains, and promotes the general comfort ; but, in a cold atmosphere, the supply of blood to the surface being so much larger than ordinary, and perspiration being also increased, while active tissue-changes are checked, heat is abstracted from the body by evaporation at a rate which soon affects the vital powers seriously.

In giving stimulants there are various points to notice by which to judge whether it is doing good or not.

The pulse has been mentioned ; the tongue gives another indication. If a dry tongue becomes moist under the influence of alcohol, it is acting well ; if the dryness of the tongue be increased, it is not, and the same rule applies to the skin. If nervousness is quieted, sleep induced, delirium and subsultus lessened by alcohol, it is acting favorably ; if restlessness and uneasiness follow, or increased delirium, or sleeplessness,—unfavorably.

In cases of sudden heart failure alcoholic stimulants are given hot and concentrated.

Preparations of Alcohol.

Spiritus Rectificatus.

Rectified Spirit.

Contains 85 per cent. of pure ethylic alcohol with 15 of water.

Absolute Alcohol.

Made from the rectified spirit by a lengthy chemical process, in which carbonate of potash and chloride of calcium are used. It consists of 99 parts pure alcohol with 1 of water, and is not kept for sale but used only for pharmaceutical purposes.

Spiritus Tenuior.

Proof Spirit.—Equal parts of alcohol and water, or, strictly speaking, 49 per cent. alcohol.

Alcohol Dilutum.**Dilute Alcohol.**

Equal parts of alcohol and water.

Alcohol.

Contains of absolute alcohol 94 parts by volume (91 parts by weight).

Alcoholic Beverages.**Spiritus Frumenti.**

Whiskey.—Made in the United States from rye and corn, in Scotland from barley, and in Ireland from potatoes.

It has from 44 to 50 per cent. by weight of ethylic alcohol (by volume 50 to 56 per cent.), and contains ethers which are developed in the course of its fermentation; and, even in the best varieties, some traces of fusel oil. Whiskey should be at least two years old before it is used.

It is sometimes necessary or convenient to use alcohol instead of whiskey. The ordinary dose of $\frac{3}{4}$ ss. whiskey is represented by a little over 3 ii. of alcohol, or by $\frac{3}{4}$ ss. of dilute alcohol.

Spiritus Vini Gallici.**Brandy.**

Brandy should be distilled from grapes, but it is also made artificially. It has about the same percentage of alcohol as whiskey. It may be either pale or dark; in the former case it is colored by the cask, in the latter it contains caramel. It should be at least four years old. Brandy has a more sedative action on the stomach than whiskey, and is preferable where there is any tendency to diarrhœa, as it is slightly constipating, containing a little tannin. Both brandy and whiskey are more easily taken, as medicines, if poured over a small glassful of cracked ice; or they may be diluted with carbonated or seltzer water more acceptably than with plain water. Giving them in milk very often causes patients to take a dislike to the milk. They are both used hypodermically, and for this purpose should always be filtered.

Rum.

Made by the distillation of fermented molasses.

Gin.

Distilled from rye or barley, and flavored with juniper berries. If it is pure, it is an efficient **diuretic**, owing to the oil of juniper, but it is rarely pure.

Wines.

Officinal wines are white wine, *vinum album*, and stronger white wine, *vinum album fortius*. They are used in medicinal preparations. White wine contains about 10 per cent. of alcohol, and is made from grape juice without skins, stems, or seeds.

All wines contain various acids and traces of mineral substances. Those which are free from sugar are called "dry" wines.

The red wines—claret, port, etc., are made from colored grapes with the skins, and have considerable alcoholic strength. Port wine, *vinum portense*, contains from 30 to 40 per cent. of alcohol, but is rarely pure.

As **stimulants** and in **narcotic** power these wines stand next to brandy and whiskey. They contain some tannic acid and are **astringent**, causing constipation and disordering the stomach. They also tend to raise the temperature.

Vinum xericum, or sherry, belongs to the dry spirituous wines. It contains 17 per cent. of alcohol, and is usually made artificially. It **assists digestion** if taken during meals.

Sparkling wines, of which champagne is the most important, are bottled before fermentation is complete, and are effervescent, being charged with carbonic acid. They are more **intoxicating** than others in proportion to their strength, are **less stimulating** to the heart, and liable to leave headache and sour stomach as after-effects when freely taken. In small doses they are **gastric sedatives**, champagne especially being so. Given ice-cold and in teaspoonful doses, at short intervals, it may be

retained by an irritable stomach which rejects every thing else. In giving champagne in this way care is necessary to prevent escape of the gas and flattening of the wine. A champagne tap is used, and the bottle held head downward. In the intervals it is kept on ice in the same position.

Sweet wines, including Burgundy and Madeira, are rather trying to the digestion. They disorder the stomach and cause headache. They contain 6 or 7 per cent. of alcohol.

Dry acid wines,—the German and some of the French wines, are stimulant, and do not cause acid fermentation. They contain from 5 to 7 per cent. of alcohol.

Beer, Ale, Porter, Stout,

Contain from 2 to 6 per cent. of alcohol ; also extract of malt, lactic acid, salts of potash and of soda, and aromatics.

Chloroformum (Chloroform).

Chloroform is made by the action of chlorine on alcohol. The crude or commercial chloroform, called chloroformum venale, is purified by an intricate chemical process and called chloroformum purificatum.

Physiological Actions.

Externally applied and allowed to evaporate, chloroform causes a sense of coldness and depresses the terminations of the sensory nerves, acting as an anodyne and producing insensibility to pain. If evaporation is prevented it irritates, reddens, and blisters the skin. These effects are followed by anæsthesia of the part. Given by mouth, chloroform has a hot, sweet taste, and in the stomach produces a feeling of warmth. In large quantities or undiluted it causes violent gastro-enteritis. Medicinally it is given as an **antispasmodic**, **anodyne**, and **carminative**. It enters the circulation through the lungs, stomach, and unbroken skin. It reaches the tissues very rapidly, and exerts its greatest power on the central nervous system. It is excreted partly as chloroform by the kidneys, lungs, mammary glands, and skin, and part is lost in the system.

Symptoms of Poisoning.

In poisoning by chloroform taken internally the symptoms are stupor ; cold skin covered with perspiration ; pulse slow, thready, sometimes almost imperceptible ; respirations at first stertorous, afterwards becoming shallow, irregular, and infrequent. The symptoms come on almost immediately after it has been swallowed, and death may result in a few hours, or may result after a longer time from gastro-enteritis or from inflammation of the trachea.

Treatment of Poisoning.

There is no antidote for chloroform, on account of its extremely rapid diffusibility through the system. The stomach must be emptied ; washed out, if necessary, and cold-water affusions applied to the head, and plenty of fresh air admitted. Artificial respiration should be practised steadily and unremittingly.

The smallest fatal dose recorded is 3 ii.

Dose of chloroformum purificatum, ℥ xv.-xxx. (℥ x. = gtt. lx.).

Spiritus Chloroformi.

Strength of 10 per cent. Dose, 3 ss.-i., well diluted.

Mistura Chloroformi.

Chloroform, 8 per cent., and a small proportion of camphor. Dose, $\frac{3}{4}$ ss.

Chlorodyne.

A proprietary medicine containing chloroform, ether, morphia, cannabis indica, and hydrocyanic acid.

Dose, ℥ v.-xxx. (℥ x. = gtt. xx.), well diluted.

Linimentum Chloroformi.**Chloroform Liniment.**

Composed of soap liniment, 60 parts, and chloroform venale 40 parts.

In the use of the vapor of chloroform as an anæsthetic there are three stages of narcosis: the first, a short period of excitement during which the sensibilities are blunted, though consciousness is not lost; second, the stage of anæsthesia. Consciousness and sensibility are abolished; the pulse is about normal in frequency and slightly weaker; respiration slow, heavy, and stertorous. During this period operations are performed. The third stage is a dangerous one, with profound narcosis; entire muscular relaxation; stertorous breathing, gradually becoming sighing and weak; and complete abolition of reflex actions.

Chloroform is preferred to ether in some cases because it is easier and pleasanter to take; is more prompt in its action; is not so nauseating, and its after-effects pass away more quickly. In obstetrical cases it is preferred because by its use a state of insensibility to pain can be produced without bringing on complete muscular relaxation, which would delay labor.

No fatal cases are known to have occurred in parturient women, although in surgical cases death has occurred quite frequently and with great suddenness, from paralysis of the respirations and heart, and ordinarily chloroform is considered much less safe than ether. In giving chloroform to a patient in labor (which a nurse may be required to do), the face must first be oiled with vaseline to prevent any possibility of blistering.

About 3 ss. of chloroform is poured at one time on a sponge, or piece of lint, and held before the nose in a way that will allow plenty of air to mix with it, as the chloroform should only be in a strength of 3 per cent. with the inspired air when inhaled.

It is only to be inhaled during the existence of a pain, and not in sufficient quantity to lessen uterine contraction. If the pulse weakens, the respirations grow shallow, or the pains become insufficient it is stopped.

It is well to keep the supply safely out of reach in the case of excitable and hysterical patients.

In the treatment of poisoning by inhalation of chloroform vapor, the head is lowered to an angle of about 40° .

Plenty of fresh air is needed, and should be warm, about 80° – 85° F. External heat must be applied, inhalations of nitrite of amyl may be used, and artificial respiration kept up for several hours.

Æther (Ether, Ethyl Oxide).

A colorless, volatile liquid, made by the action of sulphuric acid on alcohol, by a very elaborate process. It evaporates rapidly on exposure to the air, and is very inflammable, as is also the vapor. The odor is very strong, heavy, and peculiar.

Physiological Actions.

Applied to the skin and allowed to evaporate, ether is a **refrigerant** and local **anæsthetic** of such power that minor surgical operations are sometimes performed under its local influence; the part to be operated on—as, for instance, a finger—being sprayed with ether until benumbed, a process which only requires a few moments' time.

Internally it has a strong burning taste, is **irritant** to mucous membrane, and causes salivation through reflex action. In the stomach it acts as a local **stimulant** and **carminative**, and also, by reflex action, as a stimulant to the heart, respiratory organs, brain, and intestines.

It is an **antispasmodic**, **anthelmintic**, and **diaphoretic**. When inhaled it first produces a strong irritation of the throat, with a strangled feeling. The cerebrum is first affected by the use of ether as an anæsthetic; the sensory and motor nerves next; the centres of respiration and circulation in the medulla are the last to become influenced, and continue to act, unless the anæsthetic is pushed too far, when the respirations die away, the heart continuing to beat after breathing has stopped.

The state of the bladder must be carefully watched in all cases after etherization, as there is often retention of urine. External heat must be plentifully supplied, and

the facility with which an insensible patient may be seriously burned by hot-water bottles and bags should be constantly kept in mind. The effects of the ether are allowed to pass off quietly of themselves, plenty of fresh air being secured, any effort at vomiting being best overcome by giving a teaspoonful of very hot water at intervals. If there is no tendency towards collapse, cracked ice in small quantities may be used.

In preparing a patient for etherization, definite orders from the surgeon are always received, and it is only necessary here to speak of the absolute importance of having the stomach, bowels, and bladder entirely empty.

Death from strangulation may be caused by a fragment of vomited food lodging in the windpipe, and the bowels and bladder, if not thoroughly attended to, will empty themselves spontaneously.

Ether is excreted like chloroform, and rapidly.

Preparations of Ether.

Æther Fortior.

Stronger Ether.—Called sulphuric ether. It is the preparation used in anæsthetizing, and contains 6 per cent. alcohol and a little water.

Spiritus Ætheris.

Has 30 parts of ether and 70 of alcohol.

Dose, ʒ i., well diluted with very cold water.

Spiritus Ætheris Compositus.

Compound Spirit of Ether.

Hoffman's Anodyne.

Contains 30 per cent. ether, with alcohol and ethereal oil. It is a **carminative, antispasmodic, and stimulant.**

Dose, ʒ i.-ii., diluted with very cold or iced water.

Spiritus Ætheris Nitrosi.

Spirits of Nitrous Ether.

Sweet Spirit of Nitre.—A solution of nitrous ether in alcohol, made by adding sulphuric and nitric acids to

stronger alcohol, adding also some copper wire, and distilling. Sweet spirit of nitre is volatile and inflammable. It should not be kept long, as it becomes acid with age. It is a **diuretic** and **diaphoretic**, acting by relaxing and dilating the renal and cutaneous vessels. It is also a nerve **sedative** and **antispasmodic**.

The action on the skin is made more prominent by keeping the patient warmly covered in bed, and on the kidneys when kept cool, or out of bed. Like all preparations of ether it should be largely diluted and given very cold, as this lessens the strangling feeling in the throat.

The inhalation of sweet spirit of nitre has caused alarming symptoms—viz. : pallor, weak pulse, muscular weakness, pain about the heart, and headache.

Taken internally, in large quantities, it has in one or two instances caused death.

Dose, ʒ i.— $\frac{2}{3}$ ss.

Preparations of ether are given hypodermically as heart stimulants, and should be injected deeply into the muscular tissues to avoid irritation and formation of abscesses.

Bichloride of Methylene.

An anæsthetic obtained from chloroform by the action of hydrogen, and somewhat similar in its action. It is sometimes used in English surgery.

Chloral.

Chloral is an oily colorless fluid made by the action of chlorine on alcohol. It is not used in medicine. United with water it forms a hydrate which is the chloral of the U. S. P.

Chloral Hydras.

Hydrate of Chloral.

Colorless volatile crystals of hot burning taste and pungent odor; readily soluble in water, ether, or alcohol.

Physiological Actions.

Chloral has **antiseptic** properties and has been so used in a strength of gr. v.— $\frac{7}{3}$ i. of water. A concentrated solution vesicates and is very painful.

Given internally it acts on the nerve centres as a **sedative**, its effect on the brain, under suitable conditions, being that of a pure and perfect **hypnotic**. The sleep it causes resembles natural sleep, coming on quickly and lasting for six or seven hours. The patient may be aroused from it for medicine or nourishment, and falls asleep again, finally awaking refreshed, and without headache or the unpleasant after-effects—such as nausea, giddiness, and constipation—which are commonly found after taking opium. Even if given for a long time chloral is not apt to cause constipation or disturbance of the stomach.

In the sleep of chloral the pupil is slightly contracted, the pulse unaltered or a little slower than normal, the respirations regular, full, and quiet. The cases in which its beneficial action are best seen are cases of insomnia from mental labor, anxiety, or fatigue. It is not an anodyne, having no power to overcome pain unless given in dangerous doses. If so given the after-effects are bad.

The action of chloral is not always satisfactory. With some persons headache, excitement, and even delirium, are caused by medicinal doses.

Symptoms of Poisoning.

In larger doses the respiratory centre is depressed and the respirations become slow, irregular, and shallow. The activity of the vasomotor centre is lessened, so that the vessels dilate generally, and the heart is depressed and weakened not only through the centre in the medulla but also by a direct influence on its own nerve ganglia.

The pulse becomes weak and slow ; in toxic doses it grows rapid and irregular, and in fatal cases feeble and thready, while other symptoms are coma, great muscular relaxation, pupils at first contracted, afterwards dilated, and death results from paralysis of the respirations and heart.

Treatment of Poisoning.

The treatment in chloral poisoning consists in the use of alcoholic stimulants, strong coffee, galvanism, and artificial respiration. The application of external heat is of the utmost importance. Mustard pastes and hot mustard foot-baths may be used, avoiding, however, all measures which might exhaust the patient.

Incidental Effects.

There may be noticed after ordinary doses of chloral, dyspnœa ; redness and swelling of the conjunctivæ ; and eruptions of the skin, most frequently a simple erythema which seems to follow preferably the course of the large nerve trunks. Sometimes the eruption takes the form of wheals, and a papular eruption has also been observed. These disorders are often attended by some rise of temperature, and desquamation sometimes results. It is supposed that they, as well as the more alarming ill effects of chloral, are greatly, if not altogether, due to impurities of the drug.

The great danger of chloral is the sudden paralysis of the heart, which may occur even after ordinary medicinal doses, and without warning. This attaches so much uncertainty to its action that it is impossible to express caution too strongly in regard to using it without orders. The patient may be sleeping quietly, but suddenly becomes restless and passes into a state of syncope. The danger cannot be considered past until from 60 to 100 pulse beats can be counted continuously without any irregularity in strength.

The habitual use of chloral may become a disorder almost as grave as the opium habit. Those who have formed this habit are usually excitable in manner ; hurried and voluble in speech ; nervous and wakeful at night ; melancholy and low-spirited during the day, and subject to vertigo and ringing in the ears.

The eyes are brilliant and restless ; the appetite capricious or lacking altogether ; digestion disordered ; the heart action weak and irregular, and the secretion of bile deficient.

Dose, gr. v.-xx., diluted only moderately with water or a weak syrup.

Butyl Chloral Hydrate.

Croton Chloral.

A crystalline body formed by the action of chlorine on aldehyde; sparingly soluble in water, readily so in glycerine. It is said to resemble chloral in its action, but to be more depressing and less efficient. A feebler poison, more disagreeable in taste, and having a special anæsthetic effect on the fifth nerve.

Dose, gr. v.-xx., in syrup or glycerine.

Metachloral.

A solid substance prepared by acting on chloral hydrate with sulphuric acid, and used as a counter-irritant and local anæsthetic.

Chloral Camphor.

Equal parts of camphor and chloral, used as an external application for the relief of pain.

Paraldehyde.

Made by treating aldehyde with sulphuric or nitric acid. Aldehyde in chemical constitution is between an alcohol and an acid, and is produced by taking away two atoms of hydrogen from an alcohol.

Paraldehyde is a colorless liquid solidifying below 50° F., and soluble in ten parts of water. It has a strong ethereal odor and unpleasant taste. It is a pure **hypnotic**, like chloral, having about half its power and many of its qualities without the dangers of chloral.

In its action the cerebrum is first affected, and sleep induced with no primary stage of excitement. The medulla is next affected, and next the spinal cord. It has little or no control over pain. In medicinal doses it is not paralyzing to the heart, and does not, as a rule, leave headache or unpleasant after-effects.

It is irritant to mucous membrane, and is likely in

time to impair digestion. It gives an unpleasant odor to the breath, and if used for a long time it may produce nasal ulcers, cerebral congestion, and vasomotor paralysis. It sometimes causes erythema or reddening of the skin.

Dose, ℥ xxx.-ʒ i. (℥ x. = gtt. xxv.), in water, either plain or with simple syrup. It must be well diluted.

Sulfonal.

Sulfonal is an alcohol derivative, belonging to what are chemically known as the sulphur compounds of alcohol. It has **hypnotic** action. It is a white, odorless, and tasteless powder, almost insoluble in water, requiring from 100 to 150 parts of cold, and 18 or 20 of boiling, water to dissolve it.

In favorable instances it produces a physiological sleep, which lasts for several hours, with no unpleasant after-effects. With susceptible cases sleep has been known to come on in an hour or little over, but as a usual thing sulfonal is rather slow in action, sometimes not taking effect for several hours, sometimes even not until the next day; and in these delayed cases, sleep, when it does come, is prolonged and dull. In a certain number of cases sulfonal fails to act satisfactorily, and, in these, nausea, mental excitement, vomiting, dizziness and staggering, headache and depression have been observed after its use.

It may be given dry on the tongue, but is best given in hot milk, or soup, or beef-tea, with plenty of salt. Large amounts of warm fluids favor its absorption, and as it is often slow in action it is better given early in the evening. Dose, gr. xx.-xxx.

Hypnone.

A new **hypnotic**, produced chemically as a derivative of alcohol. A colorless liquid having a strong odor of almond or orange. It is not dangerous, and leaves no ill after-effects except a disagreeable odor to the breath.

Dose, ℥ v.-x., in capsule, being insoluble in water.

Urethan.

A combination of carbonic acid and ethylic ether, lately introduced as a **hypnotic**. Its action is rather uncertain, and resembles paraldehyde. It has no power over pain, is not depressing or irritating to the stomach, and under favorable circumstances has induced sleep in 15 or 20 minutes, and prolonged it for 6 or 8 hours. It is soluble in water, and may be given hypodermically, as it is not irritating.

Dose, gr. x.-lx., best given in pellet, wafer, or capsule.

Amylene Hydrate.

An alcohol derivative, with properties as a **hypnotic**, its power being considered intermediate between chloral and paraldehyde. It is a clear liquid, soluble in 8 parts of water, and readily so in alcohol. It is agreeable to the taste and not dangerous, having, in medicinal doses, no depressing effect. Very large doses paralyze the respiratory centre, and also the heart.

Dose, ʒ i.-iss.

Amyl Nitris (Nitrite of Amyl).

Nitrite of amyl is produced by distilling nitric acid with amylic alcohol (fusel oil), sulphuric acid, and copper, and purifying with alkalis by various intricate processes. An ethereal liquid of yellow color and fruity odor.

It is given by inhalation usually. The vapor enters the blood through the lungs with extreme rapidity, reaching the tissues and producing its characteristic effects almost instantaneously.

Nitrite of amyl is a **motor depressant**. Its leading physiological action is upon the spinal cord and the circulation, other effects being secondary. The motor centres in the cord are directly and strongly depressed, and a similar but less powerful action is exerted on the motor nerves and muscles. The sensory nerves are but little affected.

Two effects are produced on the circulation. First, the muscular walls of the arteries are paralyzed ; the vessels dilate, and the blood pressure falls. Second, by this reduction of the blood pressure the resistance which was met by the left ventricle in discharging its contents disappears, with consequent relief to the heart, which has at once less work to do, with the same, or increased strength, to do it. The heart-beats are increased in number—not always in force,—and the depression of the inhibitory apparatus gives the beats an energetic and thumping character.

In this way nitrite of amyl acts as a **heart stimulant**, not by actually strengthening the heart itself, but by clearing away obstructions to a free circulation which increased the work of the heart and exhausted it by compelling it to put forth abnormal exertions.

From 2 to 5 drops, inhaled, will give this result, with the attendant symptoms of fulness and throbbing of the head, amounting sometimes to severe pain.

If inhalation is carried beyond this there will be vertigo ; flushing of the face, with visible pulsation of the carotids ; deep, labored respiration ; tingling of the surface ; dilatation of the pupils ; restlessness and anxiety. These symptoms disappear rapidly on the withdrawal of the drug, and the heart-beats fall to normal.

It is stated that all objects look yellow to one fully under the influence of nitrite of amyl.

Larger doses increase all these symptoms in severity, to the point of grave depression, with cold extremities ; heavy clammy perspiration ; slow, almost imperceptible pulse ; irregular respirations ; and severe persistent headache. There may sometimes be convulsions. Toxic doses paralyze the heart and respiratory centres. In cases of poisoning by nitrite of amyl all the blood of the body becomes a uniform hue, which is described as being nearer a chocolate color than ordinary venous blood.

The poisonous dose is not certainly known. A dessert-spoonful taken internally has been recovered from, by the aid of emetics, and hypodermically 3 ii. have been given in an hour and a half without unpleasant symptoms.

In giving inhalations of nitrite of amyl, from 3 to 5 drops are placed on a handkerchief, or piece of lint or cotton, held near the nose, and withdrawn as soon as fulness in the head or flushing of the face is produced. The symptoms usually are a little more prominent for a moment or two after the drug has been withdrawn. It has been given hypodermically and also by mouth. In the latter way the dose is ℥ ii.-iii. on sugar (℥ x. = gtt. xxx.).

Nitrite of amyl escapes by the kidneys. The urine is increased in amount and in acidity, and may sometimes contain sugar.

Nitro-Glycerinum (Nitro-Glycerine), Trinitrine, Glonoin.

Made by dropping glycerine in a mixture of sulphuric and nitric acids kept ice-cold; separating by pouring the product into water, washing, and evaporating to a proper density. A colorless, oily liquid, odorless, with sweet, pungent taste; slightly soluble in water and freely so in oils, alcohol, and ether.

If heated in a close vessel, or if subjected to percussion, it will explode. Mixed with porous silica, nitro-glycerine constitutes dynamite. It is never used undiluted in medicine.

Physiological Actions.

Nitro-glycerine is the most powerful of the nitrites. Its physiological actions resemble very strongly those of nitrite of amyl but in a greater degree, and the effects, while less prompt in appearing, are more lasting, being developed in from three to five minutes, and continuing for about forty-five minutes.

Depression of the motor centres, dilatation of the blood-vessels and lowering of the blood pressure are the chief factors in the action of nitro-glycerine. The first signs manifest are perspiration and quickened heart

action, with, sometimes, a dicrotic pulse; disturbed respiration, flushed face, vertigo, constriction of the head and throat, occasional nausea, throbbing of the carotids, and headache, which is of a severe frontal type, and lasts sometimes for hours after other effects have worn away. In some cases albumin in the urine is diminished by nitro-glycerine.

Symptoms of Poisoning.

Poisonous doses cause heart failure, with slow, intermittent, and very irregular pulse; dilated pupils; a feeling of weakness in the epigastrium; and intense headache, with a feeling as of a tight band around the head.

Symptoms of poisoning not resulting in death have followed doses of from two to ten drops of the alcoholic solution.

Nitro-glycerine is given in tablets, or in the form of the alcoholic solution, strength 1 per cent. This preparation should be constantly renewed, as it decomposes with age. In the case of an unconscious patient it may be dropped on the back of the tongue.

Dose, ℥ ss.-ii.; iii.; in a little glycerine (℥ x. = gtt. xxv.).

Carbolic Acid, Phenol, Phenyl Alcohol.

Carbolic acid is produced by distilling coal tar at a high temperature—between 356° and 374° F. It is not a true acid, as it does not turn blue litmus paper red, but it is one of the aromatic series of carbon compounds, and resembles alcohol in chemical constitution. It is neutral in reaction, is soluble in twenty parts of water, and freely soluble in glycerine, alcohol, ether, etc. The crystals deliquesce on exposure to air, and can be readily melted for use in making solutions by standing the bottle in a vessel of hot water. A solution for surgical purposes must be perfectly clear. If it is cloudy or contains globules it is not thoroughly mixed, and will be far more irritating than otherwise.

Physiological Effects.

Carbolic acid applied locally is **antiseptic, irritant, and anæsthetic**. In concentrated form it is a severe **caustic**. The vapor, internally, is stimulant and disinfectant. Taken into the stomach the acid arrests fermentative changes, and in large doses is a powerful irritant and narcotic poison, acting on the respiratory and vasomotor centres, which it quickly paralyzes. It is rapidly absorbed by the unbroken skin, the subcutaneous tissues, the mucous surfaces, wounds, the respiratory passages, and the stomach, and is excreted by the urine, to which it gives a dark, smoky, or greenish color; also by the saliva, which is increased in quantity.

Carbolic acid is a **deodorizer and disinfectant** as well as an antiseptic. It is very destructive to low forms of life if used in sufficient strength, but in solutions of a strength which may be safely used externally, as in the dressing of wounds, or internally, as for vaginal douches, it only prevents the development of germs, and does not kill their spores.

Symptoms of Poisoning.

The first signs of poisoning from the use, either external or internal, of carbolic acid, are: giddiness, tension of the head, and, usually, the dark color of the urine. More serious evidences of danger are: contracted pupils; pallor; embarrassed breathing; a small, slow, feeble pulse; ringing or singing in the ears; and sudden vertigo.

When swallowed in poisonous doses there is at once a hot burning sensation from mouth to stomach, and the symptoms come on immediately. The lips and lining of the mouth are white and hardened; there is nausea, with violent pain and vomiting of frothy mucus; the lips, ears, and eyelids are livid; the pupils contracted and insensible to light. The skin is cold and covered with clammy perspiration; the pulse very feeble and almost always rapid, —120—though it has been known to fall to 40 or 50 a

minute ; the respirations are rapid, irregular, and difficult, sometimes stertorous, sometimes gasping, and the breath has the odor of the acid. Insensibility, coma, and collapse follow quickly in succession, and death may occur within a few minutes from paralysis of the respirations, or, if a very large amount has been taken, from paralysis of the heart. The average time of death is between one and ten hours, and the fatal dose may range from $\bar{3}$ i. to $\bar{3}$ ss.

Treatment of Poisoning.

In the treatment of this poison emetics are not always of use, owing to a paralyzed condition of the stomach, and the stomach-pump should be used. The chemical antidotes are sulphate of magnesia or of soda, or syrup of lime, and they should be freely given ($\bar{3}$ iii. of the sulphates have been given) as long as the patient can swallow, or until there is improvement. Lime water and milk in equal parts may be given, and vegetable demulcents—as flaxseed tea, but no oils or glycerine, as they dissolve the acid and aid its absorption. Atropine is a physiological antagonist, maintaining respiration ; and cardiac stimulants may be required, given hypodermically.

Carbolic acid is in general use as an antiseptic and disinfectant, though the manner of its employment has been greatly modified and changed in some respects from that of former years. For the practical work of the nurse in cleaning and disinfecting it stands high, and is used in a strength of 1 in 20 or 1 in 40. Articles to be disinfected, viz.: soiled clothing, sputum cups, etc., must soak in it for varying lengths of time, according to the nature of the case.

Carbolic acid may be used for clothing, as it does not stain. In the sick-room its strong odor makes it unpleasant to many persons, and this odor may be covered by using oil of peppermint or cinnamon.

Dose, $\bar{\text{M}}$ i.-iii. ($\bar{\text{M}}$ x. = gtt. xviii.), in glycerine or simple syrup—well diluted.

Crude carbolic acid is used as a **disinfectant**.

Sulpho-Carbolate of Sodium.

A derivative of carbolic acid made by the action of sulphuric acid and carbonate of sodium. It is a recent preparation, and was composed with a view of obtaining the antiseptic and antipyretic action of carbolic acid, without its caustic and depressing qualities. It is used as an external application, and is given internally. Dose, gr. x.-xxx.

Dobell's solution contains carbolic acid, borax, bicarb. of soda, and glycerine.

Creasote.

Creasote is produced by the distillation of wood tar, and is a very complex substance, containing many hydrocarbons, some of which are closely related to carbolic acid. Creasote is not as poisonous as carbolic acid, nor so active as a germicide and antiseptic, but many of its physiological properties are similar, and its value medicinally is about the same, though it is oftener used.

It is a **stimulant, expectorant, and gastric sedative**. In the stomach it checks fermentation, yet does not interfere with digestion. The vapor is **disinfectant** and **deodorant**. When inhaled it is stimulant, and when ordered in this way it is convenient to use a small cone, which may be easily improvised.

Only a few cases of poisoning are recorded. The symptoms and treatment are like those of carbolic acid.

Dose, ℥ i.-iii. (℥ x. = gtt. xx.).

Aqua Creasoti. **Creasote Water.**

Strength, 1 per cent. Dose, ʒ i.-iv.

Acidum Salicylicum (Salicylic Acid).

Salicylic acid is prepared synthetically by treating a solution of carbolic acid in caustic soda with carbonic

acid, at a moderate heat. It is also found in nature in oil of wintergreen, in sweet birch, and in the bark of several varieties of willow. A dull white powder, readily soluble in alcohol and glycerine, but almost insoluble in cold water. In hot water it is more readily dissolved, and borax and boric acid assist the solvent action.

Physiological Actions.

Salicylic acid is an **antiseptic** and **disinfectant**, 1 part in 60 killing developed bacteria, and a strength of 1 per cent. preventing their development. It is a **diaphoretic** and **antipyretic** in fever, but does not lower the temperature in health. It is not much used in this way, as other antipyretics are more lasting in influence and less depressing than salicylic acid.

After an antipyretic dose there is slight temporary stimulation of the heart; the face and eyes are suffused and there is a feeling of warmth, followed by perspiration. These effects are visible in ten or fifteen minutes, and following them there is a reduction of the strength of the heart.

Salicylic acid has a stimulant and disinfectant action on the kidneys and urinary apparatus, and increases the acidity of the urine. In some cases it irritates the kidneys and causes hæmaturia or albuminuria.

In small doses it stimulates digestion, the heart, and respiration, but in large doses it depresses the two latter, lowers arterial tension, and causes nausea and vomiting.

Incidental Effects.

In giving salicylic acid the first evidences of over-dosing which are to be looked for, are buzzing and roaring in the ears, and fulness of the head. Increased doses bring severe headache, perspiration, deafness, and various disturbances of vision; and, if still continued, these symptoms are all intensified. The respirations become deeper and are labored, rapid, and irregular—sometimes the most violent respiratory efforts being made to overcome the dyspnœa; the pulse is slow and weak, and

there is great restlessness, with a delirium characterized by hallucinations of vision, and which is sometimes cheerful, sometimes melancholy, and sometimes wildly maniacal. The urine may be dark olive-green, and involuntary evacuations of the bowels may take place.

The depression of the circulatory system causes a relaxed state of the skin, and bed-sores are liable to appear rapidly. Eruptions of the skin, somewhat resembling that of urticaria, may appear even after medicinal doses.

Salicylic acid is not considered an active poison to man. Cases of death from its use have been recorded, but they are not all well verified, and poisonous symptoms almost always disappear, on the withdrawal of the drug, in a few days, or a week.

Salicylic acid is transformed in the blood into salicylate of sodium, and is slowly excreted by the urine, perspiration, saliva, bile, and mucous secretions.

Dose, gr. v.—3 i., moderately diluted.

Sodii Salicylas.

Salicylate of Soda.

Made by the action of salicylic acid on carbonate of sodium. It is readily soluble in water; has the same physiological actions as salicylic acid, and is less irritating. It has no antiseptic qualities in external use. It is considered a specific in rheumatism, and in giving a course of it the same incidental symptoms mentioned under salicylic acid are to be looked for.

Dose, gr. v.—3 i., moderately diluted.

Salol.

Salicylate of Phenol.

A preparation composed of two thirds salicylic and one third carbolic acids. It is insoluble in water and is given in compressed tablets.

Salol is **antiseptic** and **antipyretic**; **sedative** to the brain and spinal cord, and with some power as an **analgesic**. It is an active **diaphoretic**, and though in some cases it has a somewhat depressing effect, yet its

action is usually not marked by as much exhaustion as that of many of the new antipyretics, and when the temperature rises after being reduced by salol, it does so without chill or chilly feelings. Its physiological effects and medicinal uses are in general very like those of salicylic acid. It is not considered poisonous, and is, like iodoform, used as a topical application.

Dose, gr. v.—xv.

Salicin.
Oleum Gaultheriæ. } See Organic Materia Medica.
Thiersch Powder.

A combination of salicylic and boric acids, usually ordered in the proportion of $\frac{2}{3}$ ss. of the latter to 3 ss. of the former. Added to one quart of water it forms an antiseptic solution, of moderate power, which is not irritating or poisonous when freely used. The proportions of a Thiersch powder are not invariable, as Prof. Thiersch does not confine himself to one formula.¹

Naphthalin.

A coal-tar derivative with the taste and odor of tar; insoluble in water, soluble in ether, hot alcohol, and benzol.

It is **antiseptic** and destructive to low forms of life. Internally it is a **stimulant expectorant**, and acts as a **disinfectant** to the alimentary canal. The latter action is a local one, as it is not readily absorbed into the system, but is mostly carried away by the fæces; that part of it taken up by the blood being excreted by the urine partly unchanged and partly as naphthol. Externally it is used as an antiseptic.

Naphthol.

Derived from naphthalin; soluble in alcohol, ether, chloroform, oil, and vaseline. It is more easily absorbed than naphthalin, and causes vomiting, hæmaturia, convulsions, and unconsciousness.

¹ Charles Rice, Ph.D.

It is used as a local application in an ointment of a strength of 1 to 5 for adults, and 2 per cent. for children.

Hydro-Naphthol.

A derivative of naphthalin, antiseptic and non-irritant. It is claimed that in antiseptic power it stands next to bichloride of mercury, and is not poisonous. Soluble in cold water in a strength of 1 in 2,000. A saturated solution made with hot water has a strength of 1 in 1,000. It is used in ointments, strength 1 in 50. It is not in general use.

Creolin.

Creolin is a coal-tar derivative, from which the poisonous hydrocarbons have been eliminated. It is allied to carbolic acid, creasote, etc., but its exact chemical composition is kept secret. It has been introduced as an **antiseptic**, and is used in solutions of 1 and 2 per cent., making a milky-looking fluid, as it is not thoroughly soluble in water. It has been highly recommended as a **germicide** and antiseptic, but the results in general surgery after its use are not always satisfactory.

Chinolin.

Chinolin is a derivative of cinchona bark, from which it is named, and is also found in coal-tar oil. It is made synthetically by the action of glycerine on nitrobenzol and aniline. It is a colorless oily liquid, and on exposure to the air turns dark. Like an alkaloid, it combines with acids to form salts. It is **antiseptic**, and in 2 per cent. solution prevents the growth of germs.

The taste and odor are very disagreeable. It resembles quinine somewhat in its **antipyretic** action. After a full dose there is a short preliminary stage of excitement, with increased pulse and a feeling of warmth, followed by perspiration, fall of temperature, slow and weak pulse, and lessened respirations. In large doses it diminishes reflex action and causes dyspnoea, paralysis, and collapse. Only one salt, the tartrate, is used medicinally.

Chinolin Tartras.

Dose, gr. v.-xx., may be given with peppermint water.

Chinolin is not in general use, and is here placed before some of the more practically important antipyretics in an introductory way. Many of these new medicines, which are synthetically prepared in laboratories, are the results of experiments made in the attempt to produce an imitation of quinine, and different ones are derived from chinolin.

Antipyrin.

Antipyrin is a coal-tar derivative, being prepared from chinolin. It is an alkaloidal body, combining with acids to form salts. A whitish, crystalline powder of slightly bitter taste, soluble in water in a proportion of ten parts to six parts of water.

Physiological Actions.

When first introduced it was a proprietary medicine and was known principally as an **antipyretic**. With further use and investigation other therapeutic qualities have been manifested.

It is a general nerve **sedative** and **anodyne**, having a considerable degree of power in the relief of pain in various conditions of nervous origin. It is slightly **antiseptic** and **disinfectant**, **diaphoretic**, and has some **diuretic** action. It is also credited with being to some extent a **hæmostatic**. Antipyrin does not lower the normal temperature, but in fever its action is very marked. There is a short period of stimulation, with flushing of the face, a feeling of heat, and increased action of the heart. In about half an hour or more perspiration breaks out and usually becomes very profuse. The pulse is then slowed, but not always weakened. The skin is cool; there may be chilly feelings, and the temperature falls from one to several degrees, according to the amount taken, and remains down for a length of time, also proportioned to the dose—usually two or three hours, and often longer.

There results very often—especially in subjects weakened by a long illness—a decided state of depression, sometimes so marked as to be alarming, and the pulse, though not always weakened, is in some cases seriously so. The use of antipyrin in acute illness often causes nausea and vomiting, though it is not a gastric irritant in any special sense, but in small doses **tonic**, increasing the appetite. Symptoms which indicate danger in giving antipyrin are cyanosis, muscular weakness, disturbed and rapid respirations, weakened irregular pulse, dyspnœa, and sensations of heat over the body. Collapse may result from its use, and death in one instance followed the administration of fifty odd grains. An eruption of the skin frequently occurs, with some constitutional disturbance and considerable suffering and annoyance from the itching, which is severe. It lasts for several days, and in the majority of cases resembles the measles rash; but sometimes appears as a general and intense erythema, with swelling of the face, especially about the eyes, burning sensations, and rise of temperature. Antipyrin has been given hypodermically, but is irritant and liable to cause abscesses. If so given it should be injected deeply into the gluteal muscular tissue.

Dose, gr. v.–xx., diluted moderately. It may be given in a little wine, or iced brandy and water; and to children, in syrup.

Antifebrin (Acetanilid).

A neutral substance derived from anilin by the action of glacial acetic acid. A colorless crystalline powder of slightly burning taste, soluble in alcohol, but not readily so in water.

Its medicinal qualities are very similar to those of antipyrin, it being **antipyretic**, **analgesic**, and a nervous **sedative**. It has some differences of action. It diminishes the irritability of sensory nerves, lessens the reflex action of the spinal cord, raises arterial tension to some extent, and slows the heart correspondingly. The

reduction of temperature by acetanilid takes place rather more slowly than that caused by antipyrin—sometimes twice as much time being required.

The effects last longer—six or seven hours—and the fall is sometimes, though not always, accompanied by perspiration rather less profuse than that produced by antipyrin. The lowering of the temperature is not supposed to depend on this diaphoresis, as experiments show that one sometimes follows without the other.

The antipyretic action of acetanilid is occasionally followed by cyanosis, and in rare cases by collapse, though it is usually considered less apt than antipyrin to produce severe depression, and in the majority of cases its use leaves no ill after-effects and does not nauseate. It has **diuretic** action and is a cerebral stimulant, while antipyrin depresses the brain. A poisonous dose destroys the ozonizing function of the blood.

Incidental effects noticed sometimes after its use are deafness, ringing in the ears, dilatation of the pupils, and an eruption similar to that caused by antipyrin.

Dose, gr. v.–xv. It may be given in dilute alcoholic solution, and, like many remedies to-day, is put up in compressed tablets.

Resorcin.

Resorcin is obtained from galbanum, a resin, by the action of alkalies. It is also made from carbolic acid, thus belonging to the phenol group or derivatives of coal tar. It occurs as white crystals with an odor resembling carbolic acid, and is soluble in water, and also in alcohol. It is **antiseptic** and **disinfectant**, inferior, however, in these respects to carbolic acid. It has considerable **antipyretic** action, in large doses, causing free diaphoresis with reduction of the pulse and temperature. The pulse may, within an hour, be slowed by as much as one third its former number of beats, and the temperature fall three or four degrees, to remain down for from two to four hours, when it rises again rapidly. While rising there may be chilly feelings, or a distinct chill.

Doses which produce these results, viz., gr. xxx.-lx., cause also, as preliminary symptoms, dizziness, ringing in the ears, frontal headache, trembling, and quickened respirations. With the breaking out of perspiration these disturbances die away. No fatal case of poisoning is known. In one case, where 120 grains were taken, giddiness, and a feeling as of the pricking of pins came on immediately. Unconsciousness followed, with sub-normal temperature and thready pulse.

The chief action of resorcin is upon the nerve centres, and it has been shown experimentally that very large doses paralyze the heart.

Dose, gr. ii.-v.

It is used in an ointment, strength from 5 to 30 per cent.

Pheno-Resorcin.

A mixture of carbolic acid and resorcin, in the proportion of two thirds of the former and one third of the latter. Its qualities have not been thoroughly tested.

Phenacetine.

A new preparation belonging to the phenol group ; a decided **antipyretic**, being also **antiseptic**, **sedative**, and **analgesic**. After large doses profuse sweating is the first result, appearing in from thirty to fifty minutes, and in one or two hours the temperature begins to fall, reaching its lowest point in about four hours. The reduction is quite marked, averaging about 3° , while a fall of 5° or 6° has been known. Some depression may follow—not severe enough usually to be alarming,—with weak and chilly feelings and weakened pulse. The rise of temperature is more gradual than the fall. In comparison with the activity of other antipyretics, ten grains of phenacetine are said to equal fifteen grains of antipyrin or quinine, and thirty grains of salicylate of soda, and to be equal in power with antifebrin, though less rapid in action and more enduring in its effect.

An eruption of the skin sometimes occurs in anæmic patients.

Phenacetine is almost insoluble in water, and is given dry on the tongue, or in compressed tablets, or capsules.

Dose, gr. iii.-x.

Exalgine.

A preparation introduced by French physicians, derived from acetanilid. It has **analgesic** power, and the name was given with reference to this quality, and does not describe its chemical constitution, as do many of the names of new remedies. It is **hypnotic** and **anodyne** and comparatively free from ill after-effects.

Its action in the relief of pain is rapid. In some cases, dizziness, trembling, weakness of the knees, and loss of muscular power in the eyelids have appeared almost immediately after its administration, passing off in a short time.

It is given dry on the tongue, in powder or in tablets.

Dose, gr. v.-x.

Hydroquinone and Pyrocatechin.

Synthetic alkaloids, made in imitation of quinine, and resembling it in chemical constitution, while in physiological actions they are similar to resorcin.

They have some antipyretic and antiperiodic qualities, but for all practical purposes they are inferior to quinine, and are little used.

Kairin and Kairolin.

Thallin and Acetphenetidin.

Synthetic alkaloids of coal-tar derivation, resembling quinine more or less in chemical composition and in antipyretic action. They are all depressing to the heart and nervous system, and are only used experimentally.

Pyridine.

Pyridine is found in nature as one of the principles of tobacco-juice, and is imitated in chemistry, and derived from chinolin. It is a volatile liquid with strong aro-

matic odor. It gives off, at ordinary temperatures, a vapor which is used medicinally, having a stimulant effect on the respirations and on the spinal cord. On the heart it has an influence resembling that of digitalis, increasing the strength of the systole.

Dose, ℥v.-xx.

Saccharin.

Saccharin is a substance produced by a very complicated chemical process from a coal-tar product called toluene. It is the sweetest of known substances, being between two hundred and three hundred times sweeter than sugar, but in chemical constitution it is an acid.

It is not a food, like sugar, nor a medicine, as it has no special effect on the system. It may be used instead of sugar in diseases where sugar is forbidden, and may also be combined with quinine, the bitter taste of which it entirely disguises.

It has antiseptic power.

Oleic Acid.

A fluid fatty acid made from olein, the fluid principle of oils and fats, by the action of heated steam. It is used in the preparation of medicinal ointments called oleates, two of which are officinal, the oleate of veratrum viride, strength 2 per cent., and the oleate of mercury, strength 10 per cent.

The oleate of zinc is also used.

Petrolatum.

Vaseline.

Vaseline is a semi-solid substance obtained from petroleum by distillation and purification. It is the simple ointment of the pharmacopœia, and is used alone as an emollient, and also as the basis of various ointments.

Glycerinum (Glycerine).

Propenyl Alcohol.

Glycerine is obtained by the reaction of fats and fixed oils with watery alkaline fluids. Chemically it is classed with the alcohols. It is always set free in the process of soap making as a waste product, and so made is purified and sold, though the larger part of the glycerine in commerce is manufactured directly by the decomposition of fats by heated steam.

Glycerine absorbs water from the air and mixes with water in all proportions. If pure it cannot become rancid.

Applied externally it is unirritating to the sound skin, but painful if there are any abrasions.

It is slightly **stimulant** and **antiseptic**, and tends to make the skin dry and brittle. It is readily absorbed when applied externally.

Internally it has no special effect on the stomach, but is supposed to have some nutritive power. It is produced normally in the intestines during the digestion of oils and fats. If administered in free doses it has a **laxative** action, and for this purpose is given alone, or in combination with castor oil, in doses of $\frac{z}{3}$ ss.-i.

The laxative action is very notable when glycerine is administered as an enema; a small amount— $\frac{z}{3}$ ss.-ii.—acts quickly and satisfactorily.

Glycerine suppositories, lately introduced, are also, in most instances, very efficacious.

PART II.

THE ORGANIC MATERIA MEDICA.

THE VEGETABLE KINGDOM.

ARRANGED UNDER BOTANICAL DIVISIONS OR NATURAL ORDERS.

Nat. Ord. Ranunculaceæ.

Aconitum (Aconite).

Monk's-hood, Wolfsbane.

Aconite is a tall perennial plant bearing a spike of blue flowers ; found native in Europe, and cultivated in the United States. The officinal portion is the root, which is from 3 to 4 inches long, about $\frac{3}{4}$ inch in diameter at the base, and tapers to a fine point. It is brown in color, externally, and has been mistaken for horse-radish, but the latter is whitish, does not taper gradually but has almost the same diameter for several inches, and has a strong odor when scraped, which aconite root has not.

There are several varieties of the plant, all more or less poisonous.

Physiological Actions.

Aconite applied locally to the skin or mucous membrane acts on the terminations first of the sensory and

next of the motor nerves, as a **depressant** or **sedative**, and causes tingling followed by numbness and insensibility.

Taken internally aconite is **sedative** to the heart and respirations ; is **diuretic** and **diaphoretic**, and **reduces temperature**. It has no effect on the brain. Medicinal doses, given close together, reduce the frequency, force, and tension of the pulse, produce a gentle perspiration, and increase the amount of urine. Respiration becomes slower and deeper ; the temperature falls. The tendency of the pulse under the influence of aconite is to become small, compressible, and weak.

Larger doses, or a single full medicinal dose, produce a tingling feeling, usually first noticeable in the lips or extremities : or, if the impression be decided, the tingling may be felt over the whole body.

There may be also a raw, irritable, or constricted feeling in the throat, and difficulty in swallowing, caused by anæmia of the throat. There is muscular weakness ; giddiness and disorders of vision may be produced, especially if any exertion is made ; the respirations are diminished, and the pulse may fall to 30 or 40 a minute.

The first effects of medicinal doses are usually shown in half an hour, and the symptoms mentioned will pass off in three or four hours. After poisonous doses, if large, death may occur immediately from instant paralysis of the heart-muscles ; or the symptoms may come on in a few moments and death occur soon after, the average time being between three and four hours.

Symptoms of Poisoning.

The first symptom of poisoning is the characteristic tingling, which is diagnostic of every variety and preparation of aconite.

The pulse fails rapidly, becoming weak, irregular, intermittent, and slow ; the respirations are shallow, weak, and sighing, irregular and slow. There is anæsthesia of the surface and great muscular weakness ; the tongue and breath are cold ; the skin covered with a cold sweat.

The face has an anxious look and is sunken and livid. The eyes are glaring, the eyeballs protruding; the pupils are generally dilated. The voice is suppressed. There may be vomiting, although it does not always occur. The mind usually remains clear, but there are sometimes convulsions, and in these cases stupor and unconsciousness may be present. In the latter stages of collapse the special senses may be lost, especially the sight.

Treatment of Poisoning.

The first thing necessary is to empty the stomach and wash it out with the stomach-pump. Hot and concentrated alcoholic stimulants are given; external heat applied; the patient's head lowered beneath the line of his feet by taking out the pillows and elevating the foot of the bed; and absolute quiet and rest maintained. Artificial respiration may be practised, and cardiac stimulants given hypodermically.

Atropine is a physiological antagonist, stimulating respiration, and ammonia has the same effect. Digitalis counteracts the depression of the heart, but acts slowly, while aconite is exceedingly rapid in action.

Precautions.

The pulse should always be taken before giving a dose of aconite, and respirations and temperature watched. Any possibility of cold air or draughts must be guarded against, the skin being relaxed, and no exertion on the part of the patient—such as sitting up in bed—allowed.

Preparations of Aconite.

Abstractum Aconiti.

Made from the root. Dose, gr. i.

Extractum Aconiti.

Made from the leaves. Dose, gr. $\frac{1}{4}$ – $\frac{3}{4}$.

Extractum Aconiti Fluidum.

Dose, ℥ i.–ii. (℥ x. = gtt. xxv.).

Tinctura Aconiti.

Made from the root. Strength, 40 per cent., or $\frac{2}{3}$ vss. in Oj. Dose, \mathbb{M} i.-iv. (\mathbb{M} x. = gtt. xxv.), in water.

Fleming's Tincture of Aconite.

Made from the root. Strength, 79 per cent., or $\frac{2}{3}$ xss. in Oj. Dose, \mathbb{M} ss.-ii., in water (\mathbb{M} x. = gtt. xxv.).

Aconitine.

An alkaloid or active principle obtained from aconite. Dose, gr. $\frac{1}{200}$.

Aconitinæ Oleatum.

For external use, strength 2 per cent. St. Jacob's oil, a quack medicine, contains aconite.

Staphisagria (Stavesacre).

The dried ripe seeds of delphinium staphisagria. They possess four alkaloids, one of which, delphinine, is closely allied to aconitine, resembling it strongly in action. It is even more depressing. The only use of staphisagria is as a parasiticide. The preparation for this purpose is called delphine.

Podophyllum (May Apple; Mandrake).

The dried rhizome¹ and rootlets of the May apple, a perennial herb of the Northern and Middle United States. An alkaloid, berberine, and two resins, are the active principles.

Physiological Actions.

Podophyllum is an active, **cathartic**, with **chologogue** properties. Its actions are shown not only when taken internally, but also when applied to a broken surface or given hypodermically. It has a bitter acrid taste, and causes slight salivation, irritation of the stomach, nausea, and griping pains. In large doses it causes severe colic. The purgative action is very slow, requiring ten hours or more, and is due to stimulation of the

¹ Root stock.

intestinal glands and of the muscular coats of the intestine; also to a stimulant action on the liver, with a decided increase in the flow of bile.

In large quantities it may cause poisoning. Cases of poisoning in children have happened, with vomiting, purging, epileptiform convulsions, coma, and collapse.

Preparations.

Extractum Podophylli.

Dose, gr. i.-iii.

Resina Podophylli.

Dose, as a laxative, gr. $\frac{1}{2}$.

Resina Podophylli.

Dose, as a purgative, gr. $\frac{1}{6}$ - $\frac{1}{4}$.

Extractum Podophylli Fl.

Dose, ℥ v.-xv. (℥ x. = gtt. xii.).

Podophyllum used externally is irritant, and may inflame the eyes if carelessly handled.

Cimicifuga (Black Snakeroot).

The dried rhizome and rootlets of cimicifuga racemosa, an indigenous plant, containing a volatile oil, two resins, and tannin.

Cimicifuga has **antispasmodic** action. In moderate doses it has been used as a **stomachic** and **cardiac tonic**, and it increases somewhat the action of the skin and kidneys. In large doses it slows the heart, and raises blood-pressure, acting like digitalis, and in excessive doses it produces giddiness, severe headache, and prostration. No cases of poisoning are known. The preparations should not be kept long, as they spoil with age.

Preparations.

Extractum Cimicifugæ Fl.

Dose, ℥ xx. - ʒ i. (℥ x. = gtt. xii.).

Tinctura Cimicifugæ.

Dose, ʒ i.-ii.

Adonis Vernalis.

The root of *Adonis vernalis* contains a glucoside named adonidine. It is allied in action to digitoxin, one of the principles of *digitalis*, but is more powerful and irritating to the digestive organs.

Physiological Actions.

Adonidine **stimulates** the heart and vaso-motor centres, acting more promptly than *digitalis*. It is not cumulative in tendency. It has no special power as a diuretic, though there may be some slight action resulting from the effect upon the circulation in the kidneys.

In overdoses adonidine produces vomiting and diarrhœa.

Preparations.

Adonidine.

Dose, gr. $\frac{1}{3}$.

Infusion of *Adonis Vernalis*.

Strength, 3 ss.-ii. of the root to $\frac{3}{4}$ vi.

Nat. Ord. Menispermaceæ.

Calumba.

The root of *Jateorrhiza calumba*, of Eastern Africa, contains an alkaloid, berberine; a bitter neutral principle, colombin; and colombic acid. It contains no tannin, and may be given with iron.

Calumba is a **bitter tonic** and **stomachic**, stimulating the flow of saliva, the glands and blood-vessels of the stomach, and also the gastric nerves, causing a sensation of hunger. Calumba, like bitters in general, has some power to overcome fermentation or decomposition in the stomach and intestines; promotes peristalsis; (bitters containing tannin have not this property) removes flatulence and tends to regulate the evacuation of the bowels.

Bitters if given in excess or for a long time, irritate

the stomach and bring on indigestion. Calumba is one of the least irritating of this class of medicines.

Like all bitter stomachics it must be given well diluted, and about half an hour before meals.

Tinctura Calumbæ.

Strength 1 to 9. Dose, ʒ i.-ii.

Extractum Calumbæ Fluidum.

Dose, ℥ xv.-ʒ ss. (℥ x. = gtt. xiv.).

Picrotoxin.

The fruit (called fish berries) of *anamirta paniculata*, an Asiatic plant, yields an active principle, picrotoxin, a bitter neutral substance.

It is an active **excitant** of the brain and spinal cord; stimulates secretions, especially of the intestines; causes nausea and vomiting, and slows the heart and respirations. In overdoses it produces muscular twitchings, stupor, delirium, convulsions, and coma; and may cause death by paralysis of the heart.

The temperature is slightly raised by picrotoxin.

It has been used externally in an ointment, and convulsions and death have followed its use in this way.

Preparations.

Picrotoxin.

Dose, gr. $\frac{1}{40}$ — $\frac{1}{20}$, in pill.

Nat. Ord. Papaveraceæ.

Opium.

Opium is the juice of the unripe capsules of the papaver somniferum or white poppy, thickened by evaporation (inspissated), and is obtained by incising the capsules with a small sharp knife, when the juice flows forth, and hardens into a semi-solid mass. It is produced chiefly in Turkey, Asia Minor, Persia, and India.

That used in the United States is almost all brought from Asia Minor; is called Smyrna or Turkey opium, and contains from 10 to 12 per cent. of morphine.

When dried and powdered, opium is yellow brown in color, and dissolves in water, alcohol, and dilute acids.

Opium is an exceedingly complex substance, containing the alkaloids morphine, codeine, narceine, narcotine, thebaine, papaverine, porphyroxine, cryptopine, meconine, opianine, and paramorphine ; meconic, thebolactic, and sulphuric acids ; fixed oils, odorous principles, extractives, gum, resin, salts, glucose, and other unimportant substances, with about 16 per cent. of water.

Physiological Actions.

Opium is generally considered to be anodyne and anæsthetic when applied to the unbroken skin, yet some authorities consider this doubtful, and attribute any good effect from such application to the moist heat or to the resins and spirits of the liquid preparations. Mucous surfaces, wounds, ulcers, etc., readily absorb opium. The local action of the drug is **astrigent**. In the mouth the mucous lining is dried, the tongue coated, and a sensation of thirst produced. In the stomach opium may cause a short period of irritation of the nerves, with nausea, but soon sensibility is diminished, the secretions checked, sensations of appetite and hunger are lost, the digestive powers fail, and the afferent nerves are depressed, so that the act of vomiting is produced with difficulty, and direct emetics may fail altogether.

In the intestines opium is **sedative** and **astrigent**. All impressions given to the nerves from the mucous membrane are weakened ; the secretions are diminished, peristaltic action is checked, and pain relieved.

Given by the rectum, as in enemata or suppositories, opium allays local pain, checks diarrhœa, and acts as an antispasmodic, keeping the parts at rest, and preventing irritability of the mucous membrane.

The secretion of bile is diminished and the urine lessened in quantity. The bowels are constipated. The skin is the only organ whose action is not decreased by opium. Perspiration, instead of being lessened, is excited, especially by some preparations, which are decidedly diaphoretic.

Opium is eliminated by the breath, perspiration, urine, and milk. The latter is to be remembered in giving opium to a nursing mother.

The pre-eminent influence of opium is upon the brain as a stimulant, hypnotic, and narcotic. These actions are more prominent in man than in animals, and in highly civilized than in lower races.

The stimulant effect is noticeable sometimes after a medicinal dose, and precedes the hypnotic action by a short variable period. In persons who are accustomed to large doses of opium the period of stimulation is more marked. The nerve centres which preside over the imagination are specially affected. The imaginative powers are heightened and the will power weakened.

Opium also acts upon the heart as a stimulant, sustaining and strengthening it. The opium pulse resembles the healthy pulse, being strong, moderately slow, and regular; full, compressible, and of moderate length, and is not disturbed by change of position, exercise, or mental agitation—an important difference between the action of opium and other cardiac stimulants.

The anodyne effects of opium depend chiefly on morphine, its most important alkaloid. There are some differences of action between opium and morphine alone, as follows: opium is less soluble than morphine, is more slowly absorbed, and the effects last longer; its local action on the intestines is more pronounced; it reaches the bowels directly and is more constipating. For this reason it is preferred in many cases of intestinal trouble.

Opium is not as powerful a narcotic as morphine, as several of its other alkaloids (thebaine, codeine, and narcotine) have a more or less exciting or convulsant action which modifies the whole drug.

Opium disorders the digestion more than morphine and has greater power as a diaphoretic.

Finally, opium, being of variable strength, is not as reliable as morphine, the quantity of which in a given dose may be accurately determined. The relative strength of opium to morphine is about as $\frac{1}{2}$ or $\frac{1}{3}$ to 1.

Symptoms of Poisoning.

The mildest manifestation of opium on the brain is a quiet dreamy state ending after a short time in sleep, either light and natural or heavy, and passing into stupor according to the size of the dose. There is hyperæmia¹ of the brain in the sleep caused by opium. On awakening there may be slight depression with headache and languor, caused by imperfect aëration of blood—which is in turn the result of diminished respirations—and lasting several hours. There may be nausea, or even vomiting, or the patient may return at once to the normal condition. This is the first stage of opium narcosis. After large doses the second stage comes on quickly, or at once. The symptoms of this condition are very like those of congestion of the brain.

The pupils are contracted, the face flushed, often cyanosed; the pulse is full, slow, and strong; the respirations slow and deep, sometimes stertorous; the skin is usually dry and warm, and unconsciousness is apparently complete, though the patient can usually be roused, and if so, the breathing becomes more rapid and the face regains its natural color. There is usually retention of urine. Death does not often occur in this stage of opium narcosis.

The third stage is that of prostration with profound coma, from which it may be impossible to rouse the patient; but, if he can be roused and made to speak, his answer, though it may not be complete, will be rational, and there will be no thickness or indistinctness of articulation, as there is in alcoholic poisoning. This is characteristic of opium poisoning. The respirations are weak, shallow, irregular, and slow; they may fall to one or two in a minute, while in the second stage they may frequently be found as low as four or five. The face is pallid and cyanosed; the skin cold and covered with perspiration; the pupils are absolutely contracted, and just before death they dilate widely. The pulse becomes

¹ An excess of blood; the opposite condition to that found in normal sleep.

more and more rapid and weak, and death results from failure of the respirations.

Treatment of Poisoning.

The treatment of opium poisoning is mainly directed toward maintaining respiration, and in those cases where symptoms of narcotism arise gradually after the giving of medicinal doses, it is enough simply to work toward this one object, by rousing the patient and trying to keep him roused until the effects wear away of themselves. Naturally, in the case of narcotism after hypodermic injections, emetics would be useless. Black coffee, as strong as possible, is given through a tube into the stomach, if necessary, or by rectum, as it will sometimes be difficult to make the patient swallow.

In those cases where a large dose has been taken by mouth, the stomach must be emptied. A tablespoonful of mustard in a glass of warm water may be given, and repeated in ten minutes, and gr. xxx. each of ipecac and sulphate of zinc may be afterwards given and repeated once or twice at intervals of fifteen minutes, with plenty of warm water. If emetics refuse to act on the torpid stomach, the stomach-pump must be used, but, though it acts better than emetics when fluid preparations have been taken, it is useless if the solid drug has been used.

After washing out the stomach respiration must be supported in every possible way, yet measures which may exhaust the patient's strength are to be avoided. Black coffee is given as before mentioned. Cold or alternate hot and cold douches may be applied to the head and chest. Artificial respiration should be kept up untiringly, for hours if necessary, or the battery may be used.

The bladder must be emptied by the catheter, to prevent re-absorption, and the temperature kept up by the application of external heat.

Various cardiac and respiratory stimulants are given hypodermically; atropine is a physiological antagonist to the action of opium on respiration, being the most active

known respiratory stimulant ; but it is necessary to regulate the amount given with great precision and with a thorough understanding of the entire physiological relation of one to the other. Lacking this, it would probably be given rashly, and atropine poisoning be added to the opium narcosis. For this reason the administration of atropine should not be undertaken except under directions from a physician.

There are usually no sequels to opium poisoning. The amount which may cause death varies greatly with idiosyncrasy or the habits of the patient. Recovery has taken place after 55 grains of solid opium and again after 6 ounces of laudanum had been taken, while 4 grains of crude opium have caused death.

Incidental Effects of Opium.

Idiosyncrasies are very common in regard to opium, especially among delicate nervous women. Severe depression sometimes follows ordinary doses, marked especially by excessive vomiting. In these cases, nausea is not felt while the patient is lying down, but recommences on rising. Delirium sometimes follows, or retention of urine. A common result, noticed when the effects of a dose are wearing off, is an itching, sometimes general, sometimes confined to the face and especially the nose ; and erythema—red stains or blotches, appear on the face. Children and old people bear opium badly. With children this is accounted for by the disproportionately large size of brain ; and women are more susceptible to its action than men.

In conditions where there is severe suffering, much larger doses than ordinary can be safely taken, for the power of the drug then seems to be spent in overcoming the pain.

Preparations of Opium.

According to the Pharmacopœia of 1880 all the liquid preparations of opium, except paregoric, are required to be made in a strength of 10 per cent. opium.

*Solid Preparations.***Opium Denarcotisatum.**

Opium which has been deprived of its narcotine by the action of ether. Narcotine is *not* a narcotic in action. Dose, gr. $\frac{1}{4}$ -i.

Extractum Opii.

Double strength. Dose, gr. $\frac{1}{4}$ -i.

Pilulæ Opii.

It is to be remembered that opium pills, if old, are dry and hard to dissolve, and if given in succession may produce alarming symptoms by accumulating in the alimentary canal and dissolving all at once.

*Liquid Preparations.***Tinctura Opii Camphorata.****Camphorated Tincture of Opium.****Paregoric.**

Contains gr. ii. of opium to $\frac{3}{4}$ i. ; also benzoic acid, oil of anise, and camphor. Owing to the camphor it is more constipating than the other preparations.

Dose for an adult, $\frac{3}{4}$ i.- $\frac{3}{4}$ ss. ; for a baby under one year, \mathbb{M} . i.-v. ; for a child under two years, \mathbb{M} . v.-xv. ; under three years, \mathbb{M} . v.-xx. ; under four and five years, \mathbb{M} . v.-xxv. ; under ten years, \mathbb{M} . xx.-xxx. ; under fifteen years, \mathbb{M} . xxx.- $\frac{3}{4}$ i.-ii.

(\mathbb{M} x. of paregoric equal gtt. xx. and gr. $\frac{1}{4}$ of opium.)

Tinctura Opii Deodorata.**Deodorized Tincture of Opium.****McMunn's Elixir.**

Contains no narcotine and none of the odorous principles, and is therefore less nauseating than laudanum. Dose, \mathbb{M} . x.-xv. (\mathbb{M} x.-gtt. xvii. One grain is represented by twelve minims).

Tinctura Opii.**Tincture of Opium.****Laudanum.**

Dose, \mathbb{M} . x.-xv. (\mathbb{M} . x. = gtt. xx.).

Tintura Opii Acetata.

Tincture of Acetate of Opium.

Dose, \mathbb{M} . x.-xv. (\mathbb{M} . x. = gtt. xv.).**Tinctura Opii Composita.****Squibbs' Diarrhœa Mixture.**Contains in $\frac{2}{3}$ v. $\frac{2}{3}$ i. of opium and also tr. capsicum, spirits of camphor, chloroform, and alcohol.Dose, \mathbb{M} . x. (\mathbb{M} . x. = gtt. xiv.).*Other Preparations Containing Opium.***Pulvis Ipecacuanhæ et Opii.****Ipecac and Opium Powder.****Dover's Powder.**One powder of ten grains contains gr. i. of opium, gr. i. of ipecac, and gr. viii. of sugar of milk. An excellent **diaphoretic**, though somewhat nauseating.

To be taken at night. Dose, gr. v.-x.

Emplastrum Opii.**Opium Plaster.**

Composed of extract of opium, Burgundy pitch, and lead plaster.

Opium and Lead Wash.Composed of acetate of lead, gr. cxx., tincture of opium, $\frac{2}{3}$ ss., and water, $\frac{2}{3}$ xvi.**Alkaloids of Opium.****Morphinæ (Morphine).**

The officinal salts of morphine in dry form are as follows :

Morphinæ Acetas.**Acetate of Morphine.**

A white bitter powder, soluble in water in a strength of 1 to 12 ; made from the hydrochlorate of morphine by the action of acetic acid.

Morphinæ Hydrochloras.**Hydrochlorate of Morphine.**

Made by the action of hydrochloric acid ; soluble 1 part in 24 parts of water.

Morphinæ Sulphas.
Sulphate of Morphine.

Made by the action of sulphuric acid. Soluble 1 part in 24 parts of water.

The dose of all these salts in solution is gr. $\frac{1}{4}$ – $\frac{1}{8}$.

Liquid Preparations of Morphine.

Liquor Morphinæ Sulphas.
Solution of Sulphate of Morphine.

Contains gr. i. of morphine to $\frac{3}{4}$ i. Dose, 3 i.-ii., diluted only slightly with water.

Magendie's Solution of Morphine.

This preparation is not officinal ; it contains gr. xvi. of morphine to $\frac{3}{4}$ i., and it is used almost entirely hypodermically. If it is old, or exposed to the air, it develops a fungus which unfits it for use. It is not irritating to the tissues.

The analgesic and narcotic action of morphine is quickly manifested, coming on usually within half an hour after an ordinary dose, sometimes in a few moments. The length of time during which these effects last varies much with the condition of the patient, the degree of pain present, and the extent of toleration of the drug which has been established. The average may be put at four or five hours. (℥. x. = gtt. x.)

Codeina (Codeine).

Codeine has slightly exciting action on the spinal cord. Its hypnotic action is feeble and uncertain. It is not constipating.

Dose, gr. $\frac{1}{2}$ –i., usually in pill.

The other alkaloids of opium resemble morphine somewhat, but are not used in medicine.

Narcotine is wrongly named, as it has no narcotic power, and on animals acts as a tetanizer.

Thebaine is a convulsant, almost like strychnine.

Apomorphinæ Hydrochloras.

Prepared from morphine by the action of hydrochloric acid. An active and certain **emetic**, which acts indirectly or through the vomiting centre in the medulla. It may therefore be given hypodermically if the patient is unable to swallow. In from five to twenty minutes it causes nausea and repeated vomiting.

If taken by the stomach it does not irritate, and leaves no ill after-effects. Very large doses cause prostration and paralysis of the voluntary muscles and depression of the respiratory centre.

Small doses are **expectorant**, but it is not much used in this way.

Expectorant dose, gr. $\frac{1}{10}$ – $\frac{1}{15}$.

Emetic dose, gr. $\frac{1}{5}$.

Emetic dose, hypodermically, gr. $\frac{1}{10}$ every 10 minutes.

Emetic dose, hypodermically, for an infant, gr. $\frac{1}{30}$ – $\frac{1}{15}$; and for a child of 10 years, gr. $\frac{1}{20}$.

Nat. Ord. Cruciferae.

Sinapis (Mustard).

The mixed and powdered dried ripe seeds of *brassica alba* and *brassica nigra*, grown in temperate regions.

Black mustard seeds contain various principles, the most important one being a volatile oil, *oleum sinapis*, which is set free when water is added.

It is a pale-yellow or colorless fluid, of intensely pungent and penetrating odor, burning taste, and a blistering and corrosive action on the skin.

White mustard seeds do not possess this volatile oil, but contain a rubefacient principle which resembles it, and which is set free in the same way on the addition of water.

Physiological Actions.

Applied externally, as in poultices, baths, etc., mustard is a nerve **stimulant**, **rubefacient**, and **vesicant**, causing redness, heat, and severe burning pain, and, if

long applied, blistering. Relief of previous pain and loss of sensibility to other impressions follow the action of mustard. The heart, blood-pressure, respirations, and nerve centres generally are first stimulated, then quieted, and, if vesication has resulted, depressed, even seriously. In baths, mustard dilates the vessels of the skin and relieves the blood-pressure in congested organs.

The principles of counter-irritation are, first : that, by causing dilatation of the vessels of that part to which application is made, there is contraction of the vessels in other parts of the body, especially if there is nervous connection between the two ; and following this principle, counter-irritants are usually applied at some distance from the congested part, as in the use of foot-baths ; second, that, by increasing the activity of the circulation, counter-irritants promote the re-absorption of inflammatory products, and for this purpose they are sometimes applied directly over the affected region.

In making mustard paste, the addition of the white of an egg modifies the local irritant action, making it more easily borne by the skin, and less liable to injure its structure, while it does not interfere with the physiological effect. The paste should be mixed only with tepid water, as hot water dissipates the volatile oil, vinegar destroys it, and alcohol prevents its formation. Internally, mustard in small amount, as taken with food, **stimulates** the appetite and gastric circulation. In large doses it is a rapidly acting stimulant **emetic**, leaving little or no depression.

The action of mustard externally must always be specially watched with comatose patients, as injury to the skin does not show at first in a state of sluggish circulation, and may become serious before it is noticed. Emetic dose, $\frac{3}{4}$ ss., in warm water.

Nat. Ord. Polygalaceæ.

Senega (Snake-Root).

The dried root of polygala senega, of the Middle and Southern United States. The active principle is saponin.

a glucoside, allied to digitonin, one of the active principles of digitalis.

Senega acts upon the bronchial mucous membrane as a **stimulant expectorant** and also stimulates the skin and kidneys, increasing the amount of urine and its solid constituents. It is not readily absorbed by the stomach. Small doses impair digestion, and large ones irritate the stomach and intestines, causing nausea, vomiting, and diarrhœa.

Preparations of Senega.

Extractum Senegæ.

Dose, gr. v.-x.

Abstractum Senegæ Fl.

Dose, ℥ x.-xv.

Syrupus Senegæ.

Dose, ʒ i.

Nat. Ord. Sapindaceæ.

Guarana (Brazilian Cocoa).

The seeds of paullinia sorbilis. They contain an active principle, guaranine, which is similar to caffeine.

Abstractum Guaranæ Fl.

Dose, ʒ i.-ii.

Nat. Ord. Erythroxylaceæ.

Erythroxyton (Coca).

The coca tree is cultivated in South America. The dried leaves have a bitter, aromatic taste, and an odor like tea. They are extensively used by the natives, who chew them as a stimulant during hard labor, scarcity of food, etc. They contain an alkaloid, **cocaine**, the active principle.

Coca in small doses is **stimulant, tonic, and restorative**. It strengthens the heart and respirations, raises arterial tension, increases the supply of blood to the brain, producing wakefulness, and lessens the sensations

of hunger and fatigue. It has **diuretic** action, and decreases the amount of urea by checking tissue waste. Under the influence of coca, or cocaine, the skin is flushed, the circulation excited, and a sense of heat and perspiration result.

Cocaine in solution has decided action as a local **anæsthetic**. If applied to a mucous surface, as the tongue or conjunctiva, or if given hypodermically, it quickly paralyzes the sensory nerves and contracts the small vessels, producing a state of local anæmia and anæsthesia, which lasts for fifteen minutes, or longer, in proportion to the strength of the application. It is often used in this way for minor surgical operations (amputation of a finger; opening of an abscess, etc.). Applied to the eye it causes dilatation of the pupil, which begins in a few minutes, reaches its height in about an hour, and returns to the normal state in twenty-four hours.

Symptoms of Poisoning.

Overdoses weaken the heart and the pulse becomes small, rapid, and intermittent. There is a feeling of tightness about the chest; the respirations are slow and shallow, and the skin cold and clammy. There are sometimes hallucinations and delirium. Poisonous doses paralyze the sensory nerves and the respiratory centre. This has been shown by experiments on animals, no fatal cases in man being known.

Five grains taken by mouth have caused alarming symptoms: loss of sight, nausea, incoherent speech, cyanosis, rapid intermittent pulse, and a feeling of suffocation. In treating severe depression from the use of cocaine, alcohol, opium, and nitrite of amyl are used as antagonists.

The habit of constantly taking large doses of cocaine is readily formed, and produces emaciation, insomnia, and disordered digestion. If carried to excess the intellect is weakened, even to insanity. The victim has an uncertain gait, an apathetic air, eyes sunken and surrounded with a deep purple ring, trembling lips, teeth crusted with a greenish deposit, a peculiar blackness

around the corners of the mouth, and excessive fetor of the breath. Ascites sometimes appears, and death may result from a general wasting of the vital powers.

Preparations of Coca.

Extractum Erythroxyli Fl.

Fluid Extract of Coca.

Dose, 3 ss.-ii., moderately diluted.

Cocainæ Hydrochloras.

Hydrochlorate of Cocaine.

The solution of the hydrochlorate of cocaine is the familiar one, and is put up in varying strength, 2 per cent., 4 per cent., and 8 per cent., approximately. The 2-per-cent. solution has gr. x. to $\frac{2}{3}$ i.; therefore 3 i. equals gr. $1\frac{1}{4}$. The 4-per-cent. solution, the most common one, contains gr. $2\frac{1}{2}$ in 3 i., gr. $1\frac{1}{4}$ in ℥ xxx., gr. $\frac{5}{8}$ in ℥ xv. One grain is represented by ℥ xxiv., and the minims and drops are equal. Cocaine is used hypodermically as a heart stimulant.

Dose, gr. $\frac{1}{8}$ -i.

Nat. Ord. Linaceæ.

Linseed (Flaxseed).

The dried ripe seeds of the flax. They contain a fixed oil and a quantity of mucilage. The whole seeds are used to make a demulcent drink, flaxseed tea; ground into meal, they are used for poultices; and the oil, mixed with equal parts of lime-water, is called Carron oil, and is used as a dressing for burns.

Flaxseed Tea.

Pour one quart of boiling water over four ounces of flaxseed (whole). Let it boil for half an hour, and afterwards stand near the fire for fifteen or twenty minutes. Strain and sweeten it, and flavor with lemon-juice.

Flaxseed Poultice.

A flaxseed poultice must be made over a fire, or alcohol lamp. The water must be boiling actively when the meal is added, and must continue to boil until the

poultice is done. Flaxseed bubbles and seethes at a point of heat below the boiling point of water, and is thus deceptive if it is added to the water in the first place. It must be sprinkled in with the left hand and stirred constantly with the right. If added in handfuls the poultice will be lumpy. When it has reached a proper consistency, not thick enough to be stiff, nor thin enough to run, it must be taken off the fire and thoroughly beaten for several minutes. This makes it light and spongy. A perfect poultice will leave the spoon and vessel clean, and reaches this point by being sufficiently boiled.

Flaxseed poultices are sedative. They relieve pain and relax spasm. In the early stages of an inflammation they draw the blood to the surface and relieve congestion. Resolution may thus be brought about and the formation of pus avoided.

If suppuration has begun, the action of poultices favors the process. It is, therefore, not considered well to use them in the later stages of an acute inflammation, as is often seen done in the home treatment of abscesses, etc. Such cases should be brought to a physician for proper treatment, and this is the more important if the inflammation is near a joint.

Poultices, if kept up too long, give the tissues a flabby, water-soaked appearance; make granulations pale, flabby, and unhealthy; depress the circulation and the vaso-motor system, and may impair seriously the vitality of the part.

Nat. Ord. Malvaceæ.

Gossypium (Cotton-Wool; Cotton).

Cotton-wool is too familiar to need description, and is introduced here as the first step in making collodion.

Pyroxylinum (Gun-Cotton).

Made by treating cotton-wool with sulphuric and nitric acids. It is explosive, and is soluble in a mixture of ether and alcohol.

Collodium (Collodion).

Made by dissolving pyroxylin in a mixture of stronger ether and stronger alcohol. When applied to the skin, after evaporation of the ether and alcohol, a colorless, transparent, contractile film is deposited, impervious to air and moisture. The vapor of collodion is inflammable.

Collodium Flexile.

Flexible Collodion.

Contains Canada turpentine and a small proportion of castor oil. The oil renders the film pliable, and prevents its contraction.

Collodium cum Cantharide.

Vesicating Collodion.

Collodion containing a solution of cantharides, and used as a **vesicant**. The skin must be washed with the same precautions used in applying cantharides, and from three to five coats painted on with a brush, letting each dry separately. The action of the vesicating collodion is hastened by spraying with ether after application.

Nat. Ord. Byttneriaceæ.

Oleum Theobromæ (Cacao Butter).

An oil expressed from the seeds of theobroma cacao, the chocolate tree. It has the consistency of tallow, and melts at the temperature of the body. It does not become rancid, and is used as an **unguent** and in the preparation of suppositories.

Nat. Ord. Rutaceæ.

Buchu.

The leaves of *barosma crenata* and other species of the same family, from Southern Africa. They contain a volatile oil and a bitter extract.

Buchu is slightly **tonic**, owing to its bitter principle. It is also a **stimulating diuretic**, and has some **alterative** power.

Extractum Buchu Fluidum.

Dose, ʒ i., well diluted.

Oleum Rutæ (Oil of Rue).

Oil of rue is distilled from an herb, *ruta graveolens*. It is a **carminative** and **emmenagogue**.

Dose, ℥ iii.-vi. (℥ x.-gtt. xiii.).

Pilocarpus (Jaborandi).

The dried leaves of *pilocarpus pinnatus*, from Brazil. They yield, as the active principle, an alkaloid called pilocarpine.

Physiological Actions.

Jaborandi, if applied to the conjunctiva, causes contraction of the pupil, with disturbances of vision. The effect is shown in about ten minutes, and in a hour or two after begins to pass off, disappearing entirely within twenty-four hours. Pilocarpine, or the preparations of jaborandi, enter the blood rapidly, and pass into the tissues. The most prominent action of the drug is that of a prompt and powerful **diaphoretic** and **sialogogue**. It is also a **cardiac** and **motor depressant**.

When 60 to 90 grains of the infusion of jaborandi are given to an adult, after about ten minutes the face and neck are flushed, and salivation and perspiration set in. These symptoms may appear in five or six minutes after a hypodermic injection of the alkaloid.

Perspiration begins on the face, and extends downward, lasts from three to five hours, and is profuse in the extreme, amounting to ℥ ix.-xv., and becomes alkaline in reaction, if it is not so at first. The flow of saliva may equal ℥ x.-xxv. It is sometimes the case that with profusion of one secretion there will be scantiness of the other. The secretions of the eyes and nose are stimulated. Sometimes nausea and vomiting are caused. The pulse is at first stimulated and quickened, but as diaphoresis goes on it becomes slow and weak. The respirations are lowered, and apnœa may result from an increase in the mucus of the bronchial tubes. The temperature falls from 1° to 4°, and a depressed condi-

tion results, with pallor, chilliness, and general weakness, lasting for several hours.

The pupils are contracted, and vision impaired.

Jaborandi, in small doses, is **diuretic**, and increases the elimination of urea.

The patient undergoing the diaphoretic action of jaborandi should be placed between blankets, and the depression is to be combated by external heat, which also assists the diaphoretic action of the drug. Within three to six hours the effects have passed away.

Children bear relatively larger doses without harm than do adults.

Preparations.

Extractum Pilocarpi Fl.

More certain in action, less nauseating and disagreeable to take than the infusion of jaborandi, which was formerly used. Dose, ℥ xv.—3 i. (℥ x. = gtt. xx.).

Pilocarpinæ Hydrochloras.

Hydrochlorate of Pilocarpine.

A solution for hypodermic use. Dose, gr. $\frac{1}{8}$ — $\frac{1}{3}$.

Nat. Ord. Simarubaceæ.

Quassia.

The wood of *simaruba excelsa*, a tree of Jamaica.

The active principle, quassin, is an intensely bitter neutral substance.

Quassia is one of the most active of simple **bitters** and **stomachics**. It contains no tannin, and is therefore not incompatible with iron.

An infusion of quassia used as an enema is **anthelmintic**.

Preparations.

Tinctura Quassiæ.

Tincture of Quassia.

Strength, 1 to 9. Dose, ℥ xx.—3 i. (℥ x. = gtt. xiv.).

Extractum Quassiae Fl.

Fluid Ext. of Quassia.

Dose, ℥ v.-x. Both preparations to be diluted rather freely and given before meals.

Nat. Ord. Rhamnaceæ.

Cascara Sagrada.

Sacred Bark; California Buckthorn.

The bark of rhamnus purshiana.

Cascara in small doses is **tonic** and **stomachic**; in large doses, **laxative** or **cathartic**, with active and certain effect. It sometimes causes griping pain.

Ext. Cascara Sagradæ Fl.

Fluid Ext. of Cascara.

May be given at night, or one or two hours after meals. Dose, at night, ʒ ss.; after meals, ℥ x.-xv., well diluted.

Nat. Ord. Amyridaceæ.

Myrrha (Myrrh).

A gum resin which exudes from the stem of a species of balsam. Tincture of myrrh, like other oleo-resins, is mildly **stimulant** and **disinfectant**, and is useful in making mouth washes for the sick.

It has some action as a **stomachic**, and in certain cases aids the action of purgatives. It is also a **uterine stimulant** and **emmenagogue**.

Nat. Ord. Leguminosæ.

Tragacantha (Tragacanth).

A gum resin which exudes from the stem of astragalus gummifera; used to make a **demulcent** drink.

Scoparius (Broom-Tops).

The fresh and dried tops of cystisus scoparius, of Europe and the United States. They contain two active

principles, scoparine and sparteine. Scoparius is an excellent **diuretic**.

Dose of the infusion, $\frac{z}{i}$.

Sparteinae Sulphas.

Sulphate of Sparteine.

A liquid alkaloid obtained from scoparius. It is colorless, with bitter taste, and with sulphuric acid forms a crystalline salt, which is soluble in water.

Physiological Actions.

Sparteine is slightly **hypnotic**, but is more important as a **cardiac stimulant**, increasing the force and regularity of the pulse. It acts very quickly, its influence over a weak, failing heart being shown within half an hour to one hour, but it does not last long, wearing off in four or five hours.

It is not considered equal to digitalis, but it is often given with it and with other more enduring but slowly acting stimulants. It is not accumulative, and does not disturb digestion nor impair the appetite.

It has not the diuretic action of scoparius. In larger doses it is a depressant to the brain and spinal cord, and causes death by paralysis of the respiratory centre. Doses of four to six grains produce vertigo, headache, palpitations, and a feeling of formication in the extremities; and larger doses have caused loss of power in the legs, sensations of heat, with flushed face and severe pain about the heart, the symptoms beginning in about twenty minutes and reaching their climax in four or five hours.

Dose, gr. $\frac{1}{10}$ —ii.

Glycyrrhiza (Licorice-Root).

The root of glycyrrhiza glabra, cultivated in England.

Licorice is **demulcent**. It contains grape-sugar, starch, resin, and a glucoside named glycyrrhizin.

Pulvis Glycyrrhizæ Compositus.

Compound Licorice Powder.

A **laxative** preparation containing senna, licorice-root, fennel, sugar, and sulphur. Its action resembles

that of castor oil. It is not a hydragogue cathartic, and given in moderate doses causes no griping, and acts gently—in the morning if given at night ; in from three to six hours if given early on an empty stomach. Many patients find it nauseous ; it is therefore best to make the dose small as possible by diluting it only a little and giving afterwards a larger quantity of water.

Dose, ʒi.-iv.

Balsamum Peruvianum (Balsam of Peru).

A balsam exuded from the trunk of *myroxylon pereiræ*. It is a reddish-brown or nearly black liquid, thick and syrupy, and insoluble in water. It contains benzoic acid, a number of resinous principles, a volatile oil, and other constituents.

It is a **vascular stimulant** and **nerve sedative**, **antiseptic**, and **disinfectant**, and is used externally as an application to granulating surfaces. It is not used internally, though it has mild action as a **carminative** and as a stimulant and disinfectant **expectorant**.

Balsamum Tolutanum (Balsam of Tolu).

Balsam of tolu is obtained from the trunk of *myroxylon toluifera*. It is a reddish-yellow, soft, and sticky substance of fragrant odor, soluble in alcohol. It yields benzoic and cinnamic acids, various resins, etc. Its properties are the same as those of balsam of Peru ; but it is only used internally as an ingredient of cough mixtures.

Physostigma (Calabar Bean).

The dried seeds of *physostigma venenosum*, an African plant. They contain two alkaloids : calabarine, the less important one ; and physostigmine, or eserine, the active principle.

Physiological Actions.

Applied to the eye, physostigmine is absorbed by the conjunctiva, and causes contraction of the pupil, with slight twitching of the eyelids, dimness of vision, and pain over the eyes.

Calabar bean acts as a depressant on the medulla and spinal cord, but does not affect the cerebrum, the mind remaining clear in cases of poisoning. In moderate doses it sometimes produces nausea, colic, and increased peristaltic motion, resulting in diarrhœa.

The heart is first stimulated, and then weakened, and the same contraction of the pupil takes place after its internal use.

Symptoms of Poisoning.

The first symptoms of poisoning are : giddiness, weak pulse, muscular feebleness, vomiting, and free purging. The respirations become slow and irregular, and death results from paralysis of the respiratory centre.

The poison is treated by emptying the stomach, applying external heat, and using artificial respiration. Atropine is a physiological antagonist, and is given in doses not larger than gr. $\frac{1}{10}$.

Recovery has taken place, by means of prompt emesis, after a dose of gr. xii.

Preparations.

Extractum Physostigmatis.

Dose, gr. $\frac{1}{10}$ – $\frac{1}{5}$.

Tinctura Physostigmatis.

Dose, ℥ xx.–xl. (℥ x. = gtt. xiv.).

Physostigmine.

Dose, gr. $\frac{1}{15}$.

Senna.

The dried leaflets of two varieties of cassia, from Africa and Arabia. The active principle is cathartic acid, and there are other unimportant principles.

Senna is a simple **cathartic**, and acts as a stimulant to the muscular coat of the intestines, producing local reflex action, active peristalsis, and free evacuations within four or five hours. It acts especially on the colon, and does not cause constipation after its action is over. Gripping

pains are caused by full doses, but it is usually given in combination for the purpose of avoiding this.

Senna is excreted by the kidneys and the mammary glands. Nursing infants in this way feel its action as a laxative.

Preparations.

Extractum Sennæ Fl.

Dose, ʒ ii. – $\frac{7}{8}$ ss.

Confectio Sennæ.

This preparation tends to disorder the digestion.

Dose, ʒ i. – ii.

Infusum Sennæ Compositus.

Black Draught.

Contains manna and sulphate of magnesium, and is an active hydragogue purgative. Dose, $\frac{7}{8}$ iv.

Syrupus Sennæ.

Dose, ʒ i. – iv.

Nat. Ord. Rosaceæ.

Amygdala Amara (Bitter Almond).

The ripe seeds of *prunus amygdalus*, the bitter almond tree. The important principle of the bitter almond is a volatile oil, which contains from 4 to 8 per cent. of hydrocyanic acid, and is highly poisonous.

The artificial oil of bitter almonds, nitro-benzene, or nitro-benzol, is poisonous, and has caused death.

Nat. Ord. Cucurbitaceæ.

Colocynthis (Colocynth).

The dried, peeled, and seeded fruit of *citrullus colocynthis*, or bitter cucumber, from Eastern countries. The active principle is colocynthin.

Colocynth is a powerful **hydragogue** and **drastic cathartic**, irritant, and quickly acting, causing large watery evacuations, with griping pains and general depression. Besides acting as a stimulant to the muscular

coat of the intestines, it also acts on the intestinal glands and on the liver. To avoid the severity of its effects, it is always given in combination, and is not suitable as a habitual purgative, being irritant to the stomach as well as to the bowels.

Gastro-enteritis is caused by colocynth in poisonous quantity, and death has resulted in twenty-four hours from a dose of 3 i.—3 iii. of the powder.

Preparations.

Extractum Colocynthis.

Purgative dose, gr. iii.—v.

Extractum Colocynthis Compositus.

Compound Ext. of Colocynth.

Contains extract of colocynth, aloes, scammony, and cardamom.

Laxative dose, gr. i.—iii.

Purgative dose, gr. v.—xx.

Elaterium (Elaterium ; Squirting Cucumber).

Elaterium is a sediment obtained from the juice of *ecballium elaterium*, from Greece, and cultivated in England. It contains a neutral active principle, elaterin, which is the officinal preparation, elaterium being of variable strength.

The most active **hydragogue cathartic** known, producing excessive watery evacuations in a very short time. If the dose is not too large there is little or no pain or irritation, although in excess it is a gastro-intestinal irritant. It is also irritant if applied to the skin. The purgative action of elaterium is exhausting, and the condition of the patient must be watched. Catharsis is also produced when it is injected hypodermically, but it cannot be safely used in this way, as it is very irritant to the tissues, and has been followed by tetanus.

Preparations.

Elaterium.

Dose, gr. $\frac{1}{4}$.

Elaterin.Dose, gr. $\frac{1}{20}$.**Trituratio Elaterini.**Strength, 1 to 10. Dose, gr. $\frac{1}{2}$.*Nat. Ord. Umbelliferae.***Conium (Spotted Hemlock).**

The fruit and flowers of conium maculatum, belonging to Europe and naturalized in the United States. They have an odor resembling that of mice. The active principle is conine, a very volatile alkaloid, freely soluble in alcohol and ether, and slightly so in water. On exposure to the air it decomposes, and this change is assisted by heat.

Physiological Actions.

Conium is a motor depressant, paralyzing the motor nerves from below upward. It affects the respiratory centre, paralyzing it. The cardiac and vascular centres are not specially influenced. The brain is not affected but remains clear.

When conium is taken in doses just large enough to make an impression, the first effect noticed is muscular weakness in the legs. The feet feel weighed down, or as if made of lead; the knees weak and unable to bear the body, giving an intense desire to lie down, and the patient cannot walk, but staggers and falls.

The eyelids are affected and drop over the eyes; the vision is disordered, and there is frontal headache, with a feeling of heat, or of weight and pressure, in the head.

Conium is used as an **antispasmodic**; also sometimes as an **analgesic**, and as a **calmative** in conditions of hysterical and maniacal excitement. It is well borne by children.

Symptoms of Poisoning.

In serious poisoning the symptoms mentioned above are all intensified. The pupils dilate; the pulse, at first

diminished, afterwards becomes more rapid. The respiratory centre is paralyzed, and death results from asphyxia in a very short time—in one case in a few moments. There are but few recorded cases of fatal poisoning. Hemlock was the state poison of Athens in the time of Socrates, and the means of his death.

Treatment of Poisoning.

No physiological antidote to conium is known. The stomach must be emptied and tannic acid given, stimulants employed and external heat applied, and artificial respiration practised as long as there is any heart action.

Preparations.

Abstractum Conii.

Dose, gr. i.-ii.

Extractum Conii Alcoholicum.

Dose, gr. i.

Tinctura Conii.

Strength, 1 to 6.6. Dose, 3 ss.-i.

Extractum Conii Fluidum.

The best preparation. Dose, ℥ i.-ii. (℥ x. = gtt.-xx.).

Conine.

Dose, ℥ $\frac{1}{10}$ -iii.; or gr. $\frac{1}{80}$ - $\frac{1}{10}$.

Asafœtida.

A gum resin obtained by incising the root of different species of ferula, of Afghanistan. It contains a volatile oil, a resin, and gum. The oil is complex, but consists largely of the essential oil of garlic, to which it owes its unpleasant odor. The resin also yields sulphur.

Physiological Actions.

Asafœtida has, in the stomach and alimentary canal, the **stimulant** and **disinfectant** action belonging to volatile oils and resins; but while most others are pleasant to the taste, it is exceedingly nauseous and disagree-

able. The mental influence of this nauseous impression, combined with its physiological action, renders asafœtida a **nerve stimulant, antispasmodic, and calmative** in hysterical conditions.

It is a **carminative**, and in enemata dispels gas, stops convulsions, and relieves constipation. It has some slight action as a **stimulant and disinfectant expectorant**. The volatile oil is excreted by the urine, perspiration, and breath.

Preparations.

Pilulæ Asafœtidæ.

Gr. iii. in each. Dose, ii.-iv., pills.

{ **Mistura Asafœtidæ.**

{ **Milk of Asafœtida.**

Dose, $\frac{z}{3}$ ss.-i. For use in enemata, $\frac{z}{3}$ i.-iii.

Tinctura Asafœtidæ.

Stength, $\frac{z}{3}$ ii.-Oj. Dose, $\frac{z}{3}$ ss.-i.

Ammoniacum (Ammoniac).

A gum resin exuded from the stem of *dorema ammoniacum*, of Persia.

The physiological actions are unimportant. It is a local **irritant** and in large doses produces vomiting and purging. It is a **disinfectant expectorant**, being excreted by the bronchial mucous membrane, and is used externally as a mild **counter-irritant** and local stimulant, to promote circulation in the skin and aid absorption.

Preparations.

Mistura Ammoniaci.

Dose, $\frac{z}{3}$ ss.

Emplastrum Ammoniaci.

Ammoniac Plaster.

Nat. Ord. Rubiaceæ.

Cinchona.

The trees belonging to the genus cinchona are found native in South America, on mountains at a height of 5,000 to 10,000 feet, and they are being successfully cultivated in other countries. The bark is the part used in medicine.

There are many varieties of the tree, the most important being cinchona succirubra, from which "red bark" is obtained, and cinchona calisaya, from which comes the "yellow" or "calisaya bark." A bark called "pale bark" is obtained from two minor varieties, and, finally, under the general name "cinchona" or "Peruvian bark" are included all other varieties of the tree yielding two or three per cent. of the alkaloids which contain crystallizable salts.

Cinchona contains four principal alkaloids: quinine, the most important; quinidine, the strongest anti-periodic, but existing in very small quantities; cinchonine, about half the strength of quinine; and cinchonidine, a little stronger than cinchonine.

The yellow bark contains most quinine, the pale bark most cinchonine, and the red bark about equal quantities of each. Beside these important alkaloids and a number of unimportant ones, cinchona bark contains tannic and other acids, a resinous substance, coloring matter, etc.

Physiological Actions.

The preparations of cinchona bark as a whole are used as bitter **stomachics** and **tonics**.

They are too bulky to be used as antipyretics or anti-periodics if quinine can be obtained. They have some **astringent** action, due to the tannin they contain.

Preparations.

Infusum Cinchonæ.

Infusion of Cinchona.

Strength, 1 to 16.6. Dose, $\frac{3}{4}$ i.

Tinctura Cinchonæ.

Strength, 1 to 5. Dose, ʒ i.-ii.

Tinctura Cinchonæ Compositus.**Huxham's Tincture.**

Contains cinchona, glycerine, bitter orange-peel, *serpentaria*, and alcohol. Dose, ʒ i.- $\frac{3}{4}$ ss.

Extractum Cinchonæ Fluidum.

Dose, ℥ v.-xv. (℥ x. = gtt. xx.).

The preparations of cinchona are given half an hour before meals.

Quinina (Quinine).

Quinine is prepared from the powdered cinchona bark by various chemical processes, in the course of which an alkali and sulphuric acid are both used.

Alkalies, and their carbonates, and tannic acid are incompatible with quinine and the other alkaloids of cinchona. The alkalies precipitate them from solution, and tannin forms with them insoluble compounds.

One grain of dilute sulphuric acid will dissolve one grain of quinine.

Physiological Actions.

Quinine arrests some processes of fermentation and decomposition, and might, except for its cost, be used as a local **antiseptic** and **disinfectant**. It is readily absorbed, and is frequently given by rectum; it is also used hypodermically, though it is very irritating and liable to produce abscesses.

In small doses it is a powerful bitter **stomachic** and general **tonic**, stimulating digestion and increasing appetite. In large doses it may irritate and cause nausea and vomiting, or even gastritis.

Quinine may be found in the blood a few minutes after being taken, and retards oxygenation. It enters the tissues quickly and is excreted slowly, several days being required. The maximum effect of a large dose is reached in about five hours. Small doses quicken the heart and

raise the blood pressure. Large ones depress the heart, diminish the force and frequency of its contractions, and lower blood pressure. The respirations are also depressed by large doses.

Quinine acts strikingly on the nerve centres. Small doses stimulate the brain and increase the activity of the mind, while slight overdoses produce headache and ringing in the ears, with deafness, more or less pronounced. Full doses intensify these symptoms, and cause severe pain, constriction, and fulness in the head, confusion of the mental faculties, intense nervous irritability, giddiness, disorders of vision, and general prostration from depression of the spinal cord and circulation.

The pre-eminent power of quinine is shown in its control over malarial poisoning as an **antipyretic, anti-periodic, and prophylactic**. (A medicine to be prophylactic must belong either to the class of restoratives, supplying a deficiency of some natural and essential condition of the body, or to the class of germicides, preventing disease by destroying the injurious agent.)

Quinine has some power as an **oxytocic**, contracting the uterus. The question "Does it, or does it not, produce abortion?" is still debated, and has not yet been decided in the affirmative.

Incidental Effects.

Eruptions of the skin are sometimes observed after the use of quinine, even in small doses. A rash resembling that of scarlet-fever may appear, followed by severe itching and smarting, and desquamating finally. More rarely the eruption resembles urticaria, popularly known as "hives" or "nettle-rash." Occasionally irritation of the urinary organs is caused, with pain, congestion of the kidneys, or even hemorrhage. This is more liable to occur with old people. Idiosyncrasy exists in a marked degree with some persons, in regard to quinine, forbidding the use of even the smallest doses.

If much prostration follows the administration of quinine, strong black coffee with brandy is the best antidote. In giving quinine, ringing in the ears and deafness are the first symptoms to be looked for.

Quininæ Sulphas.**Sulphate of Quinine.**

Usually given in pills or capsules on account of the bitter taste. Sometimes, when rapid action is desired, it is given in solution. The taste is very persistent and is better removed by a piece of dry bread, or an olive, than any thing else. The powdered sulphate may be given in sherry wine.

Quinine pills should not be more than ten days old, as then they become so dry and hard as to be useless, passing through the alimentary canal without dissolving. Quinine should be given on an empty stomach, or after the process of digestion is partly over. If a patient is on milk diet quinine should not be given in solution near the milk, as it is very liable to cause vomiting. Otherwise there is no incompatibility between quinine and milk.

Tonic dose, gr. i.-v.

Antipyretic or antiperiodic dose, gr. x.-xxx.

Quinia Bimuriatica Carbamidata.**Quinine and Urea.**

A new compound of muriate of quinine, muriatic acid, and urea, intended for hypodermic use. It is usually prepared in strength of gr. iii. to ℥ x. It is very satisfactory, as it does not irritate or produce abscesses. It is best given deeply in muscular tissue, and special pains taken to keep the needle clean.

Warburg's Tincture.

A preparation with an exceedingly long formula, containing over a dozen drugs of vegetable origin, with a certain proportion of quinine, the most active ingredient (between 9 and 10 grains to the ounce). It is used as a diaphoretic, and is best given at night.

Dose, $\frac{2}{3}$ ss.

Ipecacuanha.**Ipecac.**

The dried root of *Cephaelis ipecacuanha*, of Brazil. Ipecac contains from $\frac{1}{4}$ to 1 per cent. of the active principle, emetine, and also a glucoside, starch, gum, etc.

Physiological Actions.

Externally, powdered ipecac irritates the skin, causing a pustular eruption. Mucous membranes are similarly irritated, and an increased bronchial and nasal secretion, sneezing, etc., follows its local application. Taken internally, it tends to soften and liquefy hard and tenacious mucous secretions.

In the stomach ipecac in very small doses (gr. $\frac{1}{4}$) is a **gastric stimulant**, increasing local circulation and secretion. In these minute doses it checks vomiting.

In large doses it is a familiar **emetic**, safe and prompt, and non-depressing. Its action is partly direct and partly indirect, the act of vomiting being promoted both by local action on the stomach walls, and by stimulation through the influence of emetine of the vomiting centre in the medulla.

The emesis caused by ipecac takes place in from twenty to thirty minutes after administration, and occurs usually only once. There is but very little nausea before or with the act of vomiting, nor is it followed by exhaustion. It is accompanied by a decided increase in the secretions of the gastric and bronchial mucous membranes, and the sputum thus being made more fluid, with the expulsive act there is a general clearing out of the bronchial tubes, the trachea, and the nasal cavities.

Ipecac, as an emetic, is between sulphate of zinc and tartar emetic, not being as prompt as the first, nor as nauseating as the second. It is not powerful enough to give alone in cases of poisoning, but is then used as an aid to other emetics. It is very suitable for children, and they bear it in relatively large doses.

Ipecac is a **sedative expectorant**, a direct **chola-gogue**, increasing the flow of bile, and a **diaphoretic**.

Preparations.

Pulvis Ipecacuanhæ.

Powdered Ipecac.

Dose, gr. xx.

Syrupus Ipecacuanhæ.

Strength 5 parts fluid ext. to 100. Dose for infant, ʒ ss-ii.

Vinum Ipecacuanhæ.

Strength 1 part fluid ext. to 7 white wine. Dose, ʒ ss.-ii

Extractum Ipecacuanhæ Fluidum.

Emetic dose for adult, ℥ xxx. (℥ x. gtt. xx.).

Emetine.

Dose, gr. $\frac{1}{6}$ – $\frac{1}{2}$.

All these preparations are best given with plenty of warm water, in cases of poisoning; with croupy children, however, swallowing being difficult, it is best not to dilute the dose, or but very little.

Catechu.

An extract from the wood of acacia catechu, from the East Indies. It contains kino-tannic and catechinic acids, and is a strong astringent.

Tinctura Catechu Compositus.

Dose, ʒ i.-iii.

Nat. Ord. Rubiaceæ.

Coffea Arabica (Coffee Plant).

The seeds of the coffee plant, grown in Arabia, yield the alkaloid caffeine (which is also obtained from plants belonging to different families, viz., paullinia sorbilis, guarana). The coffee seeds also contain sugar, tannic acid, caffeic acid, a volatile oil, etc.

The qualities of coffee as a beverage are too familiar to need mention. In moderation, and when well made, it aids digestion and has **laxative** effect. In excess, or when improperly made and allowed to boil, it causes dyspepsia by the astringent action of its tannic acid.

Caffeine.

Caffeine is distinguished by containing more nitrogen than almost any other vegetable principle. It is absorbed unchanged into the circulation, and is a **stimulant** to the brain and heart, producing wakefulness, with a clear, vigorous state of the intellect, and strengthening the contraction of the heart.

It resembles digitalis in its action as a cardiac stimulant, but acts more promptly and is more transitory in its effects.

It has no decided cumulative tendency, and does not disagree with the stomach. It acts as a **diuretic** by stimulating the cells of the kidneys, as well as by its action on the heart and circulation.

It has been known to cause, after doses of moderate size, nervous wakefulness and restlessness, tremulousness, frequent pulse, confused thought, and visions passing in a constant train. These symptoms have lasted for several hours.

In large doses it has caused poisonous though never fatal symptoms, such as muscular tremor, a burning feeling in the throat, palpitations with rapid, violent pulse and short, quick respirations; giddiness, nausea, disordered vision, and marked diuresis.

Dose of caffeine, gr. v.-xx.

Nat. Ord. Ternstroмиaceæ.

Camellia Thea (Tea Plant).

The leaves of the tea plant, grown in China, contain theine, the active principle; tannic acid, and a volatile oil. Theine was formerly considered to be identical with caffeine, but investigators have recently pronounced them to be different.

Tea is **stimulating** and refreshing. Used to excess it weakens the digestive system and causes constipation, depresses the heart and vaso-motor nerves, producing neuralgic pains. In cases of poisoning, when tannin is needed, it may sometimes be most quickly procured in

the form of strong, rank tea. By boiling it hard and squeezing dry the leaves, the tannin is extracted as thoroughly as possible, and the tea is given, without sugar or milk, in large quantities.

Nat. Ord. Valerianaceæ.

Valeriana (Valerian).

The dried rhizome and roots of *valeriana officinalis*. The active principles are a volatile oil and valerianic acid. The latter is found in many other plants, in cod-liver oil, and may be derived from amylic alcohol.

Valerian is a **carminative, circulatory stimulant, and anti-spasmodic**. In nervous cases it sometimes acts successfully as an **hypnotic**. Large doses (3 ii.-iv.) may cause nausea, vomiting, and colic, a quickened pulse, and a feeling of formication in hands and feet.

Preparations.

Tinctura Valerianæ.

Strength, $\frac{3}{4}$ ii. to Oj. Dose, 3 i.-iii.

Extractum Valerianæ Fluidum.

Dose, 3 i.

Tinctura Valerianæ Ammoniata.

Ammoniated Tincture.

Strength, $\frac{3}{4}$ ii. to Oj. Dose, 3 i.-iii.

Nat. Ord. Compositæ.

Santonica (Levant Wormseed).

The dried flower-heads of *artemisia contra*, of Asia Minor. The active principle is santonin, and there is also a compound volatile oil resembling camphor in its action.

Santonin is an **anthelmintic**, acting especially on the *ascaris lumbricoides*, or round worm. In overdoses it produces disturbances of vision and of consciousness.

Objects appear at first to be blue, then yellow. There are tremors, aphasia, and sometimes convulsions. The respirations become feeble, and the pulse is reduced.

It is necessary, in giving it, to watch its action, that these symptoms may be avoided.

It is excreted by the bowels and by the kidneys, and discolors the urine, making it saffron or reddish. There have been numerous cases of fatal poisoning among children from *santonin*. Alarming symptoms have been caused by gr. ii. in a child eight years old, and a dose of gr. ii. to a child of five years caused death.

Dose, gr. $\frac{1}{4}$ -v.

Chamomile.

The dried flowers of *anthemis nobilis*, of Europe. Chamomile belongs to the class of aromatic **bitters**, **stomachics**, and **tonics**.

Infusum Anthemidis.

Infusion of Chamomile.

Dose, a wineglassful before meals.

Taraxacum (Dandelion).

The root of the dandelion is a **simple bitter** and **mild laxative**.

Extractum Taraxaci Fluidum.

Dose, 3 i.-ii., after meals.

Arnicae Flores; Arnicae Radix.

The *arnica montana*, or leopard's bane, grows in Northern Europe and Asia and in the Northwestern United States. The root and flowers contain two alkaloids and the ammonia compound, trimethylamine, which is found in cod-liver oil and in ergot, and may also be obtained from various decomposing albuminous substances.

Externally *arnica* is **stimulating** and **irritant**, increasing the circulation of the skin. It sometimes causes excessive redness and eczema, and must be used with care.

The diluted tincture promotes the absorption of blood which has effused into the tissues, as after a blow, and prevents swelling.

Internally, in small doses, arnica is slightly stimulating to the heart, the skin, and kidneys.

In larger doses it is a cardiac **depressant**, and in doses equal to $\frac{7}{3}$ i. of the tincture it has caused the poisonous symptoms of gastro-intestinal irritation; cold dry skin; feeble fluttering pulse, lowered sometimes to 60; and occasionally vomiting and purging, with final collapse. It should never be applied to an open wound.

Preparations.

Tinctura Arnicæ Flores.

Tincture of Arnica Flowers.

Strength, 20 per cent.

Tinctura Arnicæ Radix.

Tincture of Arnica Root.

Strength, 10 per cent.

Both preparations used externally must be diluted, applied on a piece of flannel to the inflamed part, and covered with a bandage.

Dose, ℥ v.-xxx. (℥ x. = gtt. xv.).

Extractum Arnicæ Fluidum.

Dose, ℥ v.-xv.

Emplastrum Arnicæ.

Arnica Plaster.

Strength, one third of the extract.

Nat. Ord. Lobeliaceæ.

Lobelia (Indian Tobacco).

The leaves and tops of lobelia inflata, of the United States. The active principle is called lobeline.

Lobelia is a **motor-depressant** and **anti-spasmodic**. In small doses it stimulates the alimentary canal, and in full doses irritates it, causing pain, vomiting, purging, and general depression.

Large doses cause, in addition, cold sweats, muscular tremors, feeble pulse, and stupor, with coma and collapse. It has frequently caused death, which occurs by paralysis of the respiratory centre. It is very seldom used, on account of its very depressing action.

The treatment of poisoning consists in washing out the stomach with a warm solution of tannic acid (or warm, strong tea), the application of external heat, and stimulation by mustard, friction, etc.; and the use of alcoholic stimulants, ammonia, and opium.

Preparations.

Tinctura Lobeliæ.

Strength, 20 per cent. Dose, ℥ x.-xx. (℥ x. = gtt. x.).

Extractum Lobeliæ Fluidum.

Dose, ℥ i.-v. (℥ i. = gtt. i.).

Nat. Ord. Styracaceæ.

Benzoinum (Benzoin).

The thickened juice of styrax benzoin, a tree of Peru. It is soluble in alcohol; not readily soluble in water. Benzoin is a balsamic resin, containing from 12 to 15 per cent. of benzoic acid. It is antiseptic and disinfectant, and is said to have more power than salicylic acid to destroy bacteria and prevent putrefaction.

Applied to the skin, it has a **stimulating** and **healing** action. Inhaled, or applied in solid form to the nose, it irritates the nasal and bronchial mucous membranes, but in proper solution acts on them only as a gentle stimulant. Taken internally it is **diaphoretic**, increases the urine and makes it more acid, and raises the pulse rate. It is excreted by the kidneys, partly as hippuric acid, and partly unchanged.

Preparations.

Acidum Benzoicum.

Benzoic Acid.

Dose, gr. x.-xxx.

Tinctura Benzoini.

Strength, 20 per cent. Dose, ʒ ss.—i.

Tinctura Benzoini Composita.**Friar's Balsam.**

For external use ; it contains benzoin, aloes, styrax, balsam of tolu, and alcohol.

Ammonii	} Benzoas.
Lithii	
Sodii	

Dose, gr. v.—xxx.

Nat. Ord. Oleaceæ.

Oleum Olivæ (Olive Oil).

The oil expressed from the fruit of *olea europæa*. Olive oil is composed of a fluid oil, olein ; a solid oil, palmitin ; with oleic and palmitic acids.

Used externally by inunction, it is absorbed by the lymphatics, and has some **nutritive** value.

As a mechanical application it is used both externally and internally in the treatment of burns and corrosive poisons. It acts as a **laxative**, and is used for this purpose in enemata, tending to soften the fæcal mass and assist in its expulsion. Oils in general are changed into carbonic acid and water in the system, and so excreted, but an excess will appear unchanged in the urine.

Nat. Ord. Loganiaceæ.

Spigelia (Pink-Root).

Spigelia is an anthelmintic and purgative, and acts on the round worm.

Extractum Spigeliæ Fluidum.

Dose, ℥ x.—ʒ ii.

Gelsemium (Yellow Jessamine.)

The root of *gelsemium sempervirens*, of the Southern United States. The alkaloid gelsemium and gelseminic acid are the important constituents.

Physiological Actions.

Gelsemium is a **motor depressant** and **anti-spasmodic**, acting by direct influence on the spinal cord. In medicinal doses it is **sedative** and **diaphoretic**.

The smallest active quantity (℥ v.—xv.) causes a languid feeling, with slight reduction of the strength and frequency of the pulse. If the amount be increased, pain over the eyes, some disturbance of vision, and dizziness result, with increased perspiration. It has a peculiar nervous effect on some people, making them cry without knowing why.

Symptoms of Poisoning.

Poisonous doses (3 i. of the fluid extract) produce, in addition to these symptoms, great muscular weakness, affecting especially the flexors of the arms.

The gait also is affected, and becomes staggering. The jaw drops, and articulation fails. There is marked effect on the sight: double vision, partial or complete blindness may develop; sometimes a squint is produced; the eyelid droops; the pupil dilates.

There is profuse perspiration, cold surface and subnormal temperature, and a condition of general anæsthesia. The pulse is thready and feeble, and death finally results from paralysis of the respiratory muscles. Consciousness remains until carbonic-acid narcosis begins as the result of asphyxia.

Gelsemium is rapidly diffused, and the effects appear within half an hour, and, after medicinal doses, disappear within two or three hours.

Death, when it occurs, may do so in a few hours, and has been known to result from taking one sixth of a grain.

Treatment of Poisoning.

Poisonous symptoms are treated by emetics, alcoholic stimulants, external heat, electricity, and artificial respiration, if necessary.

Preparations.

Extractum Gelsemii Fluidum.

Dose, ℥ v. (℥ x. = gtt. xxv.).

Tinctura Gelsemii.

Strength 1 to 6.6. Dose, ℥ x.-xxx. (℥ x. = gtt. xx.).

Nux Vomica (Poison Nut ; Quaker Buttons).

The seeds of *strychnos nux vomica*, an East Indian tree. The active principle is the alkaloid, strychnine, an important poison. Two other important principles are brucine and igasuric acid. Brucine is of half the strength of strychnine.

Physiological Actions.

Nux vomica in medicinal doses is **tonic**, with the qualities of **bitter stomachics**; it increases appetite, aids digestion, and promotes peristalsis. It also stimulates respiration, the heart, and vaso-motor centres. These actions are largely due to the presence and influence of strychnine. Strychnine enters the system rapidly, especially the nervous tissues, on which its pre-eminent action, that of a **motor excitant**, is shown. It is excreted very slowly, not disappearing from the tissues for several days, and therefore accumulates in the system when given in continuous doses, even small ones.

The power of strychnine in regard to the nervous system is exerted on the motor centres of the spinal cord and all the important nerve centres in the medulla.

The first constitutional symptoms are a feeling of restlessness, with slight trembling of the extremities. After a full dose (gr. $\frac{1}{10}$), there are noticeable muscular twitching and jerking of the limbs, slight stiffness of the jaw, a tense feeling about the head, stricture of the throat and chest, shuddering, and a feeling of anxiety.

Symptoms of Poisoning.

After poisonous doses (gr. $\frac{1}{2}$ for an adult) violent symptoms come on very suddenly, probably within

fifteen minutes, with tonic convulsions resembling the spasm of tetanus. The legs are rigid, extended, and the feet everted, or the body may be bent backward until the head and heels meet (opisthotonos). The arms are bent, and hands clinched; the eyes open and staring. The corners of the mouth are drawn up by the muscles in a mechanical grin, the "risus sardonicus," which gives a ghastly unmeaning expression, and the face—at first pale—presently becomes livid from asphyxia.

Between the paroxysms there is a period of relaxation and quiet, but the slightest sound, or touch, or breath of air brings on the spasms again instantly by reflex action, owing to the condition of intense irritability.

In cases which terminate fatally the spasms succeed each other quickly, and death takes place in two or three hours from paralysis of the respiratory muscles. The mind usually remains clear up to the last. Sometimes asphyxia produces insensibility just before death.

Strychnine convulsions resemble tetanic and hysterical convulsions in some particulars. The special points of difference are as follows:

Strychnine.

The convulsions begin with a restless, excited state; the special senses are sharpened. Muscular symptoms come on very rapidly, either beginning in the extremities or appearing simultaneously over the body. The jaw is the last part affected and the first relaxed. The eyes are open, and the muscles are relaxed between the convulsions.

Tetanus.

The symptoms come on gradually, with pain and stiffness of the back of the neck and occasional slight muscular twitchings. The jaw is the first part affected, and is rigid (trismus, or lock-jaw). There is a permanent state of general muscular rigidity.

Hysteria.

Begins with weakness and blindness. The muscular symptoms begin with stiffness of the neck. The extrem-

ities are affected last. The jaw is set before a convulsion and remains fixed between them. The eyes are closed

Treatment of Poisoning.

In treating strychnine poisoning, tannic acid or a soluble iodine salt is given as an antidote, followed quickly by emetics, as the compounds thus formed are not permanent. The bladder must be emptied to prevent re-absorption; then absolute quiet is of the greatest importance. Inhalations of chloroform are used, with full doses of chloral and bromide of potassium given internally.

Precautions.

In giving strychnine, the possibility of its cumulative action must always be kept in mind as a grave feature. It is more likely to develop if the medicine is in pill form than if in solution. With the liquid preparation of iron, strychnine, and quinine, the danger exists also, as the strychnine is apt to precipitate. It must always therefore be well shaken. Strychnine is more effective in old people.

The first constitutional symptoms are to be looked for with care: twitching, trembling, starting, or stiffness of the muscles. It is of great importance to know exactly when they begin, especially when, as is often the case, the orders received are to push the medicine to the utmost limit.

Preparations of Nux Vomica.

Abstractum Nucis Vomicae.

Abstract of Nux Vomica.

Dose, gr. i.-ii.

Tinctura Nucis Vomicae.

Tincture of Nux Vomica.

Strength, 20 per cent. Five minims of the tincture represent $\frac{1}{200}$ grain of strychnine.

Dose, ℥ x.-xxv. (℥ x. = gtt. xxv.).

Extractum Nucis Vomicae Fluidum.

Fl. Ext. of Nux Vomica.

Dose, ℥ ii.-iii. (℥ x. = gtt. xxv.).

Extractum Nucis Vomicae, in pill.Dose, gr. $\frac{1}{4}$ - $\frac{1}{2}$.

All preparations of nux vomica are given before meals.

Preparations of Strychnine.**Strychninae Sulphas.**

Sulphate of Strychnia.

Dose, gr. $\frac{1}{80}$ - $\frac{1}{20}$ (℥ x. = gtt. x.).**Ferri et Strychninae Citras.**

Citrate of Iron and Strychnine.

Dose, gr. i.-iii.

Syrupus Ferri, Quininæ, et Strychninae Phosphatum.

Syrup of the Phosphate of Iron, Quinine and Strychnine.

One part strychnine to 2,500. Dose, ʒ i.-ii.

*Nat. Ord. Apocynaceæ.***Strophanthus (Arrow-Poison).**

The seeds of *strophanthus hispidus*, of Africa. The active principle is a glucoside named strophanthin. It exists in the seeds in a strength of 8 or 10 per cent.

Physiological Actions.

Strophanthus enters the blood and acts directly on muscular tissue as a **tonic**, increasing its contractile power, and, in poisonous doses, paralyzing and leaving it in a state of tetanic-like spasm,—not through the agency of the nervous mechanism, but by direct influence on the muscle itself. This **tonic** and **stimulant** action is quickly felt by the heart, receiving as it does in a short time all the blood of the body, and thus feeling the action of the whole amount of *strophanthus* contained in it. The beats become less frequent and the cardiac contractions strengthened.

Strophanthus resembles digitalis in its action on the heart, but it is not as lasting a stimulant, though acting more quickly. It differs from it also in not affecting the vaso-motor nerves. It is not irritating to the alimentary canal, and is not cumulative. It acts as a **diuretic** by increasing the supply of blood to the kidneys.

Preparations.

Tinctura Strophanthi.

Dose, ℥ v.-x. (℥ x. = gtt. xx.).

Strophanthin, for hypodermic use.

Dose, gr. $\frac{1}{20}$ — $\frac{1}{60}$.

Nat. Ord. Solanaceæ.

Belladonnæ Folia ; Belladonnæ Radix. Deadly Nightshade.

The leaves and root of atropa belladonna, a perennial plant, native of Great Britain, and cultivated in this country. Belladonna contains two alkaloids: belladonnine, of no special importance; and atropine, the active principle, to which the medicinal and poisonous properties of the drug are owing.

Physiological Actions.

Alone or in a watery solution belladonna (or atropine) is not absorbed by the skin, but when combined with alcohol, glycerine, or camphor, it is readily so absorbed, and even more quickly by mucous membranes and inflamed surfaces; so that physiological symptoms, from the first slight dryness of the throat to evidence of severe poisoning, may be produced by external applications.

Used in this way, belladonna acts upon the ends of the sensory nerves as an **anæsthetic**, relieving pain, as is seen in the action of belladonna plasters. This **sedative** power, exerted over the nerves which control the sweat glands, produces the familiar effect of drying up the secretion of milk and checking the action of the skin.

Taken internally, belladonna enters the blood and reaches the tissues with rapidity; and in the case of atropine alone absorption is even more quickly accomplished. Elimination takes place by the urine, and quickly, atropine appearing unchanged in from ten to twenty hours.

The **stimulant** and **tonic** powers of belladonna, which are very strong, are exerted over the whole sympathetic system and unstripped or involuntary muscular fibre; and its **sedative, anodyne** actions are directed toward the motor system. It is a **mydriatic**, dilating the pupils; an **anti-spasmodic**, and the most important **respiratory stimulant** known, keeping up the activity of the respiratory centre while at the same time allaying the irritability of the respiratory nerves.

It has but little control over severe pain, and is not, strictly speaking, an hypnotic, though it sometimes acts as one indirectly by removing conditions which prevented sleep. It has a peculiar effect on the brain, causing excitability and in large doses narcotism.

As a **cardiac stimulant** it weakens the force of the inhibitory apparatus, derived from the cerebro-spinal system, which retards the heart; and promotes the activity of the accelerator apparatus, derived from the sympathetic system, which excites the heart.

The secretion of saliva is checked by belladonna, and this causes a dryness of the mouth and throat which is diagnostic and is watched for as one of the first signs of constitutional impression.

When small doses of belladonna or atropia are given, the respirations become deeper and more frequent. The pulse, at first slowed for a short time, afterwards becomes strong and rapid, its rapidity being somewhat out of proportion to the rate of the respirations.

After full doses it may rise as high as twice its former number of beats. The small vessels are more energetically contracted, and with the impetus to the circulation the temperature rises $\frac{1}{2}^{\circ}$ or 1° . The pupils are dilated and vision disordered; the face flushed; the mouth and throat are dry; the tongue is red; swallowing is

difficult; thirst is present, and a feeling as of sore throat.

Symptoms of Poisoning.

With larger doses the flush becomes a uniform bright red, and resembles the rash of scarlet-fever, except that it is not punctated.¹ It spreads first over face and neck, extending perhaps over the whole body, and is due to a reaction and paralysis of the vaso-motor nerves following the primary stimulation.

The pupils are bright and widely staring. Headache and vertigo, restlessness, illusions, and delirium appear. The delirium of belladonna is of a peculiarly active, talkative, busy type, accompanied frequently by laughter and gayety and associated with physical lassitude. The patient is sometimes absorbed with spectral illusions and visions, without showing any fear. Occasionally he becomes furious, quarrelsome, and maniacal.

With larger poisonous doses there is loss of muscular power, beginning in the lower extremities and becoming complete. Sensation is not lost. With excessive poisonous doses convulsions may appear, and shortly before death stupor and paralysis develop, and the temperature becomes subnormal. The urine, at first increased, diminishes and may be entirely suppressed. Death results from asphyxia, from the failure of the respiratory organs, and there is heart failure as well.

The smallest fatal dose is not positively known. Alarming symptoms have been produced by gr. $\frac{2}{10}$ — $\frac{1}{10}$ of atropine, and death in fatal cases has occurred as early as five hours after taking the poison.

Treatment of Poisoning.

The first necessity is to use emetics or the stomach-pump. The bladder must be emptied at regular intervals to prevent re-absorption. Tannic acid is given; and

¹ Having the appearance of being formed by exceedingly minute dots or points of red.

external heat, mustard baths, hot and cold affusions to the head, and artificial respiration used.

Incidental Effects.

Medicinal doses sometimes produce mild delirium, or a feeling of thirst and feverishness. The local application of the drug to the eye sometimes causes an inflammation on the face about the eyelids. The rash of belladonna may appear after small doses, and may desquamate; and a bluish color may be noticed on the lips. The dryness of the throat is *always* to be looked for. Children bear belladonna well.

Preparations of Belladonna.

Tinctura Belladonnæ.

Tincture of Belladonna.

From the leaves. Strength 1 in 6.66. Dose, ℥ x.-xxx. (℥ x. = gtt. xxv.).

Extractum Belladonnæ Alcoholicum.

Alcoholic Extract of Belladonna.

Dose, gr. $\frac{1}{8}$ - $\frac{1}{2}$.

Extractum Belladonnæ Fluidum.

Fluid Extract of Belladonna.

From the root. Dose, ℥ i.-ii. (℥ i. = gtt. ii.).

Emplastrum Belladonnæ.

Belladonna Plaster.

Equals in strength its weight of belladonna root.

Atropina.

Atropine.

Dose, gr. $\frac{1}{60}$.

Atropinæ Sulphas.

Sulphate of Atropine.

Usually given hypodermically, being very soluble in water. Dose, gr. $\frac{1}{120}$ - $\frac{1}{60}$ (℥ x. = gtt. x.).

Stramonii Folia ; Stramonii Semen.**Thorn Apple ; Jamestown Weed.**

The leaves and seeds of daturia stramonium, a weed of this country and Great Britain. The active principle is an alkaloid named daturine, which is said to be a combination of atropine and hyoscyamine.

Physiological Actions.

Stramonium resembles belladonna very closely in its actions. By small doses the pulse rate is increased, arterial tension raised, and the respiration quickened. It is a mydriatic, and has some power to relieve pain. One difference between them is that stramonium is more depressing to the bronchial nerves.

The action on the intestinal muscular fibre is the same in both ; small doses increasing, and large ones diminishing, peristalsis. By large doses the tension of the vessels is relaxed, the pulse still remaining frequent, and showing a tendency to intermit.

Symptoms of Poisoning.

The symptoms of poisoning are much alike—dilated pupils, heightened temperature, rapid pulse, scarlet rash, restlessness, delirium, and convulsions, with the fatal termination preceded by stupor, paralysis, and asphyxia. The pulse in stramonium poisoning is much more inclined to irregularity than in atropine poisoning. The treatment is the same. Accidental cases are common among children.

Preparations of Stramonium.**Extractum Stramonii.**

Dose, gr. $\frac{1}{4}$ – $\frac{1}{2}$.

Extractum Stramonii Fluidum.**Fluid Extract of Stramonium.**

Dose, ℥ i.–ii.

Tinctura Stramonii.**Tincture of Stramonium.**

Strength, 10 per cent. Dose, ℥ x.-xx. (℥ x. = gtt.xx.).

Stramonii Folia.**Stramonium Leaves.**

Prepared in the form of cigarettes. They are smoked and the smoke inhaled, having an **anti-spasmodic** influence.

Hyoscyamus (Henbane).

The leaves of the second year's growth of *hyoscyamus niger*, a coarse plant native in Great Britain and naturalized in the United States. The active principles are two in number—hyoscyamine, a crystalline, and hyoscyne, an amorphous, alkaloid. These principles have the same chemical formula as atropine, yet are not identical with it.

Physiological Actions.

Hyoscyamus is a mydriatic, and has very much the same physiological actions as belladonna and stramonium. It has greater **calmative** and **hypnotic** powers than either of the others, due, it is stated, to its hyoscyne, which is supposed to be much stronger than hyoscyamine, and to have marked qualities as a **cerebral sedative**.

Like the two former drugs, it is a **cardiac** and **respiratory stimulant**, the pulse under its influence being more regular than the pulse of daturine. It has the same stimulant action on the muscular fibres of the intestines, thus being somewhat **laxative**. In poisoning, the dry mouth, flushed face, dilated pupils, and busy delirium are the same as with belladonna and stramonium, and the treatment is the same. Hyoscyamine is rapidly excreted by the urine.

Preparations of Hyoscyamus.

Tiuctura Hyoscyami.

Tincture of Hyoscyamus.

Made in a strength of 1 in 6.66. Dose, 3 ss.—ii.

Extractum Hyoscyami Alcoholicum.

Alcoholic Extract of Hyoscyamus.

Dose, gr. i.—iii.

Hyoscyaminæ Sulphas.

Sulphate of Hyoscyamine.

Dose, gr. $\frac{1}{40}$ —i.

Hyoscinæ Hydrobromas.

Hydrobromate of Hyoscine.

Hyoscine is a powerful **hypnotic**, and differs from atropine in reducing the pulse rate. This is the first evidence of its action, and is shown in a few moments. The fall may be from 8 to 20 beats in a moment, and this effect is the last to disappear. Hyoscine does not always dilate the pupils. It is eliminated by the urine.

Dose, gr. $\frac{1}{100}$ — $\frac{1}{50}$.

Duboisia.

An Australian plant, *duboisia myoporoides*. It is not officinal. It contains an alkaloid, duboisine, similar in chemical composition, and in many of its actions, to atropine.

It is less irritating to the conjunctivæ than atropine, dilates the pupil more quickly, and its effect dies away sooner. Frontal headache, giddiness, ringing in the ears, and restlessness while sleeping are among the incidental effects of duboisia.

The quickened pulse, heightened arterial tension, flushed face, dry throat, and thirst are like the symptoms of atropine. A few hours after administration the pulse falls, and a condition of quiet ensues, favorable to sleep.

Preparations of Duboisia.

Extractum Duboisiaë.

Extract of Duboisia.

Dose, gr. $\frac{1}{8}$ – $\frac{1}{2}$.

Duboisinæ Sulphas.

Sulphate of Duboisia.

Dose, gr. $\frac{1}{100}$ – $\frac{1}{40}$.

Tinctura Duboisiaë.

Tincture of Duboisia.

Dose, ℥ v.–xx. (℥ x. = gtt. xx.).

Tabacum (Tobacco).

The leaves of *nicotiana tabacum*, a native of tropical countries cultivated in the North.

They contain an exceedingly powerful alkaloid, nicotine; a volatile oil, *nicotiana*; and, in slight proportions, the following alkaloids, some of which are familiar as being found in other plants: lupuline, coniine, lobeline, piperidine, pyridine, muscarine, and sparteine; also the alkaloidal compound trimethylamine.

Tabacco smoke contains but little nicotine, if any, and a large proportion of pyridine.

Nicotine is one of the most violent poisons known, acting almost as rapidly as prussic acid.

Death has followed a toxic dose in three minutes. Emetics, tannin, and artificial respiration, are to be employed in treating the poisoning. Tobacco is no longer used in medicine, being seriously depressing in its effects.

Nat. Ord. Scrophulariaceæ.

Digitalis (Purple Foxglove).

The leaves of the second year's growth of *digitalis purpurea*, native of Great Britain, and cultivated in this country.

The active principle, digitalin, occurs in two forms, one amorphous and the other crystalline, and is composed of four glucosides. Digitalin is no longer official, the preparations made from the whole leaf being considered more trustworthy.

Physiological Actions.

The most important action of digitalis is as a **heart stimulant** and **tonic**, and is shown in the slowing and strengthening of the pulse. This is partly brought about by a direct action on the heart-muscle, by which the circulation in the organ itself is more efficiently carried on ; partly by a strengthening of the inhibitory apparatus, which tends to slow the heart ; and partly by a stimulant action on the vaso-motor system, by which the arteries are more strongly contracted, and, by offering some resistance to the force of the heart, excite it to greater effort. The result of all this is, that the diastole is lengthened, and the systole becomes more energetic. Thus the ventricles are better filled and more thoroughly emptied, and the beats, reduced in number, gain in firmness and strength.

When an excessive amount is taken, signs of overstimulation appear, marked by intermittency of the pulse or by a fall below normal ; it may be to 40 or 50 in a minute. In this condition any sudden exertion, such as sitting upright, may bring to a climax the growing exhaustion of the heart, and the pulse may run up to 150 or more, becoming small, weak, and irregular. For this reason patients taking digitalis continuously must be kept quietly in bed and not allowed to sit up or to make any sudden exertion.

In taking it only occasionally or for a short time there is not the same danger.

Digitalis is also a **diuretic**, acting through an influence on the renal as well as on the general circulation, and for this purpose it is also used locally in the form of poultices applied over the kidneys, and made from the leaves or with the fluid preparations. Digitalis is elimi-

nated by the urine, and much more slowly than it is absorbed into the system. For this reason, if doses are given close together, part of the influence of one may be added to that of the next, and the action is intensified by so much. But except conditionally in this way, a cumulative action of the drug is not acknowledged by all authorities.

Symptoms of Poisoning.

In cases of poisoning the symptoms begin with violent and repeated vomiting of mucus and bile. There is a feeling of vertigo, pain, and heat in the head, and disturbance of vision, fringes of color with a vibratory motion being sometimes seen around objects.

The face is pale, the eyes staring and prominent, with dilated pupils and a blue color of the sclerotics.¹

There is sometimes salivation, and usually diarrhœa. The urine may be suppressed. The vomiting continues, and great prostration follows. The pulse is irregular, small, and weak, yet the beat of the heart may be hard and strong. The respirations become rapid and feeble. Pains in the limbs and back may be present. There are, usually before the end, delirium and stupor, or convulsions. Death occurs from general failure of the circulation with final paralysis of the heart, and has taken place as soon as three quarters of an hour after taking the poison. The average time, however, is one or two days. Digitalis poisoning of an acute form is not common, and in the majority of cases the patient recovers. The smallest fatal dose is not known. Twenty grains of the extract are known to have caused death in ten days.

Treatment of Poisoning.

Emetics and cathartics must be given, and tannin in large quantities. Alcoholic stimulants are used, but with great care, and the most perfect rest and quiet, with a perfectly horizontal position, maintained.

¹ The whites of the eyes.

Incidental Effects.

Digitalis is very bitter, nauseating, and irritant to the stomach, and is apt to interfere with digestion, and to cause vomiting, with occasional diarrhœa, marked by green discharges. These two latter symptoms may also be produced by hypodermic administration of the drug.

Headache and vertigo, fainting, sneezing, and buzzing in the ears, are caused by overdoses; also sparks before the eyes and other disturbances of sight; sleeplessness; fall of temperature; and irregularity or threadiness of the pulse.

Preparations of Digitalis.**Infusum Digitalis.****Infusion of Digitalis.**

Strength, 1 to 66.6. Dose, ʒ i.-ʒ ss. More diuretic than stimulant. To be largely diluted.

Tinctura Digitalis.**Tincture of Digitalis.**

Strength, 1 to 6.66. Dose, ℥ v.-xx. (℥ x. = gtt. xx.).

Extractum Digitalis Fluidum.**Fluid Extract of Digitalis.**

Dose, ℥ i.-ii. (℥ i. = gtt. ii.). The tincture and fluid extract are more stimulant than diuretic, and are only slightly diluted when given.

Digitaline.

Dose, gr. $\frac{1}{30}$. It has been used hypodermically, but is irritating and much more liable to cause abscesses than either the tincture or the fluid extract given in the same way.

Nat. Ord. Labiatæ.

Oleum Lavandulæ (Oil of Lavender).

An oil obtained from the flowers of *lavandula vera*.

finctura Lavandulæ.

Tincture of Lavender.

May be pleasantly used, in small quantity, added to water for bathing.

Spiritus Lavandulæ Compositus.

Compound Spirits of Lavender.

A **stomachic** and **cordial**. Dose, 3 ss.-ii.

Oleum Menthæ Piperitæ (Oil of Peppermint).

The oil of the fresh flowering mentha piperita.

Aqua Menthæ Piperitæ.

Used as a **carminative**. Dose, ℥ x.-xx., in water (℥ x. = gtt. x.).

Menthol.

Peppermint Camphor.

A stearoptene obtained from peppermint oil. Used as a **local anæsthetic** in headache, in the form of a pencil.

Thymol.

A stearoptene from the volatile oils of thymus vulgaris and other herbs. It is an antiseptic and germicide, resembling carbolic acid and oil of turpentine in action.

Nat. Ord. Polygonaceæ.

Rheum (Rhubarb).

The root of several varieties of rheum, from China.

Rhubarb contains cathartic acid, a peculiar tannic acid, a yellow coloring matter, etc.

Rhubarb acts entirely on the alimentary canal. In small doses it is **stomachic**, strengthening appetite and digestion. In large doses it is a **cathartic**, with **astriugent** after-effects.

In its purgative action the liver is stimulated as well as the intestinal glands, and evacuation takes place in six or eight hours, accompanied by some griping pain.

Preparations of Rhubarb.

Extractum Rhei Fluidum.

Fluid Extract of Rhubarb.

Dose, ℥ xv.-xxx. (℥ x. = gtt. xx.).

Syrupus Rhei.

Syrup of Rhubarb.

Dose, for infants, ʒ i.

Tinctura Rhei.

Tincture of Rhubarb.

Dose, ʒ i.-ii.

Nat. Ord. Lauraceæ.

Camphora (Camphor).

A stearoptene obtained from the wood of *laurus camphora*, of China and other Eastern countries.

Camphor is one of the most widely diffused of all vegetable substances. It is found in pennyroyal, hemp-tops, and numbers of other plants.

Physiological Actions.

Externally applied, camphor is **irritant, stimulating** the local circulation. It has feeble **antiseptic** power, and is **sedative** to the nerves after first stimulating them. Internally, it acts as a **carminative** and **anti-spasmodic**, gives increased force and fulness to the pulse, and stimulates the cerebro-spinal nerves. When large doses (gr. xx.-xxx.) are given, the pulse falls, and a feeling of lassitude and giddiness is produced.

Symptoms of Poisoning.

After poisonous doses (gr. xxx.-lx.) there are faintness and headache, vertigo, confused ideas, burning pain in the stomach, delirium, convulsions, and insensibility. The pulse is small, sometimes slow, again accelerated. The skin is pale, cold, and covered with perspiration. No death of an adult has occurred with camphor.

Preparations.**Aqua Camphoræ.**

Strength, 1 to 125. Dose, $\frac{z}{3}$ ss.-ii.

Spiritus Camphoræ.

Strength, 1 to 10. Dose, 3 ss.-i.

Linimentum Camphoræ.

Olive oil, 6 parts ; camphor, 1 part.

Linimentum Saponis.**Soap Liniment.**

Soap, 10 parts ; camphor, 5 ; alcohol, 70 : oil of rosemary, and water to 100 parts.

Oleum Camphoræ.

More stimulating than the other preparations. Dose, \mathfrak{m} v.-x. (\mathfrak{m} x. = gtt. xx.).

Nat. Ord. Aristolochiæ.

Serpentaria (Snakeroot).

The dried rhizome and rootlets of two or three varieties of aristolochiæ, found in North America. The taste and odor resemble camphor. It contains a resin, a volatile oil, bitter principle, etc., and is a **stimulant tonic**.

Preparations.**Tinctura Serpentariæ.**

Strength, 10 per cent. Dose, 3 i.-ii.

Extractum Serpentariæ Fluidum.

Dose, \mathfrak{m} xx.

To be given half an hour before meals.

Coto Bark.

The bark of trees found in South America, somewhat similar to the cinchona, having an aromatic resinous odor and pungent taste. It contains a bitter principle, cotoin,

and has **astrigent** action. It is irritant to the skin and mucous membranes.

Extractum Coto Fluidum.

Dose, ℥ i.-xv. (℥ x. = gtt. xx.).

Should be given in wine or other dilute alcohol, as it does not combine with water, but forms a precipitate.

Cotoin.

Dose, gr. $\frac{1}{2}$ -ii.

Nat. Ord. Euphorbiaceæ.

Cascarilla.

The dried bark of croton eleuteria, from the Bahamas. It contains resins, volatile oils, tannin, a bitter principle, named cascarillin, etc. It is an **aromatic bitter**.

Infusum Cascarillæ.

Infusion of Cascarilla.

Strength, $\frac{3}{4}$ i.-Oj. Dose, a wineglassful before meals.

Oleum Tiglii (Croton Oil).

A fixed oil, obtained from the seeds of croton tiglium, a shrub of Asia. The oil is quite thick and becomes more so with age; deteriorates rapidly in quality and should not be kept long, but, if possible, always obtained fresh. In color it may vary from a pale yellow to a dark reddish-brown. The taste is acid and hot.

It is a very complex substance, containing several fixed oils and volatile acids. It is supposed to contain a vesicating principle and a distinctly purgative one, but the latter has not yet been obtained separate from the others. Croton oil is soluble in alcohol.

Physiological Actions.

It is a very powerful **irritant** and **vesicant** when externally applied, causing burning and redness of the skin and an eruption of papules, which in a short time become pustular. Taken internally it irritates actively;

causes burning in the throat and epigastrium, and has a very rapid action as a **drastic** and **hydragogue cathartic**.

The bowels are first opened in one or two hours after it is taken, and catharsis re-occurs several times within twelve hours or more, with great thoroughness, some pain, and, usually, a decided degree of prostration.

The dose, which is usually one or two drops—sometimes three or four—may be given on bread-crumbs, or in a little glycerine, or on a lump of sugar.

With unconscious or delirious patients it may be placed directly on the back of the tongue.

In applying it externally, the amount ordered is taken on a bit of flannel, and rubbed into the prescribed spot on the skin until there is well-marked redness. The eruption appears usually in about four hours; if it does not, the application is repeated.

It may also be mixed with olive oil or turpentine, or combined with liniments, alcohol, or ether.

The eruption remains for several days, and may, on disappearing, leave small cicatrices¹ behind it.

Symptoms of Poisoning.

Though so active in small doses there have not been many known instances of fatal poisoning by croton oil. Large doses usually provoke immediate vomiting, but symptoms when developed are those of gastro-enteritis, with violent catharsis and great prostration.

In some instances, instead of acting in the usual way it seems to be absorbed into the blood, and produces nervous symptoms, such as palpitation and restlessness, headache, giddiness, and confusion of ideas.

Oleum Ricini (Castor Oil).

The oil expressed from the seeds of *ricinus communis*, of Calcutta. Castor oil contains several fatty acids, of which ricinoleic acid is peculiar to itself.

¹ Scars.

Physiological Actions.

Externally castor oil is very soothing, and may be applied to the eye, or the surface, as a sedative and protective.

Internally it is unirritating to the stomach, if pure, but if impure or rancid it may cause nausea and vomiting. Aside from this, the odor may provoke nausea even before the drug is swallowed, and all pains should be taken to avoid this possibility, by preparing it carefully and holding it at the side—not under the patient's nose—until the moment comes for swallowing it.

In the intestines it acts as a simple **purgative**, and here the oil which is not perfectly pure is more efficient. It is painless, with sedative and somewhat constipating after-effects.

The muscular coat and the glands of the intestines are stimulated, and evacuation results in from three to six hours—sometimes sooner.

It is not a hydragogue cathartic, as it does not appreciably increase the intestinal secretions. It does not act on the liver.

Ricinoleic acid enters the blood and tissues and is removed by all secretions, including the milk, and in this way purgation may be produced in a nursing infant.

Castor oil is very nauseous, and needs to be carefully administered, in order that it may be as little offensive as possible. To children it is best given in hot sweetened milk, and adults may take it well in this way; or it may be poured into the centre of an equal quantity of glycerine, or given in a little hot coffee, or in brandy; first wetting the sides of the glass, and pouring the oil carefully in the centre of 3 ss. brandy, then covering it with as much more. In all cases it will be more easily taken if the mouth be first rinsed out with brandy or peppermint, or any thing pungent which will blunt the sense of taste. A little carbonated water afterwards is gratefully received, or, to those who like olives, nothing is more acceptable after nauseating, or bitter medicines, than an olive, when it may be given.

Castor oil can be had put up in soft flexible capsules, which, though large, are easily swallowed.

Dose, $\frac{z}{3}$ ss.—i.

Dose for infant one year old, 3 i.—ii.

The castor bean is very poisonous. The leaves are used as a poultice, applied to the breasts to increase the flow of milk.

Nat. Ord. Salicaceæ.

Salicinum (Salicin).

A glucoside, obtained from the bark of various species of salix or willow tree ; and from gaultheria procumbens or wintergreen.

Salicin is a **bitter tonic**, and to some extent an **anti-pyretic** and **antiseptic**. Its qualities resemble, though in a very mild degree, those of salicylic acid, which is derived from it.¹ Salicin is not poisonous. It is very insoluble, and is given dry on the tongue or in capsules. Dose, gr. xx.

Nat. Ord. Urticaceæ.

Lupulus (Hops).

The dried strobiles² of humulus lupulus, or hop vine, cultivated in England. They contain an aromatic volatile oil, valerol ; a bitter principle, lupulinic acid, etc.

The former gives a **stimulant** action, with after-effects that are **sedative** and sleep-producing. The latter gives **stomachic** and **tonic** qualities. Hops are also slightly **astringent**. These various characteristics are shown in ales and beers, which are made from hops. The heart action is somewhat strengthened and quickened by hops, and diaphoresis produced.

Hops are used externally for the relief of pain, either as a means of applying moist heat, when they are put

¹ See carbon compounds for salicylic acid.

² Cones ; from the Latin word, meaning a pine cone.

into bags and wrung out of hot water ; or as dry heat, when—also in bags—they are heated through.

Tinctura Humuli.

Dose, $\bar{5}$ ss.—ii.

Extractum Lupulini Fluidum.

Dose, 3 ss.—ii.

Hop pillows may be used as a means of inducing sleep. The crackling of the hops, which may annoy, may be stopped by sprinkling them with alcohol.

Nat. Ord. Coniferæ.

Oleum Terebinthinæ (Oil of Turpentine).

The oil distilled from the oleo-resin turpentine, which is obtained from several varieties of pines, chiefly those growing in the Southern United States.

Turpentine, as such, is not used in medicine. It may be separated into the oil and a resin, which, combined with lead plaster, forms adhesive plaster.

Physiological Actions.

Externally oil of turpentine is **stimulating** and very **irritant**, causing redness and heat followed by vesication. Its action as a counter-irritant needs to be watched with much care, as severe blistering, with depression of the general system, may result if its application be too long continued. Turpentine is absorbed by the whole skin, and enters the blood unchanged.

Internally in moderate doses its immediate action is slightly **antiseptic** and stimulant to the blood-vessels. On the nerves it acts locally as a **sedative**, and in the intestines stimulates the muscular coat, and is, in larger doses, a purgative.

It is a **carminative**, expelling gas from the intestines, and this result is produced as well by outward applications and by enemata as when given by mouth. It

is also an **anthelmintic**, and is given in enemata for thread-worm.

It is a **stimulant diuretic**, producing in large doses active irritation or congestion of the urinary organs, with pain, or it may be strangury or hæmaturia. The strength and rapidity of the pulse are increased by turpentine.

In large doses it has a sedative effect on the brain and spinal cord, shown by heaviness and drowsiness, an unsteady gait, and debility. The temperature is lowered slightly. It is eliminated by the kidneys and lungs, giving its own odor to the breath, and the odor of violets to the urine.

Turpentine is capable of causing death, but fatal cases are very rare, and there are but few instances even of serious poisoning.

Symptoms of Poisoning.

The symptoms recorded in such cases include usually vomiting and purging, though they do not always exist. The pupils are dilated; the pulse rapid, weak, and irregular. The skin may be either dry or moist; the urine diminished or suppressed altogether, or containing blood. In most cases unconsciousness is complete.

Death in one instance was supposed to have followed a dose of $\frac{3}{4}$ vi., but recovery has taken place in other cases after doses nearly as large.

Oleum Terebinthinæ.

Oil of Turpentine.

Dose, ℥ x.-xx.

It may be given on a lump of sugar. The oil and spirits of turpentine are the same, the only difference being that spirits have been redistilled.

Sanitas.

A disinfectant fluid, put up for use in sick-rooms. It is made with oxydized turpentine, and contains peroxide of hydrogen as active principle. It does not stain clothing.

Oleum Juniperi (Oil of Juniper).

The oil from the full-grown unripe fruit of *Juniperus communis*.

Juniper resembles turpentine in many of its actions, but is less powerful and also less disagreeable. It is a **stomachic stimulant**, and **diuretic**. In large doses it inflames the kidneys and produces strangury.

Dose, ℥ v.-xv. (℥ x. = gtt. xx.).

Nat. Ord. Zingiberaceæ.

Zingiber (Ginger).

The scraped and dried root-stock of *Zingiber officinale*.

Ginger contains an aromatic volatile oil, and is used as a **carminative**.

Tinctura Zingiberis.

Tincture of Ginger.

Strength, 1 to 8. Dose, ℥ xv.-xxv. (℥ x. = gtt. xx.).

Nat. Ord. Liliaceæ.

Scilla (Squill ; Sea-Onion).

The bulb of *scilla maritima*, a plant of Southern Europe.

Squill increases the strength and reduces the frequency of the heart action ; contracts the arterial system and raises blood pressure. It is **diuretic** by means of its action on the circulation in the kidneys, and a **stimulant expectorant**, increasing the bronchial secretion by improving the local circulation, and aiding in the expulsion of the mucus.

In overdoses it is **irritant**, and may cause inflammation of the kidneys, with strangury and bloody urine, or suppression. It is also irritant to the stomach and intestines, and even in medicinal doses may disorder digestion. Full doses cause nausea, vomiting, and diarrhœa.

Symptoms of Poisoning.

Fatal poisoning has been caused by squill, in which these symptoms were present in an aggravated form, with marked depression of the pulse, convulsions and collapse. Death has resulted from a dose of 24 grains.

Treatment of Poisoning.

The stomach and bowels must be emptied by ipecac and castor oil. Large quantities of water should be given to overcome the suppression of urine, and the usual methods of treating gastro-enteritis and collapse, employed.

Preparations.**Tinctura Scillæ.**

Strength, 1 to 6.6. Dose, ℥ x.-xx. (℥ x. = gtt. xxii.).

Extractum Scillæ Fluidum.

Dose, ℥ i.-iii (℥ i. = gtt. ii.).

Syrupus Scillæ.

Dose, 3 ss.-i.

Syrupus Scillæ Compositus.

Contains squill, senega, and tartar emetic. Dose, ℥ x.-xxx. (℥ x. = gtt. x.).

Aloe (Aloes).

The thickened juice of the leaves of aloe socotrina, from an island in the Indian Ocean, and Arabia. It has a very nauseous and bitter taste, and contains an active principle, aloin, which has cathartic qualities.

Aloes is a **bitter stomachic**, and, as a **cathartic**, acts principally on the colon, and with extreme slowness; ten or fifteen hours being required for a result if it is given alone. It stimulates the flow of bile to some ex-

tent, and excites the circulation of all the pelvic organs. Aloes is rarely used alone, but is an ingredient of many well-known laxative preparations, in liquid and in pill form, usually in a strength of 2 or 3 grains. It does not cause constipation as an after-effect, but on the contrary, makes the intestines more sensitive.

Tinctura Aloes.

Tincture of Aloes.

Strength, $\frac{3}{4}$ ss.—Oj. Dose, 3 i.—iii.

Tinctura Aloes et Myrrhæ.

Tincture of Aloes and Myrrh.

Strength, $\frac{3}{4}$ iss. of each in Oj. Dose, 3 i.—ii.

Nat. Ord. Labiatae.

Convallaria (Lily of the Valley).

The entire plant of the *convallaria majalis*, the lily of the valley. It contains two glucosides: one, convallarin, is crystalline, and has special qualities as a gastro-intestinal irritant; and the other, convallamarin, is amorphous, and acts as a **stimulant** to the **circulation**.

Physiological Actions.

Convallaria slows and strengthens the heart, and raises the blood pressure; makes the respirations a little more full and less frequent than ordinary, and is a very decided **diuretic**. In excessive doses the heart is disturbed and the pulse becomes irregular; the breathing is forced; deep and prolonged inspiration being produced by spasm of the inspiratory muscles.

When a poisonous quantity is taken, arterial pressure rises very high, and the pulse is correspondingly rapid, until shortly before death, when the pressure falls, respiration grows slow and deep, and the heart stops in systole. Convallaria does not affect the brain.

Preparations.

Extractum Convallariæ.

Dose, gr. v.-xv.

Extractum Convallariæ Fluidum.

Dose, ℥ ii.-x. (℥ x. = gtt. xxv.).

Convallarinum.

Convallarin.

Dose, gr. ss.-ii.

Nat. Ord. Melanthaceæ.

Veratrum Viride.

Indian Poke ; Green Hellebore.

The dried root-stock of *veratrum viride*, a plant belonging to the Northern States of the United States. It yields two alkaloids, jervine and veratroidine.

Physiological Actions.

Veratrum viride is a powerful **cardiac depressant**.

When taken in small doses the pulse is at first reduced in strength and later in frequency, being sometimes lowered to 35 or 40 a minute. The fall of the pulse is in constant proportion to dose taken. It is then soft, compressible, and may be moderately full, but any exertion may change its character and it becomes rapid, thready, small, and weak, being at times almost imperceptible. Nausea and vomiting may also be produced at this stage, with excessive muscular depression and weakness. The depressing action on the heart is the result of direct influence over the heart muscle, and also over the inhibitory apparatus. The brain is not affected.

Symptoms of Poisoning.

Excessive doses of *veratrum viride* produce violent and alarming symptoms, but fatal results from it are rare, as vomiting is usually set up immediately. The

nausea is intense and the emesis violent ; the skin cold and clammy and the pulse thread-like.

Hiccough, faintness, and vertigo, partial unconsciousness, and loss of sight may be noticed among the symptoms of poisoning. Recovery has taken place after a teaspoonful dose of the fluid extract, and, in another case, the same amount caused death.

Treatment of Poisoning.

Emesis must be encouraged, and the stomach well washed out with warm water. The patient should not be allowed to rise during the act of vomiting, but to turn to the side, and afterwards, lying on his back, with the feet higher than the head, must maintain perfect rest.

Alcoholic stimulants are used, and external heat is of importance, with gentle friction to excite the capillary circulation.

Incidental Effects.

The action of the skin is increased in an indirect way by *veratrum viride*, and the secretion of bile is also stimulated. The temperature is quite markedly lowered by full doses, and various incidental effects, such as a feeling of heat and prickling, restlessness, anxiety, dizziness, dimness of vision, unsteady gait, a dryness of the mouth, with thirst, choking, nausea, and vomiting, may appear after medicinal doses.

An eruption attended with itching is sometimes produced, appearing on the face and especially round the mouth. With suspension of the drug this soon disappears.

In giving *veratrum*, if no special orders about the pulse have been given, it should not be allowed to fall below 70. A fall below 55 is dangerous.

Preparations.

Tinctura Veratri Viridis.

Tincture of Veratrum Viride.

Strength, 50 per cent. Dose, ℥ iii.-vi. (℥ x. = gtt. xxv.).

Extractum Veratri Viridis Fluidum.

Dose, ℥ i.-iii. (℥ i. = gtt. ii.).

Norwood's Tincture is a saturated tincture and is unofficinal.

Veratrina (Veratrine).

A compound of alkaloids contained in the seeds of *veratrum album* and *sabadilla*.

It is exceedingly poisonous, and is little used internally. Poisonous doses cause convulsions and tetanus, with death from asphyxia. Externally it is irritant, causing prickling and tingling, redness of the skin, numbness, and vesication. The unguent is a powerful **counter-irritant**, but needs to be used with care, special pains being taken not to get it near the eyes, as it may cause violent irritation of the conjunctivæ.

The officinal ointment usually requires dilution.

Preparations.**Unguentum Veratrinæ.**

Strength, 4 per cent.

Ointment of Veratrine.

For external use

Oleatum Veratrinæ.**Oleate of Veratrine.**

Strength, 2 per cent. For external use.

Cochici Semen (Colchicum Seed).**Colchici Radix (Colchicum Root).****Meadow Saffron.**

The dried ripe seeds and corm¹ of *colchicum autumnale*, found in Europe. The active principle is called colchicine.

¹ A part of the stem which is underground, yet not the actual root—a bulb.

Physiological Actions.

Colchicum is a **sedative** to the central nervous system ; a **diuretic** ; and an **irritant cathartic**. It stimulates the liver, and excites the action of the skin. The urine, urea, and uric acid are increased in amount by moderate doses of colchicum. The pulse is slightly reduced in frequency—about 12 beats less to the minute being noticed while the impression lasts.

Symptoms of Poisoning.

Colchicum in poisonous doses is an acro-narcotic,¹ producing a combination of nervous and gastro-intestinal symptoms.

Nausea, violent and persistent vomiting and retching appear first, with purging of serous, mucous, and bloody matters, attended with griping pain.

Tenderness and burning are felt in the abdomen and stomach ; the urine may be diminished or suppressed, while in some cases it is increased, and in others the kidneys seem unaffected almost to the last.

Spasms occur frequently, and there may be fatal convulsions. The circulation fails, the pulse becomes rapid and grows feeble and thready, the skin is cold, livid, and covered with perspiration.

Consciousness remains, and death results from collapse.

The fatal dose is small, death having been caused by ʒ ii. ss. of the wine.

Treatment of Poisoning.

The only chemical antidote is tannin, though it is not always sure in its action. Emetics, with plenty of warm water, and castor oil must be given ; albuminous drinks—milk, white of egg, etc.—and demulcents freely given, and stimulation used as the need arises.

¹ A poison which is irritant, and which also acts on the brain and spinal cord.

Incidental Effects.

Colchicum, even in small doses, may produce unpleasant secondary symptoms: dizziness, fulness and pain in the head; pains over the body; numbness, redness, prickling or smarting sensations; sneezing; running at the eyes; irritated fauces; coated tongue; loss of appetite or nausea; abdominal uneasiness or pain; flatulence or borborygmi¹; or rectal tenesmus may be observed.

Preparations of Colchicum.

Tinctura Colchici Seminis.

Tincture of Colchicum Seeds.

Strength, seeds, 15 parts in 100. Dose, ʒ ss.—iss.

Vinum Colchici Seminis.

Wine of Colchicum Seeds.

Same strength. Dose, ʒ ss.—iss.

Extractum Colchici Seminis Fluidum.

Fluid Extract Colchicum Seeds.

Dose, ℥ ii.—vi. (℥ x. = gtt. xxv.).

Vinum Colchici Radicis.

Wine of Colchicum Root.

Strength, 40 per cent.

Dose, ℥ x.—xv. (℥ x. = gtt. xx.).

Purgative dose, ʒ ss.

Extractum Colchici Radicis Fluidum.

Fluid Extract of Colchicum Root.

Dose, ℥ ii.—iv. (℥ i. = gtt. ii.).

¹ Sounds made by gas in the intestines.

Nat. Ord. Graminaceæ.

Ergota (Ergot).

Ergot is a parasite which develops in rye, taking the place of the grain, and having the appearance of a blackish fungus. It is a complex substance, containing various alkaloids and acids ; a fixed oil, etc.

Three of the alkaloids are named ecboline, ergotine, and ergotinum ; and the watery extract ergotin contains all the important constituents, and may be considered to represent the active principles of ergot.

Physiological Actions.

Ergot is specially known as an **oxytocic**, exciting or increasing uterine contractions ; and as a **hæmostatic**. In the latter capacity it acts by contracting the small vessels, thus promoting coagulation. The frequency of the pulse is lessened by ergot, and very large doses depress the heart and vaso-motor centres and lower arterial pressure.

It is not an active poison, and an ounce of the fluid extract has been given without producing serious symptoms.

Symptoms of Poisoning.

In cases where poisoning has occurred the symptoms were thirst ; gastric irritation and diarrhœa ; a small pulse ; burning pain in the feet ; and sometimes tingling and cramps, dizziness, dilated pupils, and a feeling of cold. Before death there are convulsions. In European countries, where the poorer classes live largely on rye bread, chronic ergot-poisoning is familiar, and has at times prevailed as a scourge. There are two varieties of this chronic poisoning—the gangrenous and the spasmodic,—but it is unknown in this country, and need not be described here.

Incidental Effects.

The urine, perspiration, and milk are reduced in quantity by ergot. After taking medicinal doses, one or more of the following symptoms may be observed: an unpleasant taste in the mouth; tickling in the throat; nausea; burning pain in the stomach or abdomen, with eructations of gas or diarrhœa; headache; lassitude; giddiness; specks before the eyes; unsteady gait; irregular pulse; chilly feelings.

Extractum Ergotæ Fluidum.**Fluid Extract of Ergot.**

Dose, ʒ i.—ii.

Extractum Ergotæ.**Extract of Ergot.**

Is five times as strong as the fluid ext. (which represents gr. i. to ℥ i.), as gr. i. equals gr. v. of the solid drug.

Ergotin.

Bonjean's preparation of ergotin is about ten or twelve times as strong as ergot—gr. v. or vi. representing ʒ i. of the drug. It is used hypodermically.

It is irritant to the tissues and may produce abscesses, even when deeply given.

Preparations of ergot lose their strength if kept for any length of time.

Nat. Ord. Filices.

Filix Mas (Male Fern).

The root-stock of *aspidium filix mas*, a European fern. The medicinal principle of fern is an oleo-resin of a bitter, nauseous taste.

It is an anthelmintic, specially destructive to the tapeworm. Although less irritating than some others of its class, it may, in overdoses, produce severe intestinal irritation, and death has been caused in an adult by taking six ounces.

Nat. Ord. Fungi.

Agaricus.

A fungus, called polyporus officinalis, white or purging agaric, which grows on the larch.

In small doses it checks perspiration, the secretions of the bronchial tubes, the mammary glands, and the bowels. In large doses it is purgative.

Agaricin.

Dose, gr. $\frac{1}{8}$ to $\frac{1}{2}$, in pill.

Nat. Ord. Lycopodiaceæ.

Lycopodium.

The dust, or sporules, which fills the spikes of a European moss. Collected in Switzerland and Germany, and used as a dusting powder for infants especially; also for bed-sores, etc., either alone or mixed with bismuth. Lycopodium is inflammable, and is sometimes called vegetable sulphur. It is a very soft, fine powder, and is used in rolling and packing pills and suppositories.

THE ANIMAL KINGDOM.

Lanolin.

A combination of fats obtained from sheep's wool. It does not become rancid, nor form soaps, and is rapidly absorbed by the skin.

It is used as a simple emollient, and as a means of introducing medicine into the system.

Saccharum Lactis (Sugar of Milk).

A crystallized sugar obtained by evaporation from the whey of milk, and specially suitable for use in preparing baby foods. It is soluble in one part boiling and seven parts cold water.

Fel Bovis (Ox Gall).

Prepared by partly evaporating ox bile, adding alcohol, removing the sediment, and evaporating it again to the consistency of an extract.

Ox gall is used to intensify the action of purgative enemata. Its action is painful and very thorough.

The amount usually ordered to be given is 3 ii.-iv.

Pepsin.

Pepsin is one of the normal constituents of the gastric juice, and, with the aid of hydrochloric acid, changes albumins into peptones, in which form they are readily diffusible and capable of being absorbed into the blood.

Pepsin as used in medicine is a preparation made from the mucous membrane which lines the stomach of the calf, sheep, or pig.

It is made by cleaning the mucous lining, scraping it, drying the pulp at a temperature of 100° F., and pulverizing it. The powder is a light yellow-brown, almost insoluble in water, and of slightly salty taste. It may be taken dry on the tongue or given in milk.

Dose, gr. ii.-v., with meals or immediately after.

Pancreatin.

A preparation made from the pancreas of the pig. Pancreatic extract digests starchy and proteid¹ substances, and pancreatin, while not given alone as a medicine, is very largely used in preparing artificially digested foods, viz. : pancreatized milk, eggs, oysters, soups, broths, etc.

The principle followed in making pancreatized food is that by subjecting it to the action of pancreatin in the presence of moderate heat, the process of digestion takes place, and may be made complete or only partly so, according to the length of time during which they are in contact.

¹ Foods containing albumin, casein, gluten, gelatin, nitrogen, carbon, hydrogen, and oxygen, are called proteids.

The digestive process is stopped by heat at the boiling point, or by extreme cold. For this reason artificially digested foods, having reached the point desired, are either brought quickly to a boil or else are put on ice.

Milk, if thoroughly digested, has a slightly bitter taste, which is not noticeable if the process has been short of complete.

Adeps Præparatus (Prepared Lard).

Lard consists of a fluid oil, olein, with stearin and palmitin, which are solid oils.

It is used as the basis of various officinal ointments.

Benzoinated Lard.

One part of benzoin to fifty parts of lard.

Cetaceum Spermaceti.

A fatty substance obtained from the head of the sperm whale, and resembling white wax.

It is used as an emollient.

Oleum Morrhuæ (Cod-Liver Oil).

The oil obtained from the liver of *gadus morrhua*, and other species of cod fish. An exceedingly complex substance, containing glycerine, acetic acid, and several fatty acids, iodine, chlorine, and traces of bromine, phosphorus and phosphoric acid, and various other constituents. There are three varieties: the pale yellow, light brown, and dark. The pale oil is the purest, being prepared by forcing steam at high pressure through the livers, and is less nauseous than the dark oil.

Physiological Actions.

Cod-liver oil is an **alterative** to the general nutrition in various diseased conditions, and is more truly a food

than a medicine, as it supplies the need of the tissues for fat. Fat produces force, and is utilized by every part of the body in quantities directly proportioned to the activity of the different tissues. The nervous system needs the largest amount; the muscular, the next largest. Having been elaborated by the liver of the fish, cod-liver oil is more easily digested than other fats.

The smell of cod-liver oil is unpleasant and sometimes causes nausea. This may be avoided by taking some peppermint into the mouth just before taking the oil, and by avoiding bringing it into direct line with the nose. All patients do not know how to take oil; by tossing it into the mouth and not allowing the lips to touch it, it is less disagreeable.

It is best to mix no other medicines with cod-liver oil, except hypophosphites. If other medicines come at the same time they should be given separately. It may be given in any of the ways in which castor oil is given; it is almost always well taken if floated in a little brandy or wine, or lemon juice. These precautions about giving it do not necessarily apply to the various emulsions of oil, which are usually not at all hard to take. The proper time to administer cod-liver oil is when digestion is at its height.

In overdoses, or when first taken, it may disorder the stomach, or cause temporary relaxation of the bowels. It sometimes causes an eczema.

Emulsions of cod-liver oil spoil in a short time, and patients should not be encouraged to buy the ready-made preparations in the shops.

In giving cod-liver oil the fæces must be watched, to see if any is carried away undigested.

Dose, 3 i.— $\frac{3}{4}$ ss., from three quarters of an hour to an hour after meals.

Cantharis (Cantharides; Spanish Flies).

The dried and powdered bodies of the cantharis vesicatoria, a beetle of Southern Europe. The powder is grayish-brown and specked with minute greenish span-

gles from the wing-cases of heads. It has a strong unpleasant odor. The active principle is cantharidin, an active **irritant**, besides which it contains a volatile oil and fatty substances.

Physiological Actions.

Externally cantharides is **vesicant**. When applied to the skin a feeling of heat and burning is felt in a few hours, and small vesicles form which unite in one large blister.

The average time required for this result is about eight hours. The action of cantharides is attended with less injury to the skin than that of any other vesicant. No pus is formed during the healing process, and no scar is left by the blister.

Internally cantharides is irritant to mucous membrane, and if given medicinally must be largely diluted. It enters the blood from the stomach and also from blistered surfaces, and is slowly excreted by the kidneys. In small doses it causes **diuresis** with some irritation of the urinary organs, and larger doses produce strangury.¹

Symptoms of Poisoning.

When a poisonous dose of cantharides is taken the first symptoms are burning in the œsophagus and stomach, a constricted feeling about the throat, gastric and abdominal pain, with vomiting and in most cases diarrhœa.

If the powder has been taken the small green specks may be seen in the matter vomited, which is at first mucous, then bilious, and finally serous. The discharges from the bowels have the same characteristics and are scanty, frequent, and accompanied by tenesmus.² There is frequently salivation with swelling of the salivary

¹ Difficulty in passing urine, which comes away drop by drop, with pain.

² Frequent and painful desire for evacuation.

glands. The pulse is weak and rapid, and death usually occurs quickly from collapse caused by the gastro-intestinal inflammation, but if it is delayed for a few hours the symptoms of irritation of the urinary apparatus appear, beginning with pains in the back, and ending in strangury, with scanty, albuminous, or bloody urine, and tenesmus of the bladder.

Treatment of Poisoning.

There is no antidote to cantharides, and the stomach must be at once emptied, and as thoroughly as possible washed out ; large quantities of albuminous and mucilaginous drinks given ; warm baths to relieve the strangury, and stimulants if necessary. No oils or glycerine must be given, as they aid in the absorption of the poison.

It is to be remembered that constitutional effects are sometimes produced by even a moderate blister, and if necessary, the blister must be removed and the part washed with soap and water.

Cautions.

Before applying a blister the spot should be washed with soap and water ; dried ; washed again with alcohol or ether, and briskly rubbed for a moment or two. Absorption then takes place more quickly. A blister should never be applied over a bony prominence, as sloughing may follow, the circulation in such parts being sluggish. On tender skins vesication is soon produced and the blister must be carefully watched lest the action be too severe. On coarse skins, or in places where it is thick, as on the scalp or at the knee-joint, more time is needed.

Hairs must be cut away, or shaved. A blister should not be left on a child's skin long enough to rise, but should be removed when redness appears, and poultices be applied to finish the process.

APPENDIX.

RELATION OF MINIMS TO DROPS IN CERTAIN MEDICINAL LIQUIDS.

(SEE NOTE AT END.)

Acetum Opii	℥ 10 = gtt. 15
Acidum Aceticum	℥ 10 = gtt. 18
“ “ Dilutum	℥ 10 = gtt. 10
“ Carbolicum Liquefactum	℥ 10 = gtt. 18
“ Hydrochloricum	℥ 10 = gtt. 10
“ “ Dilutum	℥ 10 = gtt. 10 =
“ Hydrocyanicum “	℥ 10 = gtt. 10 =
“ Nitricum	℥ 10 = gtt. 17
“ “ Dilutum	℥ 10 = gtt. 10
“ Nitrohydrochlor. Dilutum	℥ 10 = gtt. 10
“ Phosphoricum “	℥ 10 = gtt. 10
“ Sulphuricum Aromaticum	℥ 10 = gtt. 24
“ “ Dilutum	℥ 10 = gtt. 10
Æther Fortior	℥ 10 = gtt. 30
Alcohol	℥ 10 = gtt. 24
Amyl Nitrite	℥ 10 = gtt. 30
Aqua Ammoniaë	℥ 10 = gtt. 10 =
Chloroform	℥ 10 = gtt. 40
Copaiba	℥ 10 = gtt. 18
Creasotum	℥ 10 = gtt. 20 =
Extractum Aconiti Fluidum	℥ 10 = gtt. 25

Extractum	Belladonnæ Fluidum	. . .	πℓ 10 = gtt. 25
“	Buchu “	. . .	πℓ 10 = gtt. 25
“	Cinchonæ “	. . .	πℓ 10 = gtt. 20
“	Colchici Sem. “	. . .	πℓ 10 = gtt. 25
“	Conii (Fructus) “	. . .	πℓ 10 = gtt. 20
“	Convallariæ “	. . .	πℓ 10 = gtt. 25
“	Digitalis “	. . .	πℓ 10 = gtt. 20
“	Ergotæ “	. . .	πℓ 10 = gtt. 20
“	Gelsemii “	. . .	πℓ 10 = gtt. 25
“	Hyoscyami “	. . .	πℓ 10 = gtt. 25
“	Ipecacuanhæ “	. . .	πℓ 10 = gtt. 20
“	Nucis Vomicae “	. . .	πℓ 10 = gtt. 25
“	Pilocarpi “	. . .	πℓ 10 = gtt. 20
“	Rhei “	. . .	πℓ 10 = gtt. 20
“	Scillæ, U. S. (with alcohol), Fluidum		πℓ 10 = gtt. 20
“	Veratri Viridis Fluidum	. . .	πℓ 10 = gtt. 25
Liquor	Acidi Arseniosi	. . .	πℓ 10 = gtt. 10
“	Arsenii et Hydrargyri Iodidi	. . .	πℓ 10 = gtt. 10
“	Ferri Chloridi	. . .	πℓ 10 = gtt. 12
“	Ferri Nitratis	. . .	πℓ 10 = gtt. 10
“	Potassii Arsenitis	. . .	πℓ 10 = gtt. 10
“	Sodii Arseniatis	. . .	πℓ 10 = gtt. 10
Oleum	Amygdalæ Amaræ	. . .	πℓ 10 = gtt. 20
“	Anisi	. . .	πℓ 10 = gtt. 20
“	Caryophylli	. . .	πℓ 10 = gtt. 20
“	Cinnamomi	. . .	πℓ 10 = gtt. 20
“	Camphoræ (Japonicum)	. . .	πℓ 10 = gtt. 20
“	Copaibæ	. . .	πℓ 10 = gtt. 20
“	Fœniculi	. . .	πℓ 10 = gtt. 20
“	Gaultheriæ	. . .	πℓ 10 = gtt. 20
“	Juniperi	. . .	πℓ 10 = gtt. 20
“	Menthæ Piperitæ	. . .	πℓ 10 = gtt. 20 =
“	Phosphoratum	. . .	πℓ 10 = gtt. 15
“	Tiglii	. . .	πℓ 10 = gtt. 15 =
Paraldehydum		. . .	πℓ 10 = gtt. 25
Solutio	Atropinæ (not safe to trust to “drops”)		πℓ 10 = gtt. 10
“	Cocainæ 1%	“ “ “ “ “ “	πℓ 10 = gtt. 10
“	Strychninæ	“ “ “ “ “ “	πℓ 10 = gtt. 10
Spiritus	Ætheris Compositus	. . .	πℓ 10 = gtt. 25

Spiritus Ætheris Nitrosi	π 10 = gtt. 25
“ “ Ammonix̄ Aromaticus	π 10 = gtt. 25
“ “ Chloroformi	π 10 = gtt. 25
“ “ Glonoini 1 %	π 10 = gtt. 25
Tinctura Aconiti	π 10 = gtt. 25
“ “ Fleming's	π 10 = gtt. 25
“ Belladonnæ*	π 10 = gtt. 25
“ Digitalis	π 10 = gtt. 20
“ Ferri Chloridi	π 10 = gtt. 25
“ Nucis Vomix̄	π 10 = gtt. 25
“ Opii	π 10 = gtt. 20
“ <i>Opii Camphorata</i>	π 10 = gtt. 20
“ Opii Deodorata	π 10 = gtt. 20
“ Stramonii	π 10 = gtt. 20
“ Veratri Viridis	π 10 = gtt. 25
Vinum Colchici Radicis	π 10 = gtt. 20
“ “ Seminis	π 10 = gtt. 20
“ Opii	π 10 = gtt. 18

NOTE.—The ratio of drops to minims here given is only approximate, and refers to drops as dropped from the edge of a bottle-neck of the style kept in the shops. It does *not* refer to drops such as are delivered from the fine point of an eye- or medicine-dropper. The sizes of the drops delivered by the latter are so varying that no reliable ratio to minims can be established.

CHARLES RICE.

NEW YORK, Feb. 14, 1890.

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NOTES ON NEW DRUGS.

"Cataract can be cured by
snuffing Sal Ammoniac."
Dr. Burrington.

Glycerine Ointment.

Spermaceti	℥ 55	} Melt by moderate heat, & pour into H. mortar and add Gly.
White Wax	℥ ʒ	
Oil Almond	℥ ʒ ii	
Glycerin	℥ ʒ i	

For chaps & excoriations etc.

NOTES ON NEW DRUGS.

Cleansing Fluid.

Soap. Pot. Carb

Boax conc. Ammon. a.a. $\frac{3}{4}$ i

Water 1 pt.

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H Dock.
490 Textbook of materia medica.
D65

