MATERIA MEDICA FOR NURSES

By Lavinia L. Dock

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TEXT-BOOK

OF

MATERIA MEDICA

FOR NURSES

COMPILED BY

LAVINIA L. DOCK

GRADUATE OF BELLEVUE TRAINING SCHOOL FOR NURSES

SIXTH EDITION, REVISED AND ENLARGED

REVISED IN ACCORDANCE WITH THE NINTH DECENNIAL REVISION OF THE U. S. PHARMACOPŒIA

G. P. PUTNAM'S SONS
NEW YORK & LONDON
The Knickerbocker Press
1916

Authority to use for comment the Pharmacopœia of the United States of America, Ninth Decennial Revision, in this volume, has been granted by the Board of Trustees of the United States Pharmacopœial Convention, which Board of Trustees is in no way responsible for the accuracy of any translations of the official weights and measures or for any statements as to strength of official preparations.

The Knickerbocker Press, New York

PREFACE TO THE SIXTH EDITION.

The special feature of this revision is a chapter on Solutions, prepared by Miss Ethel Johns of the Johns Hopkins Hospital Training School for Nurses.

The dosage has been radically altered to follow the averages as set by the Ninth Decennial Revision of the United States Pharmacopœia.

PREFACE TO THE FOURTH EDITION.

The latest revision of the Materia Medica has been entrusted to Miss Bean of the Johns Hopkins Hospital Training School for Nurses.

As in former revisions, synthetic remedies which have borne the test of practical experiment have been included, no attempt being made to present a full list of these innumerable drugs. As in former revisions also, the sources of information have been personal rather than from books; not taken from other works on Materia Medica but collected in the pharmacy, the class-room, and the clinic. Thus is preserved the practical character which is essential in the teaching of the nurse.

Whenever necessary to meet the changes in the last—Ninth Decennial—edition of the *United States Pharmacopœia* the text of the book has been changed. A generous list of new drugs or new preparations of drugs will be found either in their proper classification or towards the end of the book, and much recent material on alcohol, salts, and other substances has been incorporated. Changes in dosage have been made, the therapeutic classification recast and improved, and new tables added.

There is given information on serum- and organotherapy, notes on the hypodermic administration of drugs, emetics, and the treatment of poisoning, a list of the better-known mineral waters, and an exhaustive index which will greatly facilitate the book's use by the student.

Especial thanks for practical help in the past are due to Mr. J. L. Walz, the late pharmacist of the Johns Hopkins Hospital.

The author feels impelled by the experience of many years to remind nurses of the subtle dangers of many potent remedies with which they are entrusted, and to urge upon them most gravely never to lose sight of the dreadful possibility of falling under the influence of certain drug habits unfortunately but too easily acquired in accession to the relief offered by drugs in moments of fatigue or of nerve exhaustion. Not to prop her failing strength by stimulating drugs is imperative for the nurse. It is never necessary to tell a good nurse not to prescribe for others—she scorns an act which is not only unprofessional, but in the worst possible taste.

The newest teaching inclines steadily to less and less drug giving. Dr. Osler says that the patient who takes a medicine must recover twice—once from the disease and once from the medicine. The newer teaching of nurses, too, must remove the cult of the drug somewhat farther into the background and make more prominent the glorious principles of health preservation and reverence for Nature and her laws.

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 most of our training schools 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 last two 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 follow the averages set by the U. S. P., and not, as before, taken mainly from Dr. Wood's "Materia Medica and Therapeutics."

THE NEW PHARMACOPŒIA.

THE Ninth Decennial Revision of the Pharmacopœia of the U. S. A. is in many respects the most interesting as well as the most important yet issued, and the explanatory matter contained in its Preface and Introductory Notices gives so much that is valuable, not only to professional persons but also to the intelligent laity, that it seems well to summarize briefly here such points as are of general,—not too technical—information.

The U. S. P. IX, as it is briefly and officially called, possesses far greater actual authority than any former revision, because the National Food and Drugs Act, passed by Congress in 1906 and followed by legislation along the same lines by the various States, makes the United States Pharmacopœia and the National Formulary the standards for drugs intended to be used for the cure, mitigation, or prevention of disease of either man or animals.

This has made it possible to obtain manufacturing details heretofore withheld from publication, to set an exact standard of precision, and to use the imperative mood, instead of the conditional "if" employed in earlier revisions.

At the same time, while scientifically exact, the Pharmacopœia seems plainer and simpler than ever before, as a number of compound preparations have been deleted and given over to the National Formulary, while the Pharmacopœia provides standards for vegetable drugs, chemical substances, and such pharmaceutical preparations as are simple in character and most largely used.

A few compound preparations, much used, have been retained, and an increased number of standardized serums and animal products admitted.

A number of synthetic remedies have been added to the list, and had it not been for the European War possibly more might have been included with permission of the manufacturers.

The word "mil" is now used instead of the term "cubic centimeter." The U. S. Bureau of Standards declared that the latter term was a misnomer, there being a slight difference between the thousandth part of a liter and the cubic centimeter.

The British Pharmacopœia has also adopted the word mil, which is "short" for milliliter, and this brings uniformity into the two pharmacopœias in the English language.

A new detail in the interest of uniform exactitude is the adoption of official abbreviations of the names of drugs. As these are intended for prescription writing and drug-room use, it has not been thought necessary to include them in this volume.

Synonyms are also recognized and follow the titles printed in a smaller type. In some cases, even when these synonyms are of a purely popular character, if widely used they are repeated in the U. S. P. IX.

The doses given are averages only. The Metric System of Weights and Measures is of course the only one recognized in the formulas of the Pharmacopœia, but because of the general use by physicians of the time-honored Apothecaries Weights and Measures, these symbols are also given in the dosage.

For writing formulas in the latter system, Roman numerals are employed to follow, never to precede, the symbol or abbreviation, thus: ℥ ii,, gr. xv.

In the case of metric abbreviations, the numerals precede the abbreviation, and are always written in Arabic characters, thus: 5 Gms., 2 mils.

Because of the possibility of mistaking the abbreviation for gramme with that for grain, the former is always to have a capital (Gm.) while the latter has always a small letter (gr). These points are important for nurses to note.

It is important to remember that, because of the absolute exactitude of the metric dosage, it is practically impossible to give true equivalents in the apothecaries system, or to translate one correctly into the other. It is only possible to give an average dose in each system, and the figures for doses are not to be regarded as interchangeable nor as equivalents.

The International Conference for the Unification of Formulas for Potent Remedies has recommended that certain standards for potent medicines be recognized by all the nations of the world. The Committee on Revision of the Ninth U. S. P. recommends that the next Committee adopt these standards. This would mean a long step towards unification of drug standards throughout the world.

An unexpected feature of the pharmacopœia is the absence of brandy, whiskey, and wines. This is because of the inexact quantity of alcohol which they contain and the consequent impossibility of maintaining a fixed standard of purity.

Alcohol, being capable of exact chemical expression, is used officially in the preparation of drugs.

For medicinal use when desired the physician can order such wines, or brandy or whiskey, according to the standards of the U. S. P. VIII.

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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 of 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 the inorganic worlds furnish material useful for medicine, and in the former both the animal and the vegetable kingdoms are represented. The class of inorganic drugs is large, and comprises alkalies, alkaline earths, acids, metals, and non-metals. 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 oleoresins, 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 ascendency 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 as follows:

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

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

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

Analeptics.—Restorative medicines, or food.

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

Antacids.—Those which counteract acidity.

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

Antiarthritics.—Medicines which relieve gout.

Antihydropics.—Those which relieve dropsical conditions.

Antilithics.—Those which dissolve calculi.

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

Antipyretics.—Those which reduce fever.

Antiseptics.—Medicines which prevent putrefaction.

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

Antizymotics.—Those which have power to kill disease germs.

Aromatics.—Medicines characterized by a spiciness of odor and taste, stimulant to the gastro-intestinal mucous membrane.

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

Bitters—aromatic.—Those which unite the properties of the aromatics and the bitters.

Bitters—simple.—Medicines which have a bitter taste and power of stimulating the gastro-intestinal tract without affecting the general system.

Calefacients.—Those used to produce a sense of warmth.

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

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

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

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.

Caustics.—Drugs which have the power of destroying living tissue.

Cholagogues.—Those which cause a flow of bile.

Convulsants.—Those which cause convulsions.

Correctives.—Medicines used to correct or render more pleasant the action of other remedies, especially purgatives.

Demulcents.—Mucilaginous principles which are used in solution to soothe and protect irritated mucous membranes or other tissues.

Deodorants.—Substances which destroy or hide foul odors.

Depilatories.—Those used to remove hair.

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

Depurants.—Medicines which stimulate excretions and so purify the system.

Detergents.—Those which cleanse wounds, ulcers, etc.

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

Diluents.—Those which dilute the secretions of organs.

Disinfectants.—Those which have the power of destroying disease germs or noxious properties of organic matter.

Diuretics.—Those which increase the flow of urine.

Ecbolics.—Those which produce abortion.

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.

Emmenagogues.—Those which stimulate the menstrual flow.

Emollients.—Substances used to soften and protect tissue.

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

Errhines.—Medicines which increase the nasal secretion.

Evacuants.—A term applied to purgatives.

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

Expectorants.—Those which increase bronchial secretions.

Febrifuges.—Medicines which dissipate fever.

Galactagogues.—Those which increase the secretion of milk.

Hæmostatics.—Such as arrest hæmorrhage.

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

Mydriatics.—Drugs which cause mydriasis or dilatation of the pupil.

Myotics.—Those which cause myosis or contraction of the pupil.

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

Neurotics.—Those which act on the nervous system.

Nutriants.—Drugs which modify nutritive processes.

Nutrients.—Substances which nourish.

Oxytocics.—Medicines which stimulate uterine contractions.

Prophylactics.—Medicines which prevent the taking or development of a disease.

Refrigerants.—Those which lessen the body temperature.

Revulsants.—Those which, by causing irritation, serve to draw the blood from a distant diseased part. Counter-irritants.

Rubefacients.—Those which redden the skin by distending the capillaries. Rubefacients, 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).

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

Somnifacients, Soporifics.—Those which cause sleep.

Sorbefacients.—Medicines which cause absorption.

Specifics.—Those which have direct curative influence on certain individual diseases.

Stimulants. — Those which increase functional activity.

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

Styptics.—The same as hæmostatics.

Sudorifics.—Those which produce sweating.

Tæniacides.—Drugs which kill tape-worms.

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

Vesicatories.—Blisters.

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 preparation of drugs, each country has its *Pharmacopœia*, or authorized publication containing the list of such drugs and their preparations as are declared official for that country. Abroad the national *Pharmacopœias* 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 *Pharmacopœia*, treating with much detail not only those official drugs contained in it, but unofficial ones, and their preparations also. The *Dispensatory* and the *Pharmacopœia* both give doses. The classes of preparations of the *U. S. P.* are as follows, a few being omitted as unimportant:

LIQUID PREPARATIONS.	SOLID PREPARATIONS.
Emulsions, *Emulsa.*	Extracts, *Extracta.*
Elixirs, *Elixiria.*	Resins, *Resinæ.*
Infusions, *Infusa.*	Cerates, *Cerata.*
Solutions, *Liquores.*	Pills, *Pilulæ.*
Waters, *Aquæ.*	Powders, *Pulveres.*
Tinctures, *Tincturæ.*	Papers, *Charta.*
Fluidextracts, *Fluidextracta.*	Ointments, *Unguenta.*
Spirits, *Spiritus.*	Plasters, *Emplastra.*
Mixtures, *Misturæ.*	Suppositories, *Suppositoria.*
Vinegars, *Aceta.*	Troches, *Trochisci.*
Oleates, *Oleata.*	
Oleoresins, *Oleoresinæ.*	
Glycerites, *Glycerita.*	
Syrups, *Syrupi.*	
Mucilages, *Mucilagines.*	
Liniments, *Linimenta.*	

LIQUID PREPARATIONS.

Emulsions.—Liquid preparations in which oleaginous substances are suspended in a minutely divided state, by the aid of gummy or viscid substances, in water. Four official.

Elixirs are aromatic sweetened vehicles containing alcohol, syrup, and water, with various drugs. They are very popular in the United States and are typical of the American method of exhibiting drugs. Two official.

Decoctions.—Made by boiling the drug in water. A method used for hard fibrous or wood plants. They are made in a strength of 5% unless otherwise directed. None official.

Infusions.—Made by treating a vegetable drug with either hot or cold water without boiling. Two official. The strength is the same as that of decoctions.

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

Waters.—Solutions of volatile principles dissolved in water. Eighteen official.

Tinctures.—In the Eighth Decennial Revision of the *Pharmacopœia*, the proportion of drug to the finished tincture had been made to conform to the standard adopted at the International Conference, Brussels, 1902, either ten or twenty per cent. by volume. There are, however, exceptions to this general rule. There are fifty-four official tinctures.

Fluidextracts.—Concentrated tinctures or alcoholic extracts of definite strength. One mil of a fluidextract represents 1 gramme of the drug; or, 1 minim represents 1 grain, approximately. Forty-nine official.

Spirits.—Solutions of volatile substances in alcohol. Fifteen official.

Wines.—Preparations made with a basis of wine. None official.

Mixtures.—Watery preparations holding an insoluble substance, finely subdivided, in suspension. There are two official mixtures.

Vinegars.—Preparations made with dilute acetic acid. One official.

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

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

Glycerites.—Preparations made with a basis of glycerin. Five official.

Syrups.—Preparations made with sugar and water, sometimes containing alcohol. Simple syrup is sugar and water. Twenty-two official.

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

Liniments.—Preparations for external application with friction. They have an oily or soapy character. Eight official.

SOLID PREPARATIONS.

Extracts.—Semi-solid or solid preparations, made by evaporation of a solution of the soluble substances of drugs. Twenty-five official. .

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

Cerates.—Preparations made for inunction with white wax. They differ from ointments in that they contain a large portion of wax and do not liquefy at the body temperature. They are intended for dressings. Three official.

Confections.—Medicinal substances prepared with a mass of sugar and honey None official.

Pills.—Seven official. Need no general description.

Powders.—Seven official. Need no general description.

Papers.—Papers impregnated with medicinal substances. One official, which is 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, fixed oils, or lard, to be used by inunction. Twenty official.

Plasters.—Medicinal substances mixed with lead plaster, wax, resin or gum resin, and spread upon coarse muslin or white leather, and adherent at the body temperature to the skin. Seven official.

Troches.—There are five official. Troches are medicated lozenges.

Suppositories.—Slender cone-shaped appliances for insertion into the rectum, urethra, or vagina. The basis is usually cocoa butter. They should be protected against heat and moisture.

Recent Methods of Exhibiting Drugs.

Tablets are compressed drugs which are first granulated, then moistened with alcohol, and rubbed dry through a sieve to prevent sticking to the dies of the machine. They are prepared in a strictly aseptic way and are in much demand because convenient in form and easily soluble.

Collapsubes are collapsible tubes containing ointments, creams, or lubricants, used with proper attachments to apply substance to the urethra, uterus, rectum, and in ophthalmic surgery.

Solubes are substances put up in soluble coverings for local application as lotions.

Sterules are glass capsules of sterile solutions for ophthalmic and general use. The ends are snipped off at the file marks ¼ in. from each end and the fluid is allowed to flow into the part to be treated.

Vescettes are effervescent salts compressed, and are to be used by dissolving in water.

Cachets consist of little hollowed discs of wafer-sheet, so constructed that two can be fastened together by their concave surfaces, enclosing a powder. The cachet is dipped for an instant in water, when it softens, and is placed upon the tongue and carried down by a mouthful of water. Large doses of drugs in the form of powders may be given in this way.

Lamellæ are small gelatin discs containing drugs to be inserted between the lower lid and the eyeball.

NOTES ON *SOLUTIONS.*

Introductory.

The making of solutions is a phase of nursing procedure which necessitates exact knowledge and careful technique. It is essentially a pharmaceutical process and could be taught to good advantage in the hospital drug room by the pharmacist, since here only is to be found the requisite combination of expert knowledge and suitable equipment which makes for efficient teaching. By actually handling drugs, and by observation under expert supervision of exact methods of weighing and measuring, the nurse will more readily grasp the underlying principles and realize the necessity for caution and accuracy.

Definition.

A solution is a liquid in which has been dissolved particles of a solid, a gas, or another liquid, so finely divided that the resultant mixture appears clear and homogeneous and the dissolved substance cannot be seen.

Saturation.

A saturated solution is a fluid which contains as much of the solid as it is capable of dissolving. If more of the solid be added, it will not be dissolved but will remain as a sediment. The solubility of various substances varies widely: some substances, such as sodium iodide, dissolve readily in a relatively small quantity of water; others, such as salicylic acid, require a large proportion of water and dissolve very slowly. The solubility of a substance is affected chiefly by the following factors, viz.: (*a*) The nature of the substance to be dissolved. (*b*) The nature of the dissolving medium. (*c*) The temperature of the dissolving medium.

The first point has already been explained. To illustrate the second point, it may be stated that substances which will not dissolve in water at all will dissolve readily in alcohol (ex. camphor), and on the other hand, magnesium sulphate, which in water dissolves with the utmost ease, remains undissolved in alcohol

As regards the third factor it may be stated that, as a general rule, the higher the temperature of the medium, the higher the saturation point—*e. g.*, the more of the solid may be dissolved in it. The saturation point of alum in cold water is only 10 %, whereas if boiling water be used this is increased to 80 %.

Concentration of Solutions.

By the strength or concentration of a solution is meant the quantity of particles of a solid, a gas, or a liquid which are dissolved in a given quantity of that solution. This may be expressed in terms of percentage—that is to say, by stating the presence of so many parts of dissolved substance in every hundred parts of solution. Thus: a 5% solution of boric acid would contain five parts of the solid drug to every hundred of water. Solutions decompose very quickly, and the appearance of a cloudy growth shows that they are no longer fit to use.

Proportion.

Sometimes the strength of a solution is designated by stating that a given quantity, such as an ounce, contains so many grains. Thus: atropine solution grs. iii. ad. ℥ i. The quantity of the solid drug here used is indicated by arbitrary proportion and not by percentage.

On these two arithmetical procedures, viz., percentage and proportion, are based the following methods of working out typical problems encountered in the making of solutions.

Problem I.—To estimate the amount of a drug which must be added to a given quantity of the dissolving medium in order to make a solution of a given percentage.

Example.—Let the solution called for be atropine 5% one ounce. Reduce quantity needed to lowest unit, viz.:

℥ i = 480 ♏.
Multiply result by the rate per cent.
$480 \times 5 = 2400.$
and divide by 100.
$2400 \div 100 = 24.$

The result, viz., 24 grains, represents the amount of atropine which must be added to 1 ounce of water to make a solution of 5%.

A convenient practical rule for diluting a stronger solution to one of any given weaker strength is the following:

Take number of units indicated by solution desired, add water to bring the bulk up to number of units indicated by original strength. Thus, to get a solution of 75% from one of 95%, take 75 units of the 95% solution and add 20 units of water. The result will be of the concentration desired, viz. 75%.

Problem II.—To find the amount of a stock solution of known strength to use in making a given quantity of a solution of known different strength.

Example.—One quart of bichloride of mercury solution 1:3000 is desired. The stock solution on hand is 1:25.

Reduce quantity called for to lowest units.
1 quart = 15000 ♏. (Approx.)
Multiply result by the weaker proportion.
$15000 \times \frac{1}{3000} = 5.$
Divide the result by the stronger proportion:
$5 \div \frac{1}{25} = 5 \times \frac{25}{1} = 125.$

The result, viz., 125 ♏, represents the quantity of the 1:25 solution necessary to make the quantity called for, viz., 1 quart.

Problem III.—To make a solution of known strength from tablets of a different known strength. This problem occurs especially in the preparation of a drug to be given hypodermically when the stock tablets on hand require division in order to procure the dose desired.

Example.—Atropine gr. 1/120 desired.
Atropine gr. 1/100 on hand.

Calculate what proportion of $\frac{1}{100}$ is contained in $\frac{1}{120}$. Thus:

$$\frac{1}{120} \div \frac{1}{100} = \frac{1}{120} \times \frac{100}{1} = \frac{5}{6}.$$

The resulting fraction gives the proportion of the stock tablet (gr. $\frac{1}{100}$) required, *e.g.* $\frac{5}{6}$.

Since the most accurate method of dividing the tablet is to dissolve it in a known quantity of water and take $\frac{5}{6}$ of the resultant solution, we may proceed thus:

Add to stock tablet gr. $\frac{1}{100}$, ♏ xxx of water:

$$\frac{5}{6} \times 30 = 25.$$

Problem IV.—It is sometimes necessary to administer a fractional dose of a drug when the only preparation on hand is a solution whose strength is indicated in terms of percentage.

Example.—Strychnine gr. $\frac{1}{50}$ is called for, the solution on hand has a strength of 1%

Since ♏ 100 contains gr. i.
∴ ♏ 1 " " $\frac{1}{100}$.
∴ gr. $\frac{1}{50}$ will be contained in as many minims as grain $\frac{1}{100}$ is contained in gr. $\frac{1}{50}$.

$$\frac{1}{50} \div \frac{1}{100} = \frac{1}{50} \times \frac{100}{1} = 2.$$

Minims 2 of the stock solution represents the amount called for, viz., gr. $\frac{1}{50}$.

The foregoing examples would hold good for modification of doses if given by the metric system.

To illustrate the procedure under these conditions the following example may be given:

Codeine tablets gram 0.06 on hand.
Dose required gram 0.015.
Demonstrate the ratio of 0.06: 0.015, viz. .4.

.4 ($\frac{2}{5}$) of the .06 gram tablet will then be needed to make the dose called for, viz. 0.015.

Problem V.—Estimation of child's dose.

To estimate the proportional dose for a child under twelve years from the adult dose, proceed as follows:

Make a fraction by taking the child's age as the numerator and the child's age plus 12 as the denominator. Divide the adult dose by the resulting fraction.

Example.—Dover's powder grs. x represents adult dose.

Dose for child of 3 years required.

$$\frac{3}{3 + 12} = \frac{3}{15} \times \frac{10}{1} = 2.$$

Dose for child of three years would be grs. ii.

We find the metals, 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 strychnine, 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 morphine," the "hydrochloride 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.

Many preparations of drugs are injured by age, especially when not securely corked. Tinctures and fluid-extracts become stronger by reason of evaporation of their alcohol. Infusions soon spoil. 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 full instructions for giving hypodermic injections are found in nursing text-books, only brief details of the methods used for deep and superficial injections are here given.[1] The measurements commonly used in this country are the minim—♏, the fluid drachm—ʒ, and the fluid ounce—℥, or half ounce—℥ *ss.*

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.

Dosage.

In order to facilitate the learning of doses it may be advisable to become familiar with the ordinary dose of the different classes of drugs.

Potent tinctures are given in doses of ♏v.–xv. (0.3–1 mil), except the tincture of iodine, which is given in doses of ♏i.–iii. (0.05–0.2 mil).

Fluidextracts can be given in doses of ♏x.–xx. (0.65–1.3 mils). Potent fluidextracts are given in doses of ♏i. (0.05 mil).

Solid extracts may be administered in gr. i. (0.06

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[1] Pages 278–280.

Gm.) doses. The potent solid extracts are given in gr. $\frac{1}{4}$ (0.015 Gm.) doses.

Spirits may be given in doses of ʒ *ss.* (2 mils), except the spirits of nitroglycerin ♏i.–iii. (0.05–0.2 mil), and the spirits of phosphorus ♏x. (0.65 mil).

Syrups are given in doses of ʒ i. (4 mils); the syrup of the iodide of iron in doses of ♏x.–xxx. (0.65–2.0 mils).

Diluted acids may be given in doses of ♏ x.–xxx. (0.65–2.0 mils), well diluted and taken through a glass tube. Dilute hydrocyanic (prussic) acid is taken in doses of ♏ i.–iii.(0.05–0.2 mil).

Infusions and decoctions range in dose from one to two tablespoonfuls (15–30 mils). Infusion of digitalis is taken in doses of ʒ i.–iv. (4–15 mils).

THE METRIC SYSTEM.

This system of weights and measures, first instituted by the French, is now in general use on the Continent of Europe, and is legalized in the United States, where it is employed in certain departments of the government and by scientific people at large. Most physicians and surgeons make use of the system, particularly in the prescription of medicines and in operating-room work. It therefore has become necessary that a nurse should understand it, while its simplicity, convenience, and accuracy commend the system to everyone.

The metric tables which most concern a nurse's work are as follows:

Weights.

1 milligramme (mg.) =	0.001	gramme.
1 centigramme (cg.) =	0.01	"
1 decigramme (dg.) =	0.1	"
1 gramme (Gm.) =	1.0	"
1 decagramme =	10.0	grammes.
1 hectogramme =	100.0	"
1 kilogramme =	1000.0	"

Length.

1 millimeter (mm.) =	0.001	meter.
1 centimeter (cm.) =	0.01	"
1 decimeter (dm.) =	0.1	"
1 meter (m.) =	1.0	"

In describing dosage and quantities of fluid the term cubic centimeter has been discarded by the U. S. P. as the cubic centimeter is not an exact thousandth of the milliliter. The term now used instead of Cc. is "mil," the first syllable of milliliter.

Capacity.

1 milliliter or mil (ml.) =	0.001	liter.
1 centiliter (cl.) =	0.01	"
deciliter (dl.) =	0.1	"
1 liter (l.) =	1.0	"

In writing dosage or strengths according to the metric system, the numerals are written in Arabic characters and are followed by the proper abbreviation, as, 2 mils, 1 Gm. The abbreviation for gramme has always a capital to distinguish it from gr. But in writing by the apothecaries' system Roman numerals are employed after the symbol or abbreviation, as ʒ i., gr. i.

The primary unit of the metric system is the meter, (39.37 inches), which is approximately one ten-millionth part of the distance from the equator to the north pole; and from this as a basis the units of weight and capacity are readily derived, the remaining measurements in each table being obtained from their units by decimal subdivision and multiplication. It will be observed that any term less than the unit is expressed by the aid of a Latin prefix (*deci*, *centi*, *milli*), while Greek prefixes (*deka*, *hecto*, *kilo*) express multiplication, or terms greater.

To mention the correspondence between the metric denominations and those of the United States currency, which is a metric currency, may serve to make understanding more clear. It will be noticed that meters—for instance—correspond to *dollars*, decimeters to *dimes*, centimeters to *cents*, and millimeters to *mills*. Somewhat analogous to our method of reading currency is that of reading the metric system generally.

For instance in the figures $5.25 we have represented dollars and cents, the latter being equal to $\frac{25}{100}$ of a dollar. Similarly in the metric system these figures would stand for 5 and $\frac{25}{100}$ of whatever the measure might be —whether of length or of capacity.

Practically, of the table of capacities the liter and its multiplications only are used, as the mil is more convenient for small quantities. Formerly, instead of the liter, the term 1000 Cc. was employed. The cubic centimeter (Cc.), centimeter (Cm.), and gramme (Gm.) are the terms the nurse most often meets with. The method of obtaining the gramme, the unit of the standard for weighing both solids and liquids, has been explained.

Apothecaries' Weight.

20 grains = 1 scruple = ℈
60 grains = 1 drachm = ʒ
8 drachms = 1 ounce = ℥ = 480 gr.
12 ounces = 1 pound = lb. = 5760 gr.

Wine Measure.

60 minims = 1 fluid drachm = ʒ
8 fluid drachms = 1 fluid ounce = ℥
16 fluid ounces = 1 pint = O.
8 pints = 1 gallon = gal.

Common Measure and Metric Equivalents.

1 grain =	0.065 Gm.
1 ounce Troy =	31.103 "
1 pound avoirdupois =	453.600 "
1 fluid drachm =	4 mils.
1 fluid ounce =	30 "
1 pint =	480 "
1 inch =	2.539 Cm.
1 gramme =	15.432 grains.
1 kilo =	2.204 lbs. avoirdupois.
1 cubic centimetre =	16.23 minims.
1 liter =	33.81 fluid ounces.
1 centimeter =	0.393 inch.
1 meter =	39.37 inches.

Approximate Equivalents.

1 mil =	15 minims.
4 mils =	1 fluid drachm.
30 mils =	1 " ounce.
1 gramme =	$15\frac{1}{2}$ grains.
1 decigramme =	$1\frac{1}{2}$ grains.
1 centigramme =	$\frac{1}{6}$ grain.
1 milligramme =	$\frac{1}{64}$ grain.
1 liter =	1 quart.
1 kilo =	$2\frac{1}{5}$ lbs. avoirdupois.
1 cm. =	$\frac{2}{5}$ inch.

To obtain the number of grammes, approximately, reduce the quantity to grains and *divide* by 15. Or

Reduce the quantity to drachms and *multiply* by 4; and proceed on like principles with other denominations.

It may be interesting to note how often 15 or some multiple of 15 comes into use in measuring medicine by the metric system or in the ordinary way. Thus, 1 grain is equal to about 60 milligrammes; 15 grains are equal to about 1 gramme; 60 minims are equal to 1 drachm, or a teaspoonful, or about 4 grammes; 30 grammes are equal to about 1 ounce; and 15 milligrammes are equal to about 1 tablespoonful. For one who is accustomed to the use of the ordinary measures only three of these equivalents will be necessary in order quickly and easily to transfer doses from one system to the other. These are:

1 gr. =	60 milligrammes,	approximately.
15 gr. =	1 gramme	"
1 ℥ =	30 grammes	"

The following approximate equivalents may be used:

4 mils = 1 fluidrachm = 1 teaspoonful = 60 minims.

8 mils = 2 fluidrachms = 1 dessertspoonful = 120 minims.

15 mils = 4 fluidrachms = 1 tablespoonful = 240 minims (U. S. P., ix., p. li).

Table showing quantities from five grains down, according to the old tables, with their equivalents under the metric system:

Grammes.	Grains in decimal fractions.	Grains in common fractions (approximate).
0.324	5	5
0.291	4.5	$4\frac{1}{2}$
0.259	4	4
0.226	3.5	$3\frac{1}{2}$
0.194	3	3
0.162	2.5	$2\frac{1}{2}$
0.130	2	2
0.097	1.5	$1\frac{1}{2}$
0.065	1	1
0.061	0.94	$\frac{15}{16}$
0.060	0.93	$\frac{9}{10}$
0.057	0.88	$\frac{7}{8}$
0.053	0.82	$\frac{13}{16}$
0.050	0.77	$\frac{4}{5}$
0.049	0.76	$\frac{3}{4}$
0.045	0.69	$\frac{11}{16}$
0.040	0.62	$\frac{10}{16}$
0.036	0.56	$\frac{9}{16}$
0.032	0.5	$\frac{1}{2}$
0.028	0.43	$\frac{7}{16}$
0.025	0.39	$\frac{2}{5}$
0.024	0.37	$\frac{3}{8}$
0.020	0.31	$\frac{5}{16}$
0.016	0.24	$\frac{1}{4}$
0.012	0.18	$\frac{3}{16}$
0.008	0.12	$\frac{1}{8}$
0.004	0.06	$\frac{1}{16}$
0.0032	0.05	$\frac{1}{20}$
0.0027	0.04	$\frac{1}{25}$
0.0022	0.033	$\frac{1}{30}$
0.0018	0.028	$\frac{1}{36}$
0.0016	0.025	$\frac{1}{40}$
0.0013	0.02	$\frac{1}{50}$
0.0011	0.017	$\frac{1}{60}$
0.001	0.015	$\frac{1}{64}$
0.0006	0.01	$\frac{1}{100}$
0.0005	0.008	$\frac{1}{128}$
0.0004	0.0065	$\frac{1}{160}$
0.0003	0.005	$\frac{1}{200}$
0.0002	0.003	$\frac{1}{320}$
0.0001	0.0015	$\frac{1}{640}$

A CLASSIFICATION OF REMEDIES

ACCORDING TO THEIR

PROMINENT THERAPEUTICAL ACTIONS.

This classification of the Materia Medica, being designed for the use of nurses, follows the order in which Anatomy is commonly taught in training schools for nurses, as it is thought that the study of those remedies most frequently employed in diseases of the various systems of the body, taken in conjunction with the anatomy and physiology of each system, may induce a clearer comprehension of both our Materia Medica and Anatomy, and at the same time serve to fix both in the mind.

THE CIRCULATORY SYSTEM.

Drugs Acting on the Heart.

Cardiac Tonics,—increase force of heart's contraction, lessening frequency.

Strychnine. Digitalis. Arsenic.
Rest. Graded Exercise. Food.

Also iron, iodides, mercury, caffeine, adonis vernalis, convallaria, fresh air in carriage, cheerfulness, encouragement, Schott baths, cupping, bleeding, purging, counter-irritation, douches, etc.

Cardiac Stimulants,—increase both force and number of heart beats.

Ether. Digitalis. Belladonna.
Counter-irritation to præcordia.
Carminatives (Red Pepper. Ginger.)

Also strophanthus, squills, sparteine, camphor, ammonia hyoscyamus, stramonium, amyl nitrite, strychnine, chloroform, ammonia to 5th nerve, cold douche, flagellation, cupping, leeching, food, air, good digestion, active liver, cold weather.

Normal salt solution, one of the most efficient cardiac stimulants, has only a mechanical action, supplying a fluid of the same specific gravity as the blood, which the heart pumps upon until the natural circulation is restored.

Cardiac Sedatives,—lessen force and frequency of pulse.

Opium. Aconite. Potassium.
Venesection. Purgatives.

Also hydrated chloral, veratrine, antimony, dilute hydrocyanic acid, ergot, alcohol, chloroform (late effect), ipecac, physostigmine, conium, low diet, diuretics, arrest sensory impressions (warm bath), diaphoretics, warm weather.

Drugs Acting on the Vessels.

Vascular Stimulants,—dilate the vessels through the vasomotor centres, equalizing blood pressure.

Nitroglycerin. Amyl Nitrite. Alcohol.

Also lobelia, ether, belladonna, liquor ammonii acetatis.

Local Stimulants (on skin),—dilate the vessels by local action.

Heat (poultices, fomentation). Acrid Oils (mustard).

Also volatile oils (turpentine, camphor), irritant metals (zinc, copper, iron), carbon compounds (creosote, phenol, etc.), and pepper.

Vascular Sedatives. See Hæmatinics and Antiphlogistics.

THE RESPIRATORY SYSTEM.

Drugs Acting on Respiration.

Respiratory Stimulants,—stimulate respiration by action on brain centres.

Strychnine. Ammonia. Atropine.

Also aconite, belladonna, hyoscyamus, stramonium, camphor, caffeine, and cocaine. Alcohol, ether, and chloroform in first stages.

Respiratory Depressants,—lower action of respiratory centre.

Heroine. Hydrated Chloral. Chloroform.

Also opium, ether, alcohol, antimony, and hydrocyanic acid.

Drugs Acting on the Bronchial Tubes.

Pulmonary Sedatives,—relieve cough and dyspnœa.

Heroine. Opium. Hydrocyanic Acid.

Also codeine, hydrated chloral, bromides, oil of turpentine, belladonna, hyoscyamus, cannabis indica, chloroform, and wild cherry.

Expectorants,—modify bronchial secretion and aid its expulsion.

(1) *Depressant Expectorants.*

Antimony. Ipecac. Alkalies.

Also apomorphine, iodides, and general depressants, as opium, hydrated chloral, etc.

(2) *Stimulant Expectorants.*

Ammonium Chloride. Ammonium Carbonate. Squill.

Also balsam of Peru, balsam of tolu, creosote, senega, benzosol, aromatic oils, acids, and syrups.

Inhalations,—used to stimulate the bronchi, disinfect secretions, or relieve spasms.

Benzoin. Creosote. Amyl Nitrite.

Also turpentine, oil of eucalyptus, stramonium, conium, chloroform, tobacco, nitre paper, steam.

THE DIGESTIVE SYSTEM.

Drugs Acting on the Salivary Glands.

Sialagogues,—increase flow of saliva.

Pilocarpus. Mercurials. Acids.

Also tobacco, ether, pungents, iodine, physostigmine, antimony, and ipecac.

Anti-Sialagogues,—decrease flow of saliva.

Atropine. Opium. Alkalies.

Also belladonna, hyoscyamus, stramonium, tobacco in excess, and all nauseous or insipid stuffs.

Refrigerants,—allay thirst and create coolness.

Cool Drinks. Dilute Acids. Cold Externally.

Also fruit juices, many diaphoretics, and cold per rectum or vagina.

Drugs Acting on the Stomach.

Emetics,—cause vomiting.

Stomach Tube. Warm Water. Apomorphine.

Also mustard, soapsuds, or salt and warm water, tartar emetic, ipecac, zinc or copper sulphate, alum, infusion of camomile, and ammonium carbonate.

Anti-Emetics,—relieve nausea and vomiting.

Quiet. Morphine. Cerium Oxalate.

Also bromides, chloral, cocaine, creosote, carbolic acid, iodine, lime water, ice, bismuth subnitrate, chloroform, hydrocyanic acid, ipecac (in small doses), and alcohol.

Carminatives,—aid in expulsion of gas from stomach and intestines.

Capsicum. Ginger. Peppermint.

Also asafœtida, camphor, cardamom, cinnamon, musk, cloves, Hoffman's anodyne, spirits of chloroform, dilute sulphuric acid, and pungent, spirituous, and aromatic stomachics.

Gastric Tonics or *Stomachics*,—excite the functional activity of the stomach, and thus increase appetite and aid digestion.

Nux Vomica. Dilute Acids. All Alkalies.

Also gentian, quassia, cinchona, calumba, hydrastis, eucalyptus, wild cherry, cascarilla, taraxacum, aloes, rhubarb, pepsin, pancreatin, and alcohol.

Gastric Sedatives,—relieve pain and quiet the stomach.

Bromides. Silver Nitrate. Phenol and Iodine.

Drugs Acting on the Intestines.

Cathartics or *Purgatives*,—hasten intestinal evacuation.

(1) *Laxatives* or *Aperients*,—of moderate action.

Manna. Cascara. Prunes.

Also figs, tamarinds, molasses, sulphur, magnesia, glycerin, olive oil, and water.

(2) *Simple Purgatives*,—produce active peristalsis (and griping pain).

Castor Oil. Senna. Aloes.

Also cascara, rhubarb, glycyrrhiza, liquorice, eupatorium, and small doses of drastic, saline, and cholagogue purgatives.

(3) *Drastic Purgatives*, —intense action; watery stools; much pain.

Elaterium. Croton Oil. Compound Cathartic Pills.

Also aloes, colocynth, gamboge, jalap, podophyllum, and scammony.

(4) *Saline Purgatives* or *Hydragogues*,—slight pain; very watery evacuation.

Epsom Salt. Seidlitz Powder. Rochelle Salt.

Also sodium sulphate, magnesium citrate, sodium phosphate, cream of tartar, and saline waters.

(5) *Cholagogue Purgatives*,—remove bile from the intestines.

Calomel. Podophyllum. Sodium Phosphate.

Also blue mass, gray powder, iris, euonymus, fel bovis, and scammony.

(6) *Intestinal Antiseptics*,—destroy low organisms; check fermentation (antizymotics).

Salol. Naphthalene. Thymol.

Also beta naphthol, benzosol, silver nitrate, oil of turpentine.

Anthelmintics,—destroy (*vermicides*) or expel (*vermifuges*) intestinal worms.

(1) *Tape-worm.*

Filix Mas (*B. P.*). Cusso. Pepo.

Also turpentine, thymol, pelletierine, kamala, and granatum.

(2) *Round-worm.*

Santonin. Spigelia. Senna.

(3) *Thread-worm.*

Quassia. Alum. Sodium Chloride.

Also tannin, calumba, lime water, and vinegar (by enema).

(4) *Hook-worm.*

1. Calomel. 2. Thymol. 3. Epsom Salts.

THE NERVOUS SYSTEM.

Drugs Acting on the Spinal Cord and Nerves.

Spinal Stimulants and *Motor-Excitants*,—stimulate cells of spinal cord; act on motor nerves; increase reflex excitability.

Strychnine. Ammonia. Ether.

Also picrotoxin (on medulla), ergot, and alcohol.

Spinal and *Motor Depressants*,—lower the activity of spinal cord and motor apparatus.

Bromides. Gelsemium. Chloral.

Also atropine, amyl nitrite, physostigmine, lobelia, tobacco, alcohol, ether and chloroform, cocaine.

Drugs Acting on the Brain and Nerves.

Cerebral Stimulants,—increase the activity of the brain, most of them producing delirium if taken in large doses. Some (as alcohol) are narcotics at last.

Caffeine. Coca. Camphor.

Also cannabis indica, guarana, cocaine, belladonna, stramonium, hyoscyamus, theobromine, and alcohol.

Cerebral Depressants,—lower or suspend the activity of the brain.

(1) *Hypnotics* or *Soporifics,*—produce sleep.

Hydrated Chloral. Bromides. Opium.

Also paraldehyde, sulphonal, trional, somnal, amylene hydrate, hyoscine, exalgine, and urethane.

(2) *Narcotics,*—intensified hypnotic power.

Cannabis Indica. Bromal Hydrate. Chloretone.

Also opium and other drugs.

Anæsthetics,—produce insensibility to pain.

(1) *General Anæsthetics.*

Ether. Chloroform. Nitrous Oxide.

Also alcohol, and many derivatives of alcohol and ether, Schleich mixtures, A C E mixture, ethyl bromide, pental, and bromoform.

(2) *Local Anæsthetics.*

Cocaine. Ethyl Chloride. Eucaine B.

Also ethyl hydrate, orthoform, carbolic acid, cold, sterile water, holocaine, ether.

Anodynes or *Analgesics,*—terms applied to drugs that relieve mild pain.

(1) *General Anodynes.*

Acetanilide. Opium. Bromides.

Also phenacetine, antipyrine, all narcotics, and many hypnotics.

(2) *Local Anodynes.*

Cold or Heat. Aconite. Menthol.

Also belladonna, stramonium, carbolic acid, cocaine, chloroform and other liniments, chloral, camphor, and opium.

Antispasmodics,—prevent or relieve spasm of muscle by action on nerve centres.

Amyl Nitrite. Ether. Bromides.

Also potassium nitrate, chloroform, chloral, camphor, conium, aromatic oils, asafœtida, valerian, alcohol, musk, belladonna, stramonium, hyoscyamus, lobelia, and opium.

THE URINARY ORGANS.

Drugs Acting on the Kidneys.

Diuretics,—increase the quantity of urine.

(1) *Cardiac*,—increase the flow of urine by action on heart, and general and local circulation.

Digitalis. Alcohol. Squills.

Also strophanthus, spirits of nitre, and convallaria.

(2) *Renal*,—increase flow of urine by action on kidneys.

Salines. Buchu. Copaiba.

Also cubeb, sandalwood, capsicum, juniper, turpentine, cantharides, taraxacum, zea mays, uva ursi, and eucalyptus. Salines are potassium acetate, citrate, nitrate, and bitartrate, and sodium.

(3) *Combined Cardiac and Renal*,—act on heart, blood-vessels, and kidneys.

Caffeine. Diuretin. Water.

Also theobromine, scoparius, calomel, beer, and gin.

(4) *Urinary Alkalinizers*,—render the urine alkaline.

Salts of—
Potassium. Sodium. Lithium.

(5) *Urinary Acidifiers*,—render the urine acid.

Benzoic Acid. Salicylic Acid.

Drugs Acting on the Bladder.

Vesical Sedatives or *Tonics*,—improve the condition of the muscle and mucous membrane of bladder and urethra, reducing inflammation.

Copaiba. Salol. Urotropin.

Also cubeb, buchu, zea mays, eucalpytus, opium, belladonna, hyoscyamus, strychnine, salts of potassium and lithium, and local antiseptic and astringent applications.

THE GENERATIVE ORGANS.

Emmenagogues,—restore or regulate the menstrual flow. Most of them are tonic and sedative to the uterus and ovaries.

Viburnum Prunifolium. Iron. Aloetic Purgatives. Savine.

Also hydrastis, apiol, pulsatilla, ergot, myrrh, oil of rue, tansy. Indirect tonics—strychnine, manganese, cod-liver oil, hot hip bath, foot bath.

Ecbolics or *Oxytocics*,—cause contraction of the gravid uterus or of the uterus following childbirth.

Ergot. Quinine. Savine.

Also rue, hydrastis, and cotton-root bark.

Uterine Depressants,—restrain contraction of the uterus.

Viburnum Prunifolium. Opium. Chloral.

Also bromides, chloroform, and cannabis indica.

Galactagogues,—increase the secretion of milk.

Pilocarpus. Fluids. Milk. Leaves of Castor Oil Plant.

Antigalactagogues,—decrease the secretion of milk.

Belladonna. Camphor.

THE SKIN.

Diaphoretics,—increase the secretion of sweat. Indirectly they aid the kidneys and reduce temperature.

Pilocarpine. Dover's Powder. Acetanilide.

Also salicylates, nitrous ether, antimony, eupatorium, potassium, ammonium, camphor, alcohol, heat, antipyrine, asaprol, and other synthetics.

Anhidrotics,—diminish secretion of sweat.

Atropine. Hyoscyamus. Picrotoxin. Cold.

Irritants.—Many drugs when applied to the skin produce vascular excitement or irritation; called counter-irritants if applied to excite reflex influence at a remote point.

(1) *Rubefacients*,—cause redness of the skin.

Mustard. Heat. Turpentine.

Also ammonia, capsicum, camphor, veratrine, iodine, arnica, friction.

(2) *Vesicants* or *Epispastics*,—produce blisters, or collections of serum beneath the epidermis.

Cantharides. Mustard.

(3) *Pustulants*,—produce pustules, or small collections of white blood corpuscles.

Croton Oil. Tartar Emetic.

Caustics or *Escharotics*,—destroy the vitality of the tissues, producing a slough.

Nitrate of Silver. Caustic Potash. Sulphuric Acid.

Also zinc chloride, mercury, copper, chloride of antimony, bromine, lime, caustic soda; acids—carbolic, nitric, acetic (glacial).

Astringents,—produce contraction of vessels and tissue and lessen secretion from mucous membrane. Known as remote or local astringents according as they act on internal organs or affect the part to which they are applied. As they chiefly affect the vessels they may also be considered in relation to the circulation.

Tannic Acid. Alum. Iron.

Also gallic acid; substances containing tannic acid, as galls, hamamelis, catechu, etc.; acetic acid; salts of—lead, silver, zinc, copper, bismuth.

Antiphlogistics,—agents reducing or subduing inflammation or fever (Gould). They include all medicines and means to this end.

Styptics or *Hæmostatics*,—arrest hæmorrhage.

Adrenalin. All Astringents. Cold.

Also ergot, strychnine, digitalis, actual cautery, heat.

Emollients and *Demulcents*,—soften and protect skin or mucous membranes.

Vaseline. Cacao Butter. Borax.

Also olive oil, lanolin, lard, glycerin, starch, lycopodium, licorice, white of egg, barley water, rice water, flax seed, tragacanth, acacia, and other mucilaginous substances.

Protectives,—used to cover a part.

Collodion. Guttapercha, etc.

THE EYE.

Mydriatics,—cause dilatation of the pupil of the eye.

Atropine. Duboisine. Cocaine.

Myotics,—contract the pupil.

Physostigmine (Eserine). Opium, etc.

SUBSTANCES HAVING GENERAL SYSTEMIC EFFECT ON BLOOD AND TISSUE.

Restoratives,—promote constructional tissue change.

(1) *Foods*,—supply new material for repair and oxidation.

Proteids. Carbohydrates. Fats. Salts. Water.

Including albumins, starches, sugars, sodium chloride calcium phosphate; oils—olive, cod-liver; alcohol and other substances.

(2) *Hæmatinics*,—increase the hæmoglobin (red coloring matter) in the blood.

Iron. Manganese.

(3) *Tonics*,—promote nutrition and give *tone* to the system.

Strychnine. Iron. Arsenic.

Also quinine, vegetable bitters, phosphates, hypophosphites, cod-liver oil; acids—hydrochloric, nitro-hydrochloric, phosphoric, lactic, citric; salicin, and other drugs.

Alteratives,—by some unknown process *alter* morbid conditions and improve the nutrition of the body.

Mercury. Arsenic. Iodine.

Also antimony, gold and sodium chloride, sarsaparilla, colchicum, cod-liver oil.

Antipyretics,—reduce fever (1) by promoting loss of heat and (2) by lessening its production.

Cold. Acetanilide. Quinine.

Also antipyrine, salicylic acid, guaiacol, resorcin, phenacetine, aconite, chinoline, asaprol, and others.

Antiperiodics,—lessen the severity or prevent the return of certain periodically recurring diseases.

Quinine. Hydrastine. Eucalyptus.

ANTISEPTICS AND DISINFECTANTS.

Antiseptics,—arrest the growth of or destroy micro-organisms.

Disinfection,—relates to the complete destruction of the organism.

Formaline. Bichloride of Mercury. Sulphurous Acid.

Also carbolic acid, boric acid and borax, chloride of zinc, oxalic acid, permanganate of potassium, salicylic acid, peroxide of hydrogen, oil of eucalyptus, thymol, quinine, bismuth, iodoform, europhen, benzoin, lysol, aristol, dermatol, pyrogallol, chlorine, naphthalene, lime, creolin, and others.

Deodorants,—remove disagreeable odors.

Potassium Permanganate. Chloride of Lime. Chlorinated Soda. Charcoal, and many others.

Parasiticides,—destroy parasites on the skin.

Staphisagria. Picrotoxin. Ichthyol. Mercurials. Sulphur. Ether. Alcohol. Carbolic Acid.

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, or prepared synthetically in the laboratory; 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 and are nearly all soluble in water.

Salt Action or Ion Action.

The alkalies and their combinations with acids, forming salts, act in the system in a different way from the animal or vegetable drugs or the metals. When the salts are taken into the stomach and intestines there is set up a process of osmosis, diffusion, and filtration, while the secretory activity of the mucous-membrane cells in these organs is increased, and, as a result of these various actions, water is diverted from the blood into the stomach and intestines, at the same time that a portion of the salt is absorbed. Later the fluid and salt are all absorbed in the case of the chlorides, iodides, and bromides, this being accomplished readily. The carbonates, tartrates, citrates, phosphates, and sulphates are less readily absorbed, the last two being very difficult of absorption. The alkalies also vary in their rate of absorption, magnesium being very difficult of absorption. This enables one to understand why magnesium sulphate (Epsom salt) is a good purgative. The following list shows the rate of absorption of the various alkalies and salts, those most rapidly absorbed being given first, the rate decreasing in order as given:

1 Ammonium	1 Chlorides
2 Sodium	2 Carbonates
3 Potassium	3 Citrates
4 Lithium	4 Tartrates
5 Calcium	5 Phosphates
6 *Magnesium*	6 *Sulphates*

The action of the saline purgatives is considered to take place in this manner: When the salt enters the stomach and passes into the intestines, very little if any of it is absorbed, but a great deal of water is extracted from the blood by osmosis, diffusion, and filtration. This distends the intestines, increases peristalsis, and the contents of the bowel is liquefied and evacuated. The blood then repletes itself from the tissues. Should the blood and tissues be deficient in fluid this process would not go on, and there would be no purgative action. The salt would be slowly absorbed and cause diuresis, with consequent greater decrease in the fluid of the blood. But in cases of dropsy the fluid will be drawn off and evacuated through the bowel. The saline purgatives should be given in the morning, on an empty stomach, in as little water as will dissolve the salt, the water being as hot as can be taken internally. Activity aids the action of the salines, therefore the person taking them should move about during the day if practicable. The three alkalies, sodium, potassium, and ammonium, with their salts, may be divided into four groups.

I. In this group are placed sodium chloride and potassium chloride, which exhibit the specific action of the metallic ions, sodium and potassium, and are therefore depressant.

II. Group two contains sodium and potassium hydroxide, carbonate, and subcarbonate, which act through the non-metallic ion (the hydroxide, carbonate, or subcarbonate) by deoxydizing, or drawing oxygen from, the tissues. Their action is manifested in three ways: They

1. Neutralize acids, stop stomach secretion, aid pancreatic secretion, and cause alkaline urine. Some claim that they stimulate stomach secretion by neutralizing acid.

2. Dissolve proteids, and change them to alkali proteids—surface effect on skin and mucous membrane.

3. Saponify fats—surface of body and alimentary canal.

III. Ammonium chloride represents this group. Its action is due to both the metallic and non-metallic ion. It is stimulant and is used as an expectorant.

IV. Ammonium hydroxide and carbonate belong to this group, which is noted for its instability. Ammonia is given off freely and readily, exhibiting its stimulant effect. "Smelling salts" and aromatic spirits of ammonia belong here.

Salt action is not confined to the alkalies and salts, but is possessed by other bodies, such as sugar and urea.

Potassii Hydroxidum, Potassium Hydroxide. (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.

Potash 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 membranes, and stimulants to sustain the heart.

Preparations of Potassium.

Potassii Carbonas.
Potassium Carbonate.
Salt of Tartar.

A white, granular powder, with strongly alkaline taste which liquefies on exposure to the air by absorbing moisture from it. Average dose, gr. xv.–1 Gm.

Potassii Bicarbonas.
Potassium Bicarbonate.

Sometimes called saleratus. It is not deliquescent[1] 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.

[1] Melting by absorbing moisture from the air.

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 taken during digestion. They must be well diluted, in mucilaginous or sweetened water. Average dose, gr. xv.–1 Gm.

Liquor Potassii Hydroxidi.
Solution of Potassium Hydroxide.

A clear, colorless liquid, strongly alkaline, containing about six per cent. potassium hydroxide. Average dose, ♏ xv.–1 mil, well diluted.

Potassii Hydroxidum.
Potassium Hydroxide.
Caustic Potash.

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 other 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.
Potassium Citrate.

Made with citric acid and potassium carbonate. 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. Average dose, gr. xv.–1 Gm., well diluted.

Potassii Acetas.
Potassium Acetate.

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. Average dose, gr. xv.–1 Gm., largely diluted.

Potassii Chloras.
Potassium Chlorate.

The powder is white, odorless, with a cool, salty taste. It is not deliquescent. In combination with organic matters it is explosive. Soluble in 16 parts of cold and 2½ parts of boiling water.

Physiological Action.

Potassium chlorate 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.

Poisoning by potassium chlorate is manifested in three directions:

1. By the formation of methæmoglobin and the destruction of red blood cells.
2. By irritation of the kidneys.
3. By depression of the heart.

Minute quantities of the drug may cause no ill effect, but in children, or when more of the drug is taken than nature can care for, the formation of methæmoglobin by oxidation from the hæmoglobin of the red blood cells occurs at the same time that the cells are destroyed. Extrusion of the hæmoglobin from the cells is called "laking" the blood. The result of this process is that the blood carries less oxygen and the tissues become asphyxiated by lack of oxygen, the latter being held in closer combination in methæmoglobin than in hæmoglobin.

The kidneys are blocked up by the detritus of broken-down cells, and there may be acute inflammation of these organs—nephritis.

The depression of the heart and nervous system with the body muscles is due to the action of the potassium. The drug is especially dangerous for children and should not be given to them as a gargle or mouth wash in sore throat, diphtheria, etc.

The poisonous effect of potassium chlorate is not very generally known among non-professional people, and potassium chlorate 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. Potassium chlorate is eliminated unchanged by the urine.

Symptoms of Poisoning.

Taken in sufficient quantities potassium chlorate 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 diarrhœa, and great dyspnœa 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 muscular contractions, a peculiar stiffness of the extremities, delirium, and coma. Small ecchymoses 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 ℥ ss. A child one year old died from ʒ i. given in a night, and a child of three years from ʒ iii. In one case death took place a week after taking ℥ i.

Dose, gr. iv.–0.25 Gm., well diluted.

Potassii Cyanidum.
Potassium Cyanide.

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 potassium cyanide, in the strength of 2 to 4 grains in ℥ i. of water, will remove the stains of nitrate of silver.

Potassii Bitartras.
Potassium Bitartrate.
Cream of 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 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 ℥ ss.

Potassii Nitras.
Potassium Nitrate.
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 calcareous 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 ℥ 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.

Average dose, gr. viii.–0.5 Gm., well diluted with barley water or other demulcent.

Potassii et Sodii Tartras.
Potassium and Sodium Tartrate.
Rochelle Salt.

Made by adding carbonate of soda to a solution of potassium bitartrate. A mild saline **purgative,** less efficient 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.

Average dose, ʒ ii*ss*.–10 Gm.

Sodium (Soda).

There are four natural sources of the official salts of soda and their preparations, viz.:

1. Sodium, a metallic element.
2. Sodium chloride, or common salt, obtained from sea-water by evaporation and from salt mines.

3. Sodium nitrate. Found native in Chili and purified by crystallization from water.

4. Sodium borate or borax; a native product found in various localities.

Physiological Actions.

The salts of soda are absorbed into the blood and excreted from it more slowly than the salts of potash, 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 soda 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. Soda is excreted by all the mucous surfaces, by the kidneys, the liver, and, possibly, by the skin.

Sodii Chloridum.
Sodium Chloride.
(Common Salt.)

Salt performs a very important part in the human economy. It exists normally in the blood in the proportion of 9 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 sodium chloride, 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

[1] The force by which fluids pass through moist membranes.

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 2¾ 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.

The difficulty found by some persons in digesting milk may possibly be overcome or lessened by adding a generous pinch of salt to the beverage.

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

Sodii Carbonas.
Sodium Carbonate. Not official.

Called sal soda, or washing soda. Transparent colorless crystals, soluble in two parts of water. Its effects are similar to those of the potassium carbonate, 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 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 Bicarbonas.
Sodium Bicarbonate.

Soluble in 12 parts water (saturated solution). Sodium bicarbonate has a soothing action in burns, eruptions, and irritation of the skin. Dose, as an antacid, gr. x.–xx. (0.65–1.3 Gm.) 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 sodium bicarbonate and gr. cxx., or ℨ ii., 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.
Sodium Borate.
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 waste. 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 (Lithia).

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. Lithium Carbonate.
Average dose, gr. viii.–0.5 Gm.

Lithii Citras. Lithium Citrate.
Average dose, gr. viii.–0.5 Gm.

Lithii Bromide. Lithium Bromide.
Average dose, gr. xv.–1 Gm.

Ammonium (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 is 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.
Ammonium Chloride.

A white crystalline or granular powder, of a cooling, salty taste. The action of ammonium chloride 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 expectorant.** The taste is very nauseous, resembling sea-water.

Average dose, gr. v.–0.3 Gm., well diluted with cold water.

Ammonii Carbonas.
Ammonium Carbonate.

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.) ammonium carbonate acts as an emetic. It has a nauseous taste, is very pungent, and must be well diluted. It may be given in milk.

Average dose, gr. v.–0.3 Gm.

Aqua Ammoniæ Fortior.
Stronger Ammonia Water.

Has a strength of 28 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.
Ammonia Water.

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**.

Average dose, ♏ xv.–1 mil, largely diluted.

Spiritus Ammoniæ Aromaticus.
Aromatic Spirit of Ammonia.

Contains ammonia water, and ammonium 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.

Average dose, ♏ xxx.–2 mils, well diluted in milk or water.

Liquor Ammonii Acetatis.
Solution of Ammonium Acetate.
Spirit of Mindererus.

Made from carbonate of ammonia and diluted 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 must be freshly prepared. Average dose, ℨ iv.–15 mils, well diluted with water.

Linimentum Ammoniæ.
Ammonia Liniment. Hartshorn Liniment.

A mixture of ammonia water with sesame oil. It should be freshly made.

Raspail's Sedative Water. Not official.

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

Nitrous Oxide Gas (Laughing Gas).

Nitrous oxide gas is a colorless, inodorous gas that can be liquefied by pressure, and is made by heating ammonium nitrate to 350–450° F., and washing the gas. It is used in dentistry, in minor surgery, and as a starter in ether and chloroform anæsthesia. It is administered through an inhaler connected with a cylinder, where the gas is under pressure, and is given without admixture with air. The inhalation is carried on until distinct cyanosis is visible. Unconsciousness comes on in from one-half to three minutes. Anæsthesia occurs when the blood becomes dark. Blood pressure is very high and there is almost complete asphyxia. Return to consciousness occurs in from one to three minutes after removal of the gas, without leaving any after-effects except a slight headache, which may persist for hours. Nitrous oxide is the safest known anæsthetic, and much the most pleasant.

Calx. Calcium Oxide, Lime.

Calcium occurs abundantly in nature and in manufacture. It is found largely as a carbonate in the form of limestone, chalk, marble, etc.; as a sulphate as plaster of Paris, gypsum, alabaster; as a phosphate in the different phosphate rocks and bone ash. Calcium is an exceedingly important constituent of the body, being found, in the form of solution of the phosphate, in every animal tissue and fluid. It gives solidity to bones, and accumulates wherever rapid tissue changes are taking place. The preparations of calcium are **antacid** and slightly **astringent.** Locally they are **sedative** to mucous membrane. Calcium 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 Oxide.

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 slaked lime, or quick-lime. If it should come in contact with the eye, it should be washed out with a solution of boric acid.

Liquor Calcis. Solution of Calcium Hydroxide.
Lime-Water.

Lime-water is a saturated solution of lime containing about $\frac{3}{4}$ of a grain to ℥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 ℥ss. to milk ℥v., increased, according to circumstances, to $\frac{1}{3}$ or even $\frac{1}{2}$ lime-water. Lime-water is slightly **constipating.**

Milk of Lime. Whitewash. Not official.

To one part of slaked lime, as above, four parts of water are added. This, mixed thoroughly with infectious stools, and added until the mixture gives a strong alkaline reaction when tested with litmus paper, is considered an efficient disinfectant for cholera and typhoid stools. Next to it in value comes chloride of lime, which is not effective unless fresh. This is to be made in a solution of six ounces to one gallon of water.

Syrupus Calcii Lactophosphatis.
Syrup of Calcium Lactophosphate.

Contains calcium carbonate, lactic acid, and phosphoric acid. Average dose, ʒ iiss.–10 mils.

Linimentum Calcis.
Lime Liniment.
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 **astringent** action. Externally, it is used as a dusting-powder. When taken internally it may be administered in glycerin or syrup. Average dose, gr. xv.–1 Gm.

Mistura Cretæ.
Chalk Mixture.

Contains prepared chalk, and is an **astringent.** It must be freshly made. Dose, ℥ ss.–15 mils.

Calcii Chloridum.
Calcium Chloride.

A white salt, very deliquescent, and soluble in water. Odorless, with a sharp, salty taste. Average dose, gr. viii.–0.5 Gm.

Magnesii Oxidum, Magnesium Oxide, Magnesia.

The official 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 Magnesia.

Magnesii Sulphas.
Magnesium Sulphate.
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 (℥ 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 2½ parts of water. Dose, ℥ ss. (15 Gm.) in carbonated, Seltzer, or Vichy water.

Liquor Magnesii Citratis.
Solution of Magnesium Citrate.

In small doses 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. Average dose, ℥ xii.–350 mils.

Magnesii Sulphas Effervescens.
Effervescent Magnesium Sulphate.

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

Dose, ʒ i.–iv. stirred up in cold water. (4–15 Gm.)

Cerium (Cerium).

A metal of which the oxalate only is used.

Cerii Oxalas.
Cerium Oxalate.

A white granular powder, insoluble in water, alcohol, or ether. It is a **gastric sedative**, and is given dry on the tongue. Average dose, gr. iii.–0.2 Gm.

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,** and **hæmostatic.**

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 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. 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. Potassium iodide aids in elimination of the poison, and baths of potassium sulphide 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.

Plumbi Acetas.
Lead Acetate.
Sugar of Lead.

Made by the action of acetic acid on litharge, or lead oxide. This is the only preparation of lead given internally. Acute poisoning has been caused by the lead acetate, 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 under chronic poisoning. Recovery may take place within a few days, although symptoms recur, occasionally, after a long interval. The fatal dose is between ℥ 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.

Average dose, gr. i.–0.06 Gm.

Liquor Plumbi Subacetatis.
Solution of Lead Subacetate.
Goulard's Extract.

Used only externally. It should be diluted, in a strength of ℥ i.–iv. to O. i. of water.

Ceratum Plumbi Subacetatis.
Cerate of Lead Subacetate.
(Goulard's Cerate.)

Compound of wool fat, paraffin, white petrolatum, camphor, and Goulard's extract. For external use.

Emplastrum Plumbi.
Lead Plaster.
Diachylon Plaster.

Made with lead oxide, oil, lard, and water.

Emplastrum Adhæsivum.
Adhesive Plaster.

Made of rubber, lead plaster, and petrolatum.

Emplastrum Saponis.
Soap Plaster.

Made of soap, lead plaster, and water.

Unguentum Diachylon.
Diachylon Ointment.

Made of lead plaster, petrolatum, and oil of lavender.

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.
Silver Nitrate.

Prepared by dissolving silver in nitric acid.

Physiological Actions.

Silver nitrate 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 styptic 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 **astringent** 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.

Average dose of the nitrate, gr. $\frac{1}{6}$–0.01 Gm., in pill, given after meals, unless otherwise ordered. Silver nitrate 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.
Moulded Silver Nitrate.
Lunar Caustic.

Made by evaporating silver nitrate and forming it in pencil-shaped moulds. It is used externally as a caustic. 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 silver nitrate the pencil should always be washed in an antiseptic solution before and after using, and, especially before it is put away, carefully dried.

Argenti Nitras Mitigatus.
Mitigated Silver Nitrate.
(Mitigated Caustic.)

Made with silver nitrate and potassium nitrate. For local use externally, and is used as an application to the eyelids.

Aurum (Gold).

Preparations of Gold.

Auri et Sodii Chloridum.
Gold and Sodium Chloride.

This salt is a somewhat deliquescent powder of salty metallic taste, soluble in water. The precise physiological actions of the salts of gold are not well understood. Clinically the gold preparations are looked upon as alteratives and nerve tonics, improving general nutrition, and more especially the nutrition of the nervous system. The most prominent use of gold is in connection with the alcohol habit. It is believed that in the Keeley Institutes for the cure of alcoholism the treatment consists in part at least of the gold and sodium chloride, with intervening doses of strychnine and atropine.

The average dose in solution or pill form is gr. $\frac{1}{12}$–0.005 Gm. Hypodermically it is irritating and painful.

Auri Chloridum. Not official.
Gold Chloride.

This salt is not in frequent use. Dose, gr. $\frac{1}{150}$. (0.00043 Gm.)

Auri et Potassii Bromidum. Not official.
Gold and Potassium Bromide.

This drug is usually given hypodermically. Unpleasant symptoms referable to the cardiac region may be caused by it, as pain and rigor, but they do not last long. Dose, gr. $\frac{1}{6}$–$\frac{2}{3}$. (0.02–0.04 Gm.)

Zincum, Zinc.

There are two sources of the salts and preparations of zinc, viz.: the metal, zinc, and the native carbonate, calamine. Not official as a metal.

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; 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.
Zinc Chloride.

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 ℥ 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]
Zinc Sulphate.

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

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[1] Zinc solution for the disinfection of white clothing. Sulphate of zinc, ℥ ii. Common salt, ℥ iv. Water, 1 gallon. Soak clothes for from 4 to 6 hours, boil, and wash.

of zinc has **tonic** and **astringent** properties. Continued long in medicinal doses it may cause ulceration of the mucous membrane of the alimentary canal. Zinc sulphate 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.

Average dose (medicinal), gr. $\frac{1}{10}$–0.006 Gm.

Dose (emetic), gr. xv.–1 Gm., largely diluted with warm water, and given every fifteen minutes until vomiting occurs.

Zinci Oxidum.
Zinc Oxide.

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

Unguentum Zinci Oxidi.
Ointment of Zinc Oxide.

Made of oxide of zinc, usually twenty parts, to benzoinated 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 **astringent.** Internally in small doses they have the last two, 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.** The metal is not official.

Preparations of Copper.

Cupri Sulphas.

Copper Sulphate.

Sometimes called blue vitriol, or bluestone.

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 ℥ 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 be delayed 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 potassium ferrocyanide, but with this, too, emesis should follow promptly.

Average dose (medicinal), gr. $\frac{1}{16}$–0.004 Gm.

Average dose (emetic), gr. iv.–0.25 Gm.

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 is the sulphate of aluminum and potash and has a crystalline form and a taste which is both acid and sweetish, and also astringent. It is soluble in water, but insoluble in alcohol.

Physiological Actions.

Alum is an **astringent** and **styptic.** In doses of ʒ i. 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 hæmorrhage 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 promoting vomiting and washing out the stomach, giving magnesium hydrate in large quantities, or a weak solution of ammonium carbonate at intervals. Death has been caused in eight hours in an adult by ℥ ii. of alum.

Preparations of Alum.

Alumini Hydroxidum.
Aluminum Hydroxide.

The average dose of alum is gr. viii.–0.5 Gm. Any preparation should be taken through a tube.

Alumen Exsiccatum.
Exsiccated 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 ʒ i.–iv. to alcohol ℥ 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 **astringent,** 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 astringent 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 astringent 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.

Organic and inorganic compounds of iron are believed to be absorbed with equal readiness in the alimentary canal, principally in the duodenum, whence they pass to the spleen, where they are stored up, being given off to the blood later, and carried to the liver, where they assist in forming hæmoglobin. Some part of the iron is afterwards taken into the blood, and is excreted by the cæcum and large intestine. This is the prevalent view regarding the absorption of iron and its distribution throughout the system. Some claim that the inorganic iron combines with the sulphur in the intestines, forming the sulphide of iron which is excreted in the fæces, thus leaving all the food iron to be absorbed. Part of the food iron would be taken into combination, otherwise, by the sulphur, preventing absorption.

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, two things must be provided for:

1. The bowels must be loose.
2. The digestion must be good ; and in the course of administration 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, constipation, 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 everything 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 ammonia water undiluted. Oxalic acid will take the stains out of muslin or linen.

Preparations of Iron.

The five preparations of iron which are especially prescribed because of their effectiveness and because they are the least irritating of the iron compounds are:

Tincture of the chloride.
Syrup of the iodide.
Solution of the acetate of iron and ammonia ("Basham's Mixture").
Pills of the carbonate ("Blaud's Pills").
Iron and potassium tartrate.

(*Saline Combinations.*)

Tinctura Ferri Chloridi.
Tincture of Ferric Chloride.

Sometimes called the muriated tincture.

It is reddish-yellow in color, and has peculiar properties. It is the most frequently used of all the preparations of iron. It is **astringent, 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. It contains about 4% of metallic iron.

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. It may be given with glycerin, 3 parts to iron 1 part, the glycerin to prevent constipation, or it may be dropped into egg albumen to prevent its action on the teeth. It is a very incompatible drug, and should not be given at the same time that another drug is administered. 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.

Average dose, ♏ viii.–0.5 mil, half an hour after meals, in a tumblerful of water.

Liquor Ferri et Ammonii Acetatis.
Solution of Iron and Ammonium Acetate.
Basham's Mixture.

Composed of tr. of ferric chloride, diluted acetic acid, solution of ammonium acetate, elixir of orange, glycerin, and water. It should be freshly made.

Average dose, ʒ iv.–15 mils, well diluted.

Syrupus Ferri Iodidi.
Syrup of Ferrous Iodide.

Iodide of iron affects the teeth seriously. It has iodine, iron, and syrup, and exerts a special action on nutrition by means of the iodine.

Average dose, ♏ xv.–1 mil, largely diluted.

Mistura Ferri Composita.
Compound Iron Mixture.
(Griffith's Mixture.)

Contains ferrous sulphate, potassium carbonate, and myrrh.

Dose, ℥ ss.–15 mils.

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

Contains about 13 % of metallic iron.

Ferrous sulphate, 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.

Liquor Ferri Tersulphatis.
Solution of Ferric Sulphate.

Contains about 10 % metallic iron. The chief employment of it is in making other ferruginous preparations. It should always be kept on hand for the quick preparation of the antidote to arsenic.

Pilulæ Ferri Carbonatis.
Pills of Ferrous Carbonate.
Blaud's Pills.

Contains sulphate of iron and carbonate of potassium, althæa, tragacanth, and glycerin. Dose, pil. i.

Ferrum Reductum.
Reduced Iron.
Quevenne's Iron.

A light gray powder, quite tasteless, and of all the preparations of iron the most free from astringency. Dose, gr. i.–0.06 Gm., taken after meals in pill form. It may be given to children in candy or lozenges.

Pilulæ Ferri Iodidi.
Pills of Ferrous Iodide.

Contain reduced iron, iodine, glycyrrhiza, acacia, and balsam of tolu. Dose, pil. i.

Ferri et Quininæ Citras.
Iron and Quinine Citrate.

Contains about 12% of quinine. It should not be exposed to the light.
Average dose, gr. iv.–0.25 Gm.

Ferri Sulphas Granulatus.
Granulated Ferrous Sulphate.

Average dose, gr. iss.–0.1 Gm.

Ferri Phosphas.
Ferric Phosphate.

Contains not less than 12% of iron. It should not be exposed to light.
Average dose, gr. iv.–0.25 Gm.

(*Antidotes to Arsenic.*)

Ferri Hydroxidum.
Ferric Hydroxide.

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 ammonia water or sodium carbonate 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. About 8 grains of it are required to neutralize 1 grain of the poison.

Ferri Hydroxidum cum Magnesii Oxido.
Ferric Hydroxide with Magnesium Oxide.

Made by combining the solution of the ferric sulphate with magnesia. It is said to be the best antidote for arsenic. Dose as antidote, ℥ iv.–120 mils.

Dialyzed Iron. Not official.

An antidote to arsenic; also given medicinally. It is said that it does not blacken the teeth nor constipate. Dose, from 20 to 40 drops. It should always be given alone.

Manganesium (Manganese).

Manganese is found native in the form of the black oxide. Not official as such.

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.

Potassii Permanganas.
Potassium Permanganate.

Made from the black oxide of manganese, potassium chlorate, 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. It should be kept in the dark.

Potassium permanganate 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,** but practically it is not useful in disinfecting excreta, as the amount required to be effectual would make it enormously expensive.

It is oftenest and most satisfactorily used as a deodorizer, in the one-per-cent solution, as a wash, douche, spray, or gargle, for foul, carious, or gangrenous discharges. It is also used in skin disinfection, in a supersaturated solution.

The stains made upon linen by this salt may be removed with oxalic acid, lemon juice, or water with muriatic acid.

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.
Manganese Sulphate.

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. (0.1–0.3 Gm.)

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. It is considered a specific in some forms of syphilis.

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.

When chronic poisoning by mercury is evident, the drug should be stopped immediately, the throat and mouth gargled regularly with a solution of potassium chlorate, and atropine may be given to lessen the excessive secretion of saliva, while potassium iodide is used to eliminate the mercury from the tissues.

Acute poisoning will be described under corrosive sublimate.

Preparations of Mercury.

Hydrargyri Chloridum Corrosivum.
Corrosive Mercuric Chloride.
Corrosive Sublimate.

Known as bichloride of mercury, or "bichloride." 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.

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

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

Average dose, gr. $\frac{1}{20}$–0.003 Gm., well diluted and given after meals. All other non-purgative preparations are, as a rule, taken after meals also.

Hydrargyri Salicylas.
Mercuric Salicylate.

Average dose, gr. $\frac{1}{15}$–0.004 Gm.

Hydrargyri Iodidum Flavum.
Yellow Mercurous Iodide.
Protoiodide of Mercury.

Average dose, gr. $\frac{1}{6}$–0.01 Gm.

Hydrargyri Iodidum Rubrum.
Red Iodide of Mercury.
Biniodide of Mercury.

Average dose, gr. $\frac{1}{20}$–0.003 Gm.

Hydrargyri Chloridum Mite.
Mild Mercurous Chloride.
Calomel.

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

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.

It should never be used as a home remedy. Average dose, gr. i.–0.06 Gm., as laxative.

Massa Hydrargyri. Mass of Mercury.
Blue Mass.

Made by combining mercury in the metallic state with glycyrrhiza, althæa, etc. 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. $\frac{1}{3}$ of metal. Average dose, gr. iv.–0.25 Gm.

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 glycerin. Dose, gr. i.–v. (0.06–0.25 Gm.) 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 mercury, benzoinated lard, suet, and oleate of mercury. Strength about 50%. The diluted ointment is called "blue."

Unguentum Hydrargyri Oxidi Flavi.
Ointment of Yellow Mercuric Oxide.

Strength, 10 %.

Unguentum Hydrargyri Ammoniati.
Ointment of Ammoniated Mercury.

Strength, 10 %.

Unguentum Hydrargyri Nitratis.
Ointment of Mercuric Nitrate.
Citrine Ointment.

Strength, 7 %. Contains also nitric acid.

Black Wash. Not official.

Calomel ʒ i, lime-water O. j. Used externally.

Yellow Wash. Not official.

Corrosive sublimate ʒ ss, lime-water O. j. Used externally.

These two washes depend for their efficacy on the black and yellow oxides which are formed by the union with lime-water. They are used for syphilitic ulcers. The yellow wash is the more stimulating.

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.

The bowels should be kept open and the teeth should be kept clean in order to prevent salivation.

Mercurial ointment should be rubbed in with a piece of flannel and the nurse's hand must be well protected to prevent absorption.

Arsenium (Arsenic).

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

Arseni Trioxidum. Arsenic Trioxide.
Arsenous Acid.
White 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,** but 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 albuminons 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, diarrhœa, 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 arsenical poisoning two effects are produced upon the tissues:

1. The epithelium of mucous membranes is desquamated, especially in the alimentary canal.

2. The blood-vessels in the splanchnic area are widely dilated.

These two conditions give rise to clear watery stools —"rice water stools,"—which are characteristic of arsenical poisoning and Asiatic cholera.

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; dyspnœa; 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 hours. 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 signs to be watched for in the administration of arsenic are:

1. Puffiness about the eyes in the early morning.
2. Constriction of the throat.
3. Gastric disturbances—indigestion, pain, nausea, etc.
4. Pigmentation of the skin.
5. "Rice water stools."

The arsenic should be discontinued for a short time, but may be resumed unless the symptoms were alarming.

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.

Arseni Trioxidum.
Arsenic Trioxide.
Arsenous Acid.

Average dose, gr. $\frac{1}{30}$–0.002 Gm., well diluted and given after meals.

Liquor Acidi Arsenosi.
Solution of Arsenous Acid.

Contains arsenic trioxide 1 part in 100, and diluted hydrochloric acid 5 parts in 100.

Average dose, ♏ iii.–0.2 mil, well diluted and given after meals.

Liquor Potassii Arsenitis.
Solution of Potassium Arsenite.
Fowler's Solution of Arsenic.)

Contains tr. of lavender and arsenic trioxide and bicarbonate of potassium, 1 part of arsenic in 100. Five minims represent gr. $\frac{1}{24}$.

Average dose, ♏ iii.–0.2 mil, well diluted and given soon after meals.

Arseni Iodidum.
Arsenous Iodide.

Average dose, gr. $\frac{1}{12}$–0.005 Gm.

Liquor Arseni et Hydrargyri Iodidi.
Solution of Arsenous and Mercuric Iodides.
(Donovan's Solution.)

A very powerful alterative, containing 1 % each of iodide of arsenic and red iodide of mercury. It is capable of acting as a corrosive poison, and may salivate. Locally it is a violent irritant.

Average dose, ♏ $1\frac{1}{2}$–0.1 mil, well diluted.

Cupri Arsenis. Not official.
Paris Green.

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

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 official, all preparations being derived from black antimony, which is obtained from siliceous matter, purified and powdered.

Antimonii et Potassii Tartras.
Antimony and Potassium Tartrate.
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 ℥ 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.

Average dose of tartar emetic, gr. $\frac{1}{12}$–0.005 Gm., diluted.

Vinum Antimonii.
Wine of Antimony. Not official.

Contains of tartar emetic gr. ii. to ℥ i.

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

It is not considered useful.

Syrupus Scillæ Compositus.
Compound Syrup of Squill.

Contains squill, senega, sugar, and water, with tartar emetic, about gr. $\frac{3}{4}$ to ℥ 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. Not official as a metal.

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.
Bismuth Subnitrate.

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

Average dose, gr. viii.–0.5 Gm.

NON-METALLIC ELEMENTS.

Phosphorus, 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.

Phosphorus poisoning causes grave changes in metabolism, indicated by lessened oxidation, and fatty degeneration in all the tissues of the body and cirrhosis of the various organs, stomach, liver, and kidneys, as well as necrosis of bone, especially of the jaw.

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 ʒ 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.

Pilulæ Phosphori.
Pills of Phosphorus.

Each contains gr. $\frac{1}{100}$ of phosphorus. (0.0006 Gm.)

Calcii, Potassii } Hypophosphis.	**Calcium, Potassium } Hypophosphite.**

Average dose of each, gr. viii.–0.5 Gm.

Sodii Hypophosphis.	**Sodium Hypophosphite.**

Average dose, gr. xv.–1 Gm.

Syrupus Hypophosphitum.
Syrup of Hypophosphites.

Contains hypophosphite of lime, about gr. iii. to ʒ i., and of soda and potash each about gr. i. to ʒ i., with diluted hypophosphorous acid, glycerine, and sugar.

Average dose, ʒ iiss.–10 mils, 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 official, 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 (℥ 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 Chlorinata.
Chlorinated Lime.

Made by the action of chlorine on slaked lime, containing 30 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. This preparation is popularly called chloride of lime.

Liquor Sodæ Chlorinatæ.
Solution of Chlorinated Soda.
Labarraque's Solution.

Contains sodium carbonate and chlorinated lime. 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.

The antidote, in case of poisoning by any of the chlorine compounds, is albumin: white of egg, milk and flour.

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.
Potassium Bromide.

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.

Potassium bromide 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.–xx. (0.65–1.3 Gm.)

Ammonii Bromidum.
Ammonium Bromide.

Prepared by precipitating the freshly made solution of bromide of iron with ammonia water. The salt remaining 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.

Average dose, gr. xv.–1 Gm.

Sodii Bromidum
Sodium Bromide.

Colorless crystals, soluble in $1\frac{2}{10}$ parts of water, and containing 98 per cent. of sodium bromide. It resembles potassium bromide, and has very much the same qualities. It is considered less depressing, and the least toxic of all the bromide preparations. There is a variety of opinions as to its hypnotic power compared with that of potassium bromide.

Average dose, gr. xv.–1 Gm.

Lithii Bromidum.
Lithium Bromide.

A granular, very soluble salt, containing 98 per cent. of lithium bromide. In addition to the hypnotic power of the bromides in general it is said to have some **tonic** and **diuretic** action.

Average dose, gr. xv.–1 Gm.

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 glycerin. 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 ʒ i. 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.
Potassium Iodide.

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

Potassium iodide 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 headaches; 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 1 in 1 (♏ i. = 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.

Potassium iodide is given pleasantly and with great freedom in aromatic spirits of ammonia.

Average dose, gr. v.–0.3 Gm.

Liquor Iodi Compositus.
Compound Solution of Iodine.
Lugol's Solution.

Composed of iodine and potassium iodide—of the former, 5%.

Average dose, ♏ iii.–0.2 mil, well diluted.

Tinctura Iodi.
Tincture of Iodine.

Contains 70 Gm. iodine, and 50 Gm. potassium iodide, in 1000 mils alcohol.

Recent surgical work has given the iodine tincture a distinguished place in the technique of disinfection and treatment of wounds. It was formerly used simply as a counterirritant, painted on the skin as ordered, with a camel's-hair brush. If the application is painful and it is desirable to remove it, a weak solution of ammonia will take it off.

Unguentum Iodi.
Iodine Ointment.

Contains 4 parts in 100 of iodine, with 4 parts of potassium iodide, 12 parts glycerine, and benzoinated lard to make up the rest.

Iodoformum.
Iodoform.

Iodoform is made by heating iodine with potassium carbonate, 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. It is slightly volatile at ordinary temperatures, and at a temperature above 239° F. emits vapors of iodine.

Iodoform was discovered in 1822, but was not used for some years. Before the perfecting of surgical technique it had great vogue for a time as a disinfectant and antiseptic. Iodoform gauze was much used for wounds and dressings, and the powder freely applied. This overuse caused many cases of poisoning, as it is absorbed with great facility through an abraded surface.

Such incidents checked its popularity, and its strong odor made patients averse to it.

As sterilization developed and other substances were evolved, the use of iodoform was diminished. 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 depression 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. Average dose, gr. ii.–0.125 Gm.

Unguentum Iodoformi.
Iodoform Ointment.

Iodoform 10 parts, and benzoinated lard 90 parts.

Iodolum.
Iodol.

Iodol is an unofficial substance which has been 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.

Other derivatives of iodoform, unofficial, are:

Aristol.	**Antiseptin.**
Europhen.	**Losophane.**
Antiseptol.	**Sozoiodol.**
Sozal.	**Sulphaminol.**
Thiophene.	

Sulphur (Brimstone).

Sulphur is found native in volcanic districts as crude sulphur, and in combination with metals, as sulphides. Not official as crude sulphur.

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 used only in making other preparations.

Sulphur Lotum.
Washed Sulphur.

Sublimed sulphur washed with ammonia water and freed from acid. The action is **laxative.** It is given in powder mixed with simple syrup or molasses. Dose, ʒ i.–4 Gm., given at night.

Potassa Sulphurata.
Liver of Sulphur.

A mixture containing about 12 per cent. of sulphur. Solid greenish pieces, alkaline, and of very acrid taste; soluble in water, making an orange-colored solution. Locally applied, sulphurated 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 ʒ 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.

Unguentum Sulphuris.
Sulphur Ointment.

Sulphur in strength of 1½ parts in 10, with benzoinated lard.

Ichthyol. Not official.

A preparation obtained from a bitumen[1] 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. It is useful as a sedative, antiseptic, and alterative.

Carbo Ligni.

Wood 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. For this reason, when intended for medicinal purposes it must be kept carefully covered in well-stoppered 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. Average dose, gr. xv.–1 Gm.

Liquor Hydrogenii Dioxidi.

Solution of Hydrogen Dioxide.

Solution of Hydrogen Peroxide.

A slightly acid watery solution of hydrogen dioxide, containing, when fresh, about 3 per cent., by weight, of the pure dioxide, corresponding to about ten volumes of oxygen.

It is used in the treatment of ulcers, fetid suppura-

[1] An inflammable mineral substance.

tion, diphtheritic membranes, etc. Its virtues depend on its readiness to yield oxygen to all oxidizable substances.

As it soon loses strength, it should be kept in small quantities, in a cool place, not exposed to the light, and as it is an expensive article, should be carefully used.

INORGANIC ACIDS.

Acidum Sulphuricum, Sulphuric Acid.

(Oil of Vitriol.)

Sulphuric acid is made by passing in leaden chambers simultaneously the vapors of burning sulphur, nitric acid, steam, and air.

It is a colorless, oily-looking, intensely acid liquid, containing 7.5 per cent. water. On exposure to the air it absorbs moisture.

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 ℥ 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.
Diluted Sulphuric Acid.

Has a strength of 10 per cent. of the acid.
Average dose, ♏ xv.–1 mil.

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.
Average dose, ♏ xv.–1 mil.

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 68 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 of 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.

Nitric Acid is used in preparing Acidum Nitrohydrochloricum in its strong and diluted forms. There is no longer an official preparation of diluted nitric acid for medicinal use.

Acidum Hydrochloricum.

Hydrochloric (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 31 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 other two.

Acidum Hydrochloricum Dilutum.

Diluted Hydrochloric Acid.

Has a strength of about 10 per cent.

Average dose, ♏ xv.–1 mil, well diluted and given after meals.

Acidum Nitrohydrochloricum.

Nitrohydrochloric Acid.

Made by mixing 180 parts of nitric with 820 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 especially, and also of the other glands of the alimentary canal. Besides being given internally, it is used in local applications over the liver, and in baths. In the former case, for stupes, the strength is ʒ i.–iii. to O. i. of water; and in the latter, ℥ 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 Nitrohydrochloricum Dilutum.
Diluted Nitrohydrochloric Acid.

Average dose, ♏ x.–0.65 mil, 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 85 per cent. It is very acid, but does not corrode the tissues. Its physiological effects are unimportant —mildly **tonic** and **astringent.**

Acidum Phosphoricum Dilutum.
Diluted Phosphoric Acid.

Dose, ♏ xxx.–2 mils, well diluted.

Acidum Sulphurosum, Sulphurous Acid.

Made by heating sulphuric acid with charcoal. Sulphurous-acid gas results, and is dissolved in water, constituting 6 per cent. of the solution. A colorless liquid with pungent sulphurous odor. Sulphurous-acid gas 6.4 per cent. is obtained by the combustion of roll sulphur, and was formerly used in disinfecting rooms. This form of disinfection, formerly believed to be efficient, is now known to be useless in so far as pathogenic bacteria are concerned, and boards of health are abandoning its use after contagious disease, though no faster than the advance in popular education on such lines. It is, however, of real value in ridding a room or ward of bedbugs, if these pests have lodged in the walls or woodwork, and for this purpose steam is not necessary. It is a specific for all forms of lower animal life—not bacteria.

Acidum Boricum, Boric 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.) Its use as a preservative for milk is dangerous, the milk so preserved being injurious, especially to infants.

Unguentum Acidi Borici.
Ointment of Boric Acid.

Contains paraffin, white petrolatum, 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 36 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 official.

Acidum Aceticum Dilutum.

Diluted Acetic Acid.

Has a strength of about 6 per cent.

Acetum.
Vinegar. Not official.

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 soap-suds, 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 ʒ 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, increases 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 prophylactic 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 ℥ i. has caused death in nine days. The alkalies, magnesia, lime, soap-suds, or the alkaline carbonates are antidotes.

Average dose, gr. viii.–0.5 Gm., freely diluted.

Acidum Tannicum, Tannic Acid.

There are two kinds of tannic acid, of which the official one is the gallo-tannic, and is obtained by treating powdered galls with washed ether. (Galls are growths of plant tissue caused by parasitic fungi or insects, whose excretions stimulate the plant cells to an abnormal development. There are many hundred varieties; that from which tannic acid is made being formed on an oak tree, *Quercus lusitanica*, by the action of the fly *Cynips gallæ tinctoriæ.*) Tannic acid is a light, feathery, yellow-white, non-crystalline powder, of faint odor and slightly bitter taste.

Physiological Actions.

Locally applied it is an active **astringent,** contracting the tissues, and in the case of mucous membranes causing great dryness. It coagulates albumin readily.

It has much greater strength than gallic acid. It is used to overcome relaxed conditions, and to check excessive secretions of the skin and mucous membranes. Parts exposed to friction, as tender feet or sore nipples, may be successfully hardened by the use of tannic acid. It is also a **hæmostatic.**

It is the best chemical antidote for the poisonous alkaloids, but its administration should be followed by emetics and purgatives, as the compounds formed are capable of being dissolved and absorbed in the alimentary canal.

When meant to act on the stomach it is usually given in powder; on the bowels, in pill form; and locally, as an ointment or lotion.

Tannic or gallic acid in some form is contained in and gives character to nearly all of the vegetable astringents, such as castanea or chestnut, catechu, geranium, pomegranate, logwood, hamamelis or witch hazel, kino, coto bark, alder, diospyros or persimmon, mango, *Pinus canadensis*, and others.

Preparations.

Glyceritum Acidi Tannici.
Glycerite of Tannic Acid.
Strength, 20 %.

Unguentum Acidi Tannici. Not official.
Tannic Acid Ointment.
Strength, 20 %.

Trochisci Acidi Tannici.
Troches of Tannic Acid.
1 gr. each.

Acidum Gallicum, **Gallic Acid.**

Gallic acid is also made from galls, and is an astringent similar to, but milder than, tannic acid. It does not coagulate albumin.

It is given in powder and pill, the average dose being gr. xv.–1 Gm.

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. Not official.
Dilute Lactic Acid.

Consists of 15 parts acid to 85 parts water. Dose ʒ ss., well diluted.

Acidum Hydrocyanicum.

Hydrocyanic or Prussic Acid.

The pure anhydrous [1] 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 official, and is kept only 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 Dilutum.
Diluted 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 colorless, watery liquid, containing 2 parts of the pure acid

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[1] Without water.

to 98 parts 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-stoppered 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. $\frac{9}{10}$ 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 anything 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.

Average dose of dilute acid, ♏ iss.–0.1 mil.

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 ʒ i. 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 and 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.

Dr. Potter says that the stomach pump should never be used in cases of oxalic acid poisoning.

The use of oxalic acid with permanganate of potash in the surgical theatre as a part of the process of hand and finger-nail disinfection for the surgeon is dealt with in text-books on operating-room technique.

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

[1] By uniting elements into a compound.

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.: (The two last are not official.)

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.

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

Methyl alcohol is slowly fatal if administered in small doses for a long time, or rapidly fatal if taken in large doses at one time, and causes optic-nerve atrophy —"methyl alcohol blindness." Its commercial use in many essences, Jamaica ginger, soda water, ales, etc., and in the form of "Columbian spirit," witch hazel, bay rum, eau de cologne, peruna, etc., is exceedingly dangerous.

Liquor Formaldehydi.

Solution of Formaldehyde.

Formaldehyde is derived from the oxidation of wood alcohol. It is antiseptic, disinfectant, deodorant, and germicidal in its action. It may be used either in solution in water (formaline) or as a vapor. Its action seems to be specific for the destruction of lower animal and plant life, but not for the higher animals. Sulphur is a better germicide for insects than formaldehyde, and the action of the latter is simply irritant to human beings. Formaldehyde is as efficient as corrosive sublimate and penetrates more rapidly. It is too irritating as an antiseptic in general surgery, but may be used in solutions of 1:500 or 1000. Instruments can be sterilized in a solution of 1:200 formaline. It may be employed as a deodorant, and as a disinfectant for stools and sputa in 5 % solution. A solution of 1:50 may be used for sweating feet. Clothing may be thoroughly disinfected by placing the articles in a compartment, causing a vacuum, and distilling the gas into this compartment where it penetrates thoroughly into every article. In the disinfection of rooms the gas should be admitted under pressure through the keyhole, after the room has been made practically air-tight. The gas from 150 c.c. of 40 % formaline is sufficient for each 1000 cubic feet of space. The room should be closed for twenty-four hours and before entering it a small amount of ammonia may be sprayed into the room to precipitate the formaldehyde, thus preventing the extremely irritant effects on the eyes and mucous membranes, when the room is entered.

Poisoning is very rarely reported. Large amounts internally or as douches cause toxæmia by shrivelling up the red blood cells, with the formation of hæmatin. There may be vomiting, purging, dyspnœa, cyanosis, and collapse. Ammonia water is the antidote.

Physiological Actions.

The action of alcohol is both local and general. It is an irritant in either case; an irritant being a drug that disorders or disorganizes function, in contradistinction to a stimulant, which increases activity, thereby increasing function. Its local action is the more important, for its entire effect may be due to the local irritant action on the skin and mucous membrane, and after absorption on the endothelium of the blood-vessels or their intrinsic nervous apparatus, on the heart and skeletal muscles, on the brain and nervous system, on the organs, and on all the cellular elements of the body. It produces at first a disorderly reaction by its irritant effect, finally causing fatigue, or complete inactivity of all parts by depression, depending upon the amount taken and the condition of the individual, etc. As in the case of any other poison there is a certain reaction in the organs and their functions in attempting to get rid of the noxious element. Alcohol has great affinity for nervous tissue. The brain responds by losing its power of inhibition, thus allowing free play to the emotions, while lessening will power. At first there is a quicker response to stimuli, but finally less capacity for accurate work either mental or physical. The respirations are increased in frequency, the alcohol being oxidized rapidly, and eliminated. The heart becomes more active and forceful as a result of the dilatation of the peripheral blood-vessels, due to paralysis of the vaso-constrictors, decreasing the resistance to the action of the heart, and by paralysis of the cardiac inhibitory nerves, thus giving the cardiac acceleration full play. Small quantities of alcohol after meals may improve the digestion by irritating the mucous membrane to greater activity, but prolonged regular use, or large quantities taken at one time, especially on an empty stomach, create grave indigestion by causing a catarrhal condition of the mucous membranes. Muscular activity is increased, for a few minutes, but in a disorderly way, and is rapidly followed by fatigue. Experiments prove that alcohol in even minute quantities is detrimental to riflemen at target practice, tight-rope performers in their acts, and whenever fine adjustments of nerve and muscle are necessary. Likewise it has been found to be harmful to mountain climbers, who are unable to carry on their feats of skill and endurance, to soldiers on the march, and to labor in all conditions. Theoretically alcohol is a food, saving tissue waste by taking the place of fats and carbohydrates in the production of heat and energy, but practically it is of no value. It is not a serviceable food, but an oxidizable drug, and may require more energy to overcome its irritant effects than it creates by stimulating, if it does really stimulate. Alcohol acts peculiarly by lowering body temperature and vitality, thus inviting inroads by any or all diseases that may be prevalent, or with which the person may come into contact. Its poisonous properties are thus manifested, and European studies have proved beyond a doubt that it is detrimental. It is absolutely bad for children and nervous persons.

In morbid states alcohol may be of service, as to tide over a crisis in fever, but it should never be used in case of shock, or during anæsthesia, because better remedies may be applied.

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 **antipyretic.**

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 secretion is 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: **constipa-**

tion; 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.

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 oxidized, 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.

In a healthy adult, ℥ 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 ℥ 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.

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 apparent 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 apparently 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,

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[1] Alcohol deprived of a certain proportion of its hydrogen.

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 "whisky 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 paralysis of the vaso-constrictors,—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.

Dilute alcohol administered early is a valuable antidote in carbolic acid poisoning.

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, or 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 ℥ iii.–iv. of brandy swallowed by a child of seven. One pint or 200 Cc. of whisky at one time is a fatal dose.

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.

Preparations of Alcohol.

Alcohol.
Alcohol.

Contains 94.9% by volume, 92.3% by weight, of pure ethyl alcohol with 7.7 of water.

Alcohol Dehydratum.
Dehydrated Alcohol.
Alcohol Absolutum. U. S. P., viii.

Made from alcohol by a lengthy chemical process. It consists of not less than 99% by weight of alcohol, and is not kept for sale but used only for pharmaceutical purposes.

Spiritus Tenuior.
Proof Spirit. Not official.

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

Alcohol Dilutum.
Diluted Alcohol.

41 % by weight, of alcohol, 48.6 % by volume.

Alcoholic Beverages.

Spiritus Frumenti. (U. S. P., viii. Dismissed from U. S. P., ix.)
Whisky.

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 ethyl 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. Whisky should be at least two years old before it is used.

The use of alcoholic beverages as medicinal agents is being rapidly discontinued, and if whisky is ordered in medical treatment the dosage is small and concentrated.

Spiritus Vini Gallici. (U. S. P., viii. Dismissed from U.S.P., ix.)
Brandy.

Brandy should be distilled from grapes, but it is also made artificially. It has about the same percentage of alcohol as whisky. 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 whisky, and is preferable where there is any tendency to diarrhœa, as it is slightly constipating, containing a little tannin. Both brandy and whisky 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. Not official.

Made by the distillation of fermented molasses.

Gin. Not official.

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. Not official.

Wines, brandy, and whisky have been excluded from U. S. P., ix., because of their inexact contents of alcohol. 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 whisky. 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 everything 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.

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 ʒ ii.

Average dose of chloroform, ♏ v.–0.3 mil.

Spiritus Chloroformi.
Spirit of Chloroform.

Strength 6%.
Average dose, ♏ xxx.–2 mils.

Aqua Chloroformi.
Chloroform Water.

Average dose, ℥ ss.–15 mils.

Chlorodyne. Not official.

A proprietary medicine containing chloroform, ether, morphine, cannabis indica, and hydrocyanic acid.
Average dose, ♏ xv.–1 mil, well diluted.

Linimentum Chloroformi.
Chloroform Liniment.

Composed of soap liniment and chloroform.

Linimentum Chloroformi Compositum.
Compound Chloroform Liniment. Not official.

Contains chloroform, oil of turpentine, laudanum, tincture of aconite, and soap liniment.

Chloroform Anæsthesia.

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 stage 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 ʒ 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, and artificial respiration kept up for several hours.

Æther.

Ether.

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 requires only 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. Reflexes from nose (fifth nerve) and rectum are the last to be abolished.

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. The anæsthetic mixture of Nussbaum is formed of ether 3 parts, alcohol and chloroform each 1 part.

Preparations of Ether.

Spiritus Ætheris
Spirit of Ether. Hoffman's Drops.

Has 32.5 parts of ether and 67.5 of alcohol.
Dose, ʒ i.–4 mils, well diluted with cold water.

Spiritus Ætheris Compositus.
Compound Spirit of Ether.
(Hoffman's Anodyne.)

Contains 32.5% ether, with alcohol and ethereal oil. It is a **carminative, antispasmodic,** and **stimulant.**
Dose, ʒ i.–4 mils, diluted with very cold or iced water.

Spiritus Ætheris Nitrosi.
Spirit of Nitrous Ether.
Sweet Spirit of Nitre.

A solution of sodium nitrite in alcohol, with the addition of sulphuric acid, monhydrated sodium carbonate and potassium carbonate. 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.

Average dose, ♏ xxx.–2 mils.

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.

Æthylis Bromidum.
Ethyl Bromide.
Bromide of Ether. Not official.

Made by distilling together alcohol, sulphuric ether, and potassium bromide. It is colorless, volatile, and highly inflammable. Ethyl bromide is used as a general anæsthetic in short operations, or before beginning chloroform anæsthesia. It is administered by means of a mask, as in giving ether. Anæsthesia lasts on an average for a minute and a half with one administration of the anæsthetic. Consciousness returns more quickly than from any other anæsthetic, but the inhalation is not pleasant and patients complain of great depression and discomfort afterwards. Ethyl bromide is liable to decomposition when kept long and is often furnished in impure form. It ought to be perfectly colorless, as a yellow color indicates decomposition, often with the presence of free bromine. The inhalation of from one to six drachms should give the desired result.

Æthylis Chloridum.
Ethyl Chloride.

A highly inflammable gas at the ordinary room temperature, it must never be used near a fire. It may easily be liquefied, and is used both as a general and a local anæsthetic. In obstetrics and in dentistry it may take the place of chloroform or of nitrous oxide, and it may be used preliminary to the administration of ether or chloroform. The liquid comes in sealed glass tubes with capillary points which are to be broken off or unscrewed when the liquid is volatilized by the warmth of the hand. The stream is directed upon the point desired in local anæsthesia, the tube being held a few inches away. Anæsthesia is usually effected in fifteen to twenty seconds. It should not be applied so long that the tissues are frozen hard, but should be removed as soon as they appear white. Too much freezing may cause delayed healing or a slough.

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 hydrated chloral of the U. S. P.

Chloralum Hydratum.
Hydrated 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.–℥ 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 is 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. It is preeminently a great depressant.

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 in 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.

Average dose, gr. viii.–0.5 Gm., diluted only moderately with water or a weak syrup.

Butyl Chloral Hydrate.
Croton Chloral. Not official.

A crystalline body formed by the action of chlorine on aldehyde; sparingly soluble in water, readily so in glycerin. 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.

Average dose, gr. v.–0·3 Gm., in syrup or glycerin.

Metachloral. Not official.

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

Chloral Camphor. Not official.

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

Paraldehydum, Paraldehyde.

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. Average dose, ♏ xxx.–2 mils, in water, either plain or with simple syrup. It must be well diluted.

Sulphonmethanum, Sulphonal.

Sulphonal is an alcohol derivative, belonging to what are chemically known as the sulphur compounds of alcohol. It has **hypnotic** action. It is a white, odor less, 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 sulphonal 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 sulphonal 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. Average dose, gr. xii.–0.75 Gm.

Hypnone. Not official.

A **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.

Average dose, gr. v.–0.3 Gm., in capsule, being insoluble in water.

Urethan. Not official.

A combination of carbonic acid and ethylic ether, sometimes used 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.

Average dose, gr. viii.–0.5 Gm., best given in pellet, wafer, or capsule.

Amylene Hydrate. Not official.

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.

Average dose, ♏ xxx.–2 mils.

Amylis Nitris, Amyl **Nitrite.**

Amyl nitrite is produced by distilling nitric acid with amylic alcohol (fusel oil), sulphuric acid, and copper, and purifying with alkalies 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.

Amyl nitrite 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 amyl nitrite 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 amyl nitrite.

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 amyl nitrite 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 ʒ ii. have been given in an hour and a half without unpleasant symptoms.

In giving inhalations of amyl nitrite, from 1 to 3 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 ♏ i.–ii. on sugar. Amyl nitrite is inflammable.

Amyl nitrite escapes by the kidneys. The urine is increased in amount and in acidity, and may sometimes contain sugar.

Nitro Glycerinum, Nitro Glycerin, Trinitrin, Glonoin. Not official.

Made by dropping glycerin 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-glycerin constitutes dynamite. It is never used undiluted in medicine. If spilled on the floor it may be dangerous. Pour potassium hydroxide on it to cause decomposition.

Spiritus Glycerilis Nitratis.
Spirit of Glyceryl Trinitrate.
Spirit of Nitroglycerin.

A one-per-cent. alcoholic solution of glyceryl trinitrate. It should be kept cool, away from lights or fire.

Physiological Actions.

Nitro-glycerin is the most powerful of the nitrites. Its physiological actions resemble very strongly those of amyl nitrite 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-glycerin. 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-glycerin.

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-glycerin 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. Average dose, ♏ i.–0.05 mil, in a little glycerin.

Phenol, Carbolic Acid.

Phenol is a product of the distillation of coal tar. It may also be obtained by the distillation of other organic substances, and, finally, may be made artificially—synthetic carbolic acid. Crude phenol is an imperfectly purified article, the result of two distillations. It is a dark-reddish liquid, useful as a disinfectant, and cheap. Further distillations produce pure phenol, which is colorless, crystallizes in needles, and, if absolutely pure, does not absorb water from the air.

If 5 to 10 % of water be added to the melted crystals, phenol will remain clear and not recrystallize on cooling; the further addition of water will cause a separation, phenol going to the bottom as an oily layer, the mixture not becoming clear again until 90 to 95 % of water has been added. The standard solution for ward use is made 1 part in 20 parts of water. The phenol and water should be well mixed, as they do not readily combine. Phenol is freely soluble in glycerin, alcohol, and ether. It sometimes acquires a reddish color on exposure, said to be due to minute quantities of metal, probably copper, contained in traces of the tar products present.

Physiological Effects.

Phenol 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.

Phenol 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 applications to skin or membrane, it only prevents the development of germs, and does not kill their spores. Used constantly, as in dressings, even dilute phenol will produce in time a gangrenous condition.

Symptoms of Poisoning.

The first signs of poisoning from the use, either external or internal, of phenol, 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 respiration, 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 ʒ i. to ℥ ss. (4–16 Gm.)

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, washing out the stomach with 50 % alcohol. The chemical antidotes are sulphate of magnesia or of soda, or syrup of lime, and they should be freely given (℥ 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 glycerin, as they dissolve the acid and aid its absorption. Atropine is a physiological antagonist, maintaining respiration; and cardiac stimulants may be required, given hypodermically.

Phenol 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.

Phenol 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.

Average dose, gr. i.–0.06 Gm., in glycerin or simple syrup—well diluted.

There is a large and constantly increasing group of compounds allied to phenol, called cresols. They are derived from coal tar, and possess strong antiseptic and germicidal powers. As a rule, they are less poisonous than phenol. Among them may be mentioned creolin, lysol, saprol, sozal, chlorphenol, pheno-salyl, aseptol, etc. The well-known Dobell's solution contains phenol, sodium bicarbonate, borax, and glycerin.

Creosotum, Creosote.

Creosote is produced by the distillation of wood tar, and is a very complex substance, containing many hydro-carbons, some of which are closely related to phenol. Creosote is not as poisonous as phenol, 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 phenol.

Average dose, ♏ iii.–0.2 mils.

Aqua Creosoti.
Creosote Water.

Strength, 1 per cent. Dose, ʒ i.–ii. 4–8 mils.

Guaiacol.

Obtained by distilling beechwood-tar creosote, or by preparing synthetically.

Derivatives of guaiacol: the first only official.

Guaiacolis Carbonas
Benzosol.
Styracol.

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 glycerin, 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.** 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 last two, lowers arterial tension, and causes nausea and vomiting.

Incidental Effects.

In giving salicylic acid the first evidences of overdosing which are to be looked for are buzzing and roaring in the ear, 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 a 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. As a preservative in canned foods it acts as a slow poison and as such it is even more dangerous.

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

Average dose, gr. xii.–0.75 Gm., moderately diluted.

Sodii Salicylas.
Sodium Salicylate.

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.

Average dose, gr. xv.–1 Gm., moderately diluted.

Phenylis Salicylas.
Phenyl Salicylate.
Salol.

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.

Average dose, gr. v.–0.3 Gm.

Salicin.
Oleum Gaultheriæ. } See Organic Materia Medica.

Thiersch Powder.

A combination of salicylic and boric acids, usually ordered in the proportion of ℥ ss. of the latter to ʒ 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 did not confine himself to one formula.[1]

Theobrominæ Sodio-Salicylas.
Theobromine Sodio-Salicylate.

Made from theobromine, an alkaloid obtained from the seeds of *Theobroma cacao*, the chocolate tree of South America, and sodium salicylate. It is a white powder, soluble in half its weight of warm water. As the theobromine separates from it on exposure to the air, it should not be given as powder, but as freshly prepared aqueous solution.

Physiological Actions.

It is a reliable diuretic, increasing the amount of urine, and the solids excreted by the urine. Its influence over the amount of albumin is not constant. However, in chronic nephritis the amount of albumin is generally diminished. In dropsy, with the increase of urine, there is disappearance or marked improvement of the œdema. Occasionally a profuse diarrhœa is apparently produced by the remedy, and assists in this removal of the transudation.

It is believed that the drug has a moderate influence on the heart. It strengthens and regulates it, is not depressing, and produces no functional disturbance. It does not appear that it causes any irritation either of the stomach or kidneys. Its diuretic action depends on a direct influence on the renal epithelium.

Average dose, gr. viii.–0.5 mils.

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[1] Charles Rice, Ph.D.

Naphthalenum, 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 naphtol. Externally it is used as an antiseptic.

Betanaphthol.
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. In medicinal doses it is an intestinal disinfectant, in doses of gr. i.–iv. (0.065–0.25 Gm.). It is also used as a local application, dissolved in alcohol, in from 1 to 50 %.

Allied to naphthol, all unofficial, are:

Microcidin.	**Alumnol.**
Benzonaphthol.	**Hydronaphthol.**
Betol.	**Asaprol.**

Chinolin. Not official.

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 glycerin on nitro-benzol 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.**

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 dyspnœa, paralysis, and collapse. Only one salt, the tartrate, is used medicinally.

Chinolin Tartras. Not official.

Average dose, gr. viii.–0.5 Gm., 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 medicines, which are synthetically prepared in laboratories, are the results of experiments made in the attempt to produce an imitation of quinine, and several different ones are derived from chinolin.

ANTIPYRETICS.

These drugs are supposed to act upon the heat regulating centre of the body, throwing it out of function, the heat then accumulating in the body as it is formed by oxidation and other processes, until, by a diffuse dilatation of the blood-vessels, the body loses a large amount of heat, even chills and rigors with possibly sweating and collapse resulting. Large doses of these drugs "lake" the blood, break up the red blood cells, and form methæmoglobin. *Cf.* Potassium Chlorate, p. 42. The cyanosis may be caused partly by this, partly by the dilated blood-vessels, and partly by the weak circulation due to collapse. The drugs so acting are antipyrine, acetanilide, resorcinol, and phenacetine.

Antipyrina, Antipyrine.

Antipyrine 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.** Antipyrine 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 antipyrine 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 antipyrine 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. Antipyrine 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.

Average dose, gr. v.–0.3 Gm., diluted moderately. It may be given in a little wine, or iced brandy and water.

Acetanilidum, Acetanilid. Antifebrin.

A neutral substance derived from aniline 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 antipyrine, 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 acetanilide takes place rather more slowly than that caused by antipyrine — 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 antipyrine. 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 acetanilide is occasionally followed by cyanosis, and in rare cases by collapse, though it is usually considered less apt than antipyrine 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 antipyrine 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 antipyrine.

Average dose, gr. iii.–0.2 Gm. It may be given in dilute alcoholic solution, and, like many remedies to-day, is put up in compressed tablets.

Allied to acetanilid, all unofficial, are:

Benzanilid.	**Exodyne.**
Antikamnia.	**Phenolid.**
Antinervin.	

Resorcinol, Resorcin.

Resorcinol is obtained from galbanum, a resin, by the action of alkalies. It is also made from phenol, thus belonging to the phenol group of derivatives of coal tar. It occurs as white crystals with an odor resembling phenol, and is soluble in water, and also in alcohol. It is **antiseptic** and **disinfectant,** inferior, however, in these respects to phenol. 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 subnormal temperature and thready pulse.

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

Average dose, gr. ii.–0.125 Gm.

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

Pheno-Resorcin. Not official.

A mixture of phenol and resorcinol, in the proportion of two thirds of the former and one third of the latter. It has antiseptic qualities.

Acetphenetidinum, Acetphenetidin. Phenacetin.

A 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 phenacetin are said to equal fifteen grains of antipyrine or quinine, and thirty grains of salicylate of soda, and to be equal in power with antifebrine, though less rapid in action and more enduring in its effect.

An eruption of the skin sometimes occurs in anæmic patients.

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

Average dose, gr. v.–0.3 Gm.

Allied to phenacetin, all unofficial, are:

Iodophenine. **Hydracetin.**
Methacetin. **Phenocoll Hydrochloride.**

Exalgine. Not official.

A preparation similar to, and 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.

Average dose, gr. iii.–0.2 Gm. .)

Pyridine. Not official.

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 aromatic 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.

Average dose, ♏ v.–0.3 Gm.

Benzosulphinidum. 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 specific effect on the system. It may be used instead of sugar in diseases where sugar is forbidden, as diabetes.

It retards digestion. Average dose, gr. iii.–0.2 Gm.

Acidum Oleicum.
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, of which only one is now official, viz., the oleate of mercury. Other substances that have been used in oleates are: veratrine, cocaine, quinine, atropine, and zinc.

Petrolatum (Vaseline).

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

Glycerinum, Glycerin. Glycerol.

Glycerin 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 glycerin in commerce is manufactured directly by the decomposition of fats by heated steam.

Glycerin 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 be 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.

The laxative action is very notable when glycerin is administered as an enema; a small amount—ʒ ss.–℥ ii.—acts quickly and satisfactorily.

Glycerin suppositories are also, in most instances, very efficacious. Average dose, ʒ i.–4 mils.

Preparations.

Glyceritum Phenolis.
Glycerite of Phenol.

Contains 20 parts of phenol to 80 of glycerin.

Glyceritum Acidi Tannici.
Glycerite of Tannic Acid.

The same strength as the above.

Glyceritum Boroglycerini.
Glycerite of Boroglycerin.

Boric acid 3 parts to 7 of glycerin.

PART II.

THE ORGANIC MATERIA MEDICA.

THE VEGETABLE KINGDOM.

ARRANGED UNDER BOTANICAL DIVISIONS OR NATURAL ORDERS.

Fam. Ranunculaceæ.

Aconitum, Aconite.

Monkshood (Wolfsbane).

Aconite is a tall perennial plant bearing a spike of blue flowers; found native in Europe, and cultivated in the United States. The official 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 be 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.

Fluidextractum Aconiti.
Fluidextract of Aconite.

Average dose, ♏ ss.–0.03 mil.

Tinctura Aconiti.
Tincture of Aconite.

Made from the root. Strength 10%. Average dose, ♏ iii.–0.2 mil, in water.

Extractum Aconiti.
Extract of Aconite.

One Gm. of the extract represents about four Gm. of aconite. Average dose, gr. $\frac{1}{6}$–0.01 Gm.

Aconitina.
Aconitine.

An alkaloid or active principle obtained from aconite. Average dose, gr. $\frac{1}{400}$–0.00015 Gm.

Linimentum Aconiti.
Aconite Liniment. Not official.

For external use; strength, 2 %. 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 chief use of staphisagria is as a parasiticide. The preparation for this purpose is called delphine.

Podophyllum, May Apple, Mandrake.

The dried rhizome[1] 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 **cholagogue** properties. Its actions are shown not only

[1] Root stock.

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 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.

Resina Podophylli.
Resin of Podophyllum.

Average dose, as a laxative, gr. $\frac{1}{12}$–0.005 Gm.
As a purgative, gr. $\frac{1}{6}$–0.01 Gm.

Fluidextractum Podophylli.
Fluidextract of Podophyllum.

Average dose, ♏ viii.–0.5 mil.

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.

Fluidextractum Cimicifugæ.
Fluidextract of Cimicifuga.

Average dose, ♏ xv.–1 mil.

Tinctura Cimicifugæ. Not official.
Tincture of Cimicifuga.

Average dose, ʒ i.–4 mils.

Adonis Vernalis. Not official.

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

Physiological Actions.

Adonidin **stimulates** the heart and vaso-motor centers under some circumstances. 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 circulation in the kidneys.

In overdoses adonidin produces vomiting and diarrhœa.

Preparations.

Adonidin. Not official.

Average dose, gr. $\frac{1}{8}$–0.008 Gm.

Infusion of Adonis Vernalis. Not official.

Average dose, ʒ ii.–8 mils.

Hydrastis, Golden Seal.

The roots and root stocks of *Hydrastis canadensis* yield the alkaloids verberine, xanthopuccine, and hydrastine, of which the last is the active principle.

Physiological Actions.

Hydrastis is an **astringent bitter.** It stimulates the gastro-intestinal tract, creates appetite, and promotes the functions of the liver. It is also an **antiperiodic.** It is **ecbolic**, causing uterine contractions. Applied locally to mucous membranes it is **tonic.**

In poisonous doses it has caused salivation, vomiting, muscular tremblings, loss of voluntary movement, rise of temperature, feeble, rapid pulse, convulsions, and death from failure of the respirations.

Preparations.

Tinctura Hydrastis.
Tincture of Hydrastis.

Average dose, ʒ i.–4 mils.

Fluidextractum Hydrastis.
Fluidextract of Hydrastis.

Average dose, ♏ xxx.–2 mils.

Hydrastininæ Hydrochloridum.
Hydrastinine Hydrochloride.

A synthetic alkaloid obtained by oxidizing hydrastine. It is an **oxytocic** and muscular **stimulant.** In overdoses a depressant to the whole motor tract.

Average dose, gr. ½–0.03 Gm.

Fam. Menispermaceæ.

Calumba.

The root of *Jateorhiza palmata*, 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.
Tincture of Calumba.

Strength, 20%. Average dose, ʒ i.–4 mils.

Fluidextractum Calumbæ. Not official.
Fluidextract of Calumba.

Dose, ♏ xv.–1 mil.

Picrotoxinum (Picrotoxin). Not official.

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.

Fam. 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 and called Smyrna or Turkey opium. Moist opium should contain not less than 9.5% 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 **astringent.** 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 **astringent.** 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. This last 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 $\frac{1}{6}$ 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 hyperæmia 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 more and more rapid and weak, and death results from failure of the respirations.

Treatment of Poisoning.

In treating opium poisoning the stomach-pump should be employed every half-hour until the patient is out of danger. Removing contents of stomach once is not sufficient, because any opium that may have been absorbed is secreted into the stomach and must be removed to prevent reabsorption.

Potassium permanganate (3–5 gr. in a glass of water) should be the first thing given, and it should be given every half-hour, just after the stomach is washed out with the stomach-pump. Atropine, strychnine, and caffeine may be used hypodermically as stimulants and to counteract the systemic effect of the opium. Care must be taken that the patient does not become chilled or exhausted. Too vigorous exercise or physical stimulation is not good.

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 reabsorption, 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—appears 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.

Solid Preparations.

Extractum Opii.
Extract of Opium.

Two Gm. of opium in one of extract. Average dose, gr. ss.–0.03 Gm.

Pilulæ Opii.
Pills of Opium. Not official.

Strength, about one grain to one pill.

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 4 Gm. of opium in 1000 mils; also benzoic acid, oil of anise, and camphor in the same proportions. Owing to the camphor it is more constipating than the other preparations.

As all children bear opium badly and some are highly susceptible to it, there could be no graver error than for paregoric to be included in the home medicine chest. It should never under any circumstances be given to children without the exact orders of a physician, and nurses should impress on the less well educated mother the danger of soothing syrups of a proprietary nature, as the amount of narcotics contained in them may ruin the child's development.

Average dose for adult, ʒ i.–4 mils.

Tinctura Opii Deodorati.
Tincture of Deodorized Opium.

Contains no narcotine and none of the odorous principles, and is therefore less nauseating than laudanum. The strength is 10%. Average dose, ♏ viii.–0.5 mil.

Tinctura Opii.
Tincture of Opium.
Laudanum.

Strength, 10%. Average dose, ♏ viii.–0.5 mil.

Other Preparations Containing Opium.

Pulvis Ipecacuanhæ et Opii.
Powder of Ipecac and Opium.
Dover's Powder.

One hundred Gm. contain ten Gm. each of ipecac and powdered opium. An excellent **diaphoretic,** though somewhat nauseating.

To be taken at night. Average dose, gr. viii.–0.5 Gm.

Tinctura Ipecacuanhæ et Opii. Not official.
Tincture of Ipecac and Opium.

Dover's powder in a liquid form.

Dose, the same as tincture of opium.

Tinctura Opii Composita.
Compound Tincture of Opium.
Squibb's Diarrhœa Mixture. Not official.

Contains tincture of opium, tincture of capsicum, spirits of camphor, chloroform, and alcohol.

Dose, ʒ i.–4 mils.

Alkaloids of Opium.
Morphina, Morphine.

There has been a striking elimination of morphine preparations from the official lists within the past ten years, coincident with the steady movement of the medical profession and intelligent laity to restrict the unauthorized purchase of narcotic drugs.

Morphinæ Sulphas.
Morphine Sulphate.

Average dose, gr. $\frac{1}{8}$–0.008 Gm.

Morphinæ Hydrochloridum.
Morphine Hydrochloride.
Morphine Chloride.

Average dose, gr. $\frac{1}{8}$–0.008 Gm.

Diacetylmorphina.
Diacetylmorphine.

An alkaloid prepared from morphine by acetylization.
Average dose, gr. $\frac{1}{20}$–0.003 Gm.

Diacetylmorphinæ Hydrochloridum.
Diacetylmorphine Hydrochloride.

Average dose, gr. $\frac{1}{20}$–0.003 Gm.

Pulvis Morphinæ Compositus. Not official.
Compound Powder of Morphine.
(Tully's Powder.)

With the morphine are combined camphor, glycyrrhiza, and calcium carbonate.

Tinctura Chloroformi et Morphinæ. Not official.
Tincture of Chloroform and Morphine.

Contains a small amount of morphine, with ether, alcohol, oil of peppermint, liquorice, and syrup.
Average dose, ♏ viii.–0.5 mils.

Magendie's Solution of Morphine.

This preparation is not official; it contains gr. xvi. of morphine to ℥ 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.

Codeina, Codeine, Methylmorphine.

Codeine has slightly exciting action on the spinal cord. Its hypnotic action is feeble and uncertain. It is not constipating.

Codeinæ Phosphas.
Codeine Phosphate.

Average dose, gr. ½–0.03 Gm.

Codeinæ Sulphas.
Codeine Sulphate.

Average dose, gr. ½–0.03 Gm.

Heroin [Trade Name].

Practically the same as diacetylmorphine. It is a subtle and dangerous drug of habit-forming qualities, and is employed in many trade or commercial preparations. It has been much used as a sedative, and when new was considered comparatively harmless and useful.

The addiction of young delinquents to it has brought it into notoriety, and parents should be warned against cough syrups which may possibly contain it. Dose, gr. $\frac{1}{20}$–$\frac{1}{10}$ (0.003–0.006 Gm.) in pill or powder, or in aqueous solution with a few drops of dilute acetic acid.

Apomorphinæ Hydrochloridum.
Apomorphine Hydrochloride.

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 be 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.

Average dose, expectorant, gr. $\frac{1}{20}$–0.003 Gm.

Average dose, emetic, by mouth, gr. $\frac{1}{6}$–0.01 Gm.

Average dose, emetic, by hypodermic, gr. $\frac{1}{20}$–0.005 Gm.

Fam. Cruciferæ.

Sinapis Alba and Nigra. White and Black Mustard.

The mixed and powdered dried ripe seeds of *Sinapis 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 reabsorption 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. There is an official mustard plaster, Emplastrum Sinapis, which is to be moistened thoroughly with tepid water before applying. It reddens the skin within five minutes.

Average emetic dose, ʒ iiss.–10 Gm.

Fam. 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.

Fluidextractum Senegæ.
Fluidextract of Senega.

Average dose, ♏ xv.–1 mil.

Syrupus Senegæ.
Syrup of Senega.

Average dose, ʒ i.–4 mils.

Fam. Sapindaceæ.

Guarana.

The seeds of *Paullinia Cupana*. They contain an active principle, guaranine, which is similar to caffeine

Fluidextractum Guaranæ.
Fluidextract of Guarana.

Average dose, ♏ xxx.–2 mils.

Fam Erythroxylaceæ.

Coca.

The coca tree *Erythroxylon coca* 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.

Coca is used as an ingredient in many "soft" drinks, as appears evident in their names. This constitutes an insidious danger to the young, in promoting a craving for the drug effects, a danger which has been emphasized by reliable writers.

Coca must not be confused with cocoa, the useful beverage made from the seeds of Theobroma Cacao, the chocolate tree; however, the chocolate, tea, and coffee plants are related to one another and also to the Coca plant and the Kola plant, as well as to several others containing similarly stimulating principles. From cocaine, the active alkaloid of coca, is made the only official preparation of this drug:

Cocainæ Hydrochloridum.
Cocaine Hydrochloride.
Cocaine Chloride.

The average dose is gr. $\frac{1}{4}$–0.015 Gm.

Fam. Linaceæ.

Linum, 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.

Fam. Malvaceæ.

Gossypium Purificatum, Purified Cotton. Absorbent Cotton.

Cotton-wool is too familiar to need description, and is introduced here as the first step in making collodion.

Pyroxylinum, Pyroxylin. Soluble 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 ether and 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. It should be kept in a cool place.

Collodium Flexile.
Flexible Collodion.

Contains camphor and a small proportion of castor oil. The oil renders the film pliable, and prevents its contraction.

Collodium Cantharidatum.
Cantharidal Collodion.
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.

Cantharidal collodion must be kept in a cool place and must not be brought near to a fire or flame, as it is highly inflammable.

Fam. Sterculiaceæ.

Oleum Theobromatis, Oil of Theobroma. 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.

Fam. Rutaceæ.

Buchu.

The leaves of *Barosma betulina* and other species of the same family, from Southern Africa. They contain 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.

Fluidextractum Buchu.
Fluidextract of Buchu.

Average dose, ♏ xxx., well diluted. 2 mils.

Ruta (Rue). Not official.

The leaves of *Ruta graveolens*, or garden rue. The active principle is a volatile oil, of hot and bitter taste. Rue is a **carminative** and **emmenagogue**. In large doses it is irritant and will cause abortion. It is less powerful than savine.

Dose of the oil, Oleum Rutæ, ♏ i.–0.05 mil.

Pilocarpus, Jaborandi.

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 an 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 condition results, with pallor, chilliness, and general weakness, lasting 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.

Œdema of the lungs is the untoward effect most to be dreaded in giving pilocarpine. A person literally drowns himself with his own sweat at times.

Preparations.

Fluidextractum Pilocarpi.
Fluidextract of Pilocarpus.

More certain in action, less nauseating and disagreeable to take than the infusion of jaborandi, which was formerly used. Average dose ♏ xxx.–2 mils.

Pilocarpinæ Hydrochloridum.
Pilocarpine Hydrochloride.

Average dose by mouth: gr. $\frac{1}{6}$–0.01 Gm.
Average dose by hypodermic: gr. $\frac{1}{12}$–0.005 Gm.

Fam. Simarubaceæ.

Quassia.

The wood of *Picrasma 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, 20%. Average dose, ♏ xxx.–2 mils. An infusion of quassia is considered effective and not harmful to the patient in treatment for thread worms. It is preceded by a soap and water enema, and is then given high and retained for some minutes.

Fam. Rhamnaceæ.

Cascara Sagrada.
(Sacred Bark.)

The bark of *Rhamnus purshiana.*

Cascara in small doses is **tonic** and **stomachic**; in large dose, **laxative** or **cathartic,** with active and certain effect. It sometimes causes griping pain.

Fluidextractum Cascaræ Sagradæ.
Fluidextract of Cascara Sagrada.

May be given at night, or one or two hours after meals. Average dose, at night, ʒ ss.; after meals, ♏ xv.–1 mil, well diluted. The aromatic fluidextract may be given in twice as large a dose.

Cascara is now used in greater quantity than any other drug in the pharmacopœia. It is pleasantly laxative and may be used year in and year out without losing its specific effect, and without fear of harm to the individual. Usually ten to twenty drops at night in a little water is the best manner of taking it, but the pellet form is more convenient.

Fam. Burseraceæ.

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.**

Fam. 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.** Its alkaloid only official.

Dose of the infusion, ℥ i.

Sparteinæ Sulphas.
Sparteine Sulphate.

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 large 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.

Average dose, gr. $\frac{1}{6}$–0.01 Gm.

Copaiba.

The oleo-resin of a species of Brazilian tree. It is stimulating to mucous membranes, as those of the bronchi and alimentary canal. It is also a **stimulant diuretic** of somewhat irritating character. It is stated that its use has been followed in some instances by strangury and in others by suppression of urine.

Average dose, ♏ xv.–1 mil, on sugar, or made into an emulsion with syrup and gum arabic.

Glycyrrhiza, Licorice Root.

The root of *Glycyrrhiza glabra*, *typica*, or *glandulifera*.

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.

Average dose, ʒ i.–4 Gm.

Balsamum Peruvianum, Balsam of Peru.

A balsam exuded from the trunk of *Toluifera 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 stimulate 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 *Toluifera Balsamum*. It is a reddish-yellow, soft, 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.
Extract of Physostigma.

Average dose, gr. $\frac{1}{8}$–0.008 Gm.

Tinctura Physostigmatis.
Tincture of Physostigma.

Average dose, ♏ xv.–1 mil.

Physostigminæ Salicylas.
Physostigmine Salicylate.

Average dose, gr. $\frac{1}{60}$–0.001 Gm.

Tamarindus, Tamarind.

The preserved pulp of the fruit of *Tamarindus indica*. Tamarinds are **laxative**, and are taken like preserves, or made into confections with senna.

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. Griping 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.

Senna is especially valuable as a laxative for children and may be given in the form of senna tea made with a teaspoonful of the senna leaves over which a teacupful of boiling water is poured and allowed to stand a short while.

Preparations.

Fluidextractum Sennæ.
Fluidextract of Senna.

Average dose, xxx.–2 mils.

Confectio Sennæ.
(Tamar-Indien.)
(Tropical Fruit Laxative.) Not official.

This preparation tends to disorder the digestion. Dose, ʒ i.–4 Gm.

Infusum Sennæ Compositum.

Contains six per cent. of senna with manna and sulphate of magnesium, and is an active hydragogue purgative. Dose, ℥ iv. (120 mils.)

Syrupus Sennæ.
Syrup of Senna.

Average dose ʒ i.–4 mils.

Fam. 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 % of hydrocyanic acid, and is highly poisonous.

The artificial oil of bitter almonds, nitro-benzene, or nitro-benzol, is poisonous, and has caused death.

Rubus (Blackberry).

The bark of the root of *Rubus villosus* and other varieties of rubus. An astringent, containing 10 % of tannin.

Dose of the fluid extract, ♏ x.–ʒ i.; of the syrup, ʒ i.–℥ i.

Prunus Virginiana, Wild Cherry.

The bark obtained from *Prunus serotina*, or wild cherry tree, contains tannic acid, a bitter extractive, amygdalin, and emulsin, and these two latter principles, when brought into contact in watery solution, produce hydrocyanic acid.

The effect of cherry bark, as administered, is due to the tannic and hydrocyanic acids and the bitter extractive. None of these, however, are present in sufficient amount to make a strong impression, and the only physiological action is that of a mild **astringent** and **tonic.** The syrup of wild cherry bark is much used as the basis of cough mixtures. Its average dose is gr. xxx.–2 Gm.

Fam. Myrtaceæ.

Eucalyptus, Blue Gum Leaves.

The blue gum tree, *Eucalyptus Globulus*, is found in southern countries. From a hygienic point of view it is unusually interesting. It has an enormous capacity for absorbing water from the soil. One tree, it is said, will absorb in twenty-four hours ten times its weight of water. Swamps are therefore drained and transformed into dry land by planting the eucalyptus. It is also believed that it purifies the air of malarial districts by absorbing poisonous emanations and by giving forth balsamic principles.

It is largely cultivated in southern malarial localities; for instance, in the Roman Campagna, portions of which it has transformed into habitable regions.

The leaves only are official. They yield tannic acid, the principles turpene, cymol, eucalyptol, and others.

Physiological Actions.

It is **tonic** to appetite and digestion, and stimulates all the juices of the alimentary tract. It is destructive to low forms of life, **antimalarial, diaphoretic,** and a **stimulant expectorant.** It is eliminated by the skin, mucous membranes, and kidneys. It is given when quinine cannot be administered, its effect being much the same. In excessive doses, symptoms similar to those caused by overdosing with quinine appear, as headache, palpitations, and numbness of the limbs.

Preparations.

Oleum Eucalypti.
Oil of Eucalyptus.

The essential oil, which is the active principle of the drug. Average dose, ♏ viii.–0.5 mil, in emulsion or capsule.

Fluidextractum Eucalypti.
Fluidextract of Eucalyptus.

Average dose, ♏ xxx.–2 mils.

Granatum, Pomegranate.

The bark of the pomegranate root contains four alkaloids, which are combined in the standard preparation, called pelletierine. The drug is an efficient **tæniacide,** or remedy for tapeworm. It is capable of causing symptoms of some severity, such as muscular depression almost amounting to paralysis, and it is not considered a safe drug for children. The taste is very unpleasant. In administration the patient fasts for twelve or eighteen hours previously to taking the dose. The decoction of the fresh root is used in a strength of two ounces to a pint of water. This quantity is divided into several doses, and taken at intervals of an hour.

Pelletierine tannate is given in the same way. A cathartic is given afterwards, no food being allowed until the treatment is over.

Pelletierinæ Tannas.
Pelletierine Tannate.

Average dose of pelletierine tannate, gr. iv.–0.25 Gm.

Caryophyllus, Cloves.

The unopened flowers of *Eugenia aromatica*, a tree of the Molucca Islands. The spice made from them contains oleum caryophyllæ, or oil of cloves, a pungent, volatile oil. It is **aromatic** and **carminative,** and locally to some extent **anæsthetic,** as shown by its popular use in the cavity of an aching tooth. Clove tea is made with spice and boiling water, ʒ ii.–O.i.

Jambul. Not official.

The drug obtained from the bark of *Eugenia jambolana*, an East Indian tree, is used in India as a **stomachic astringent,** and also as a specific in diabetes.

Average dose of the fluid extract, ♏ x.–1 Gm.

Fam. 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 an 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 ʒ i.–ʒ iii. of the powder.

Preparations.

Extractum Colocynthidis.
Extract of Colocynth.

Average purgative dose, gr. ¼–0.03 Gm.

Extractum Colocynthidis Compositus.
Compound Extract of Colocynth.

Contains extract of colocynth, aloes, scammony, and cardamom.

Average laxative dose, gr. ii.–0.125 Gm.

Average purgative dose, gr. iv.–0.25 Gm.

Pilulæ Catharticæ Compositæ.
Compound Cathartic Pills.

Contain extract of colocynth, mild mercurous chloride, extract of jalap, and gamboge.

Dose, i or ii pills.

Pilulæ Catharticæ Vegetabiles. Not official.
Vegetable Cathartic Pills.

Contain compound extract of colocynth, extract of hyoscyamus, jalap, leptandra, and resin of podophyllum.

Elaterinum, Elaterin.

Elaterium is a sediment obtained from the juice of the fruit of *Ecballium Elaterium*. It contains a neutral active principle, elaterin, which is the official 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.

There is no official preparation of elaterium, but only of its active principle.

Elaterinum.

Elaterin.

Average dose, gr. $\frac{1}{20}$–0.003 Gm.

Trituratio Elaterini.

Trituration of Elaterin.

Strength 1 to 10. Dose, gr. ss.–0.03 Gm.

Pepo, Pumpkin Seed.

The seeds of *Cucurbita Pepo*, or ordinary pumpkin, are useful as a remedy for tapeworm, being considered more efficient than Felix mas, and quite harmless. The dose of the expressed oil is half an ounce, given in three doses on an empty stomach, the patient having fasted on the day before; or two ounces of the seeds may be beaten into an emulsion with sugar and water and taken with the same precaution. A cathartic follows.

Fam. Umbelliferæ.

Conium (Spotted Hemlock). Not official.

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 weighted 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, as of weight and pressure, in the head.

Conium is also a gastric irritant, producing nausea and vomiting.

It is employed medicinally as a **calmative** and **antispasmodic,** but its uncertain, inexact strength is considered to make it unreliable.

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.

Fluidextractum Conii. Not official.
Fluidextract of Conium.

Average dose, ♏ iii.–0.2 mil.

Although this is regarded as the best preparation of conium, yet it is very uncertain, because of the volatile character of the essential principle.

Asafœtida. Asafetida.

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 disagreeable. 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.
Pills of Asafetida.

Each pill contains ⅕ Gm. of the drug. Dose 2 pills.

Emulsum Asafœtidæ.
Emulsion of Asafetida.

Average dose, ℥ ss.–15 mils.

Tinctura Asafœtidæ.
Tincture of Asafetida.

Strength, 20%. Dose, ♏ v.–1 mil.

Fam. Caprifoliaceæ.

Viburnum Prunifolium, Black Haw.

Viburnum acts upon the nerve centres of the uterus and ovaries as a **sedative** and **tonic**, and is given to correct pain and irritation arising from these sources.

Viburnum opulus is useful in the same way.

Average dose of the fluid extract, ♏ xxx.–2 mils.

Fam. Rubiaceæ.

Cinchona.

The trees belonging to the genus Cinchona are found native in South America, on mountains at a height of 5000 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 antiperiodic, 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. Besides 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 antiperiodics if quinine can be obtained. They have some **astringent** action, due to the tannin they contain. They should be given half an hour before meals.

Preparations.

Tinctura Cinchonæ.
Tincture of Cinchona.

Strength, 20%. Average dose, ʒ i.–4 mils.

Tinctura Cinchonæ Composita.
Compound Tincture of Cinchona.

Contains cinchona, glycerin, bitter orange-peel, serpentaria, and alcohol. Average dose, ʒ i.–4 mils.

Fluidextractum Cinchonæ.
Fluidextract of Cinchona.

Average dose, ♏ xv.–1 mil.

The sulphates of cinchonine and cinchonidine are also official. Average dose, gr. iiss.–0.15 Gm.

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. This deafness usually passes off quickly, but may be permanent. 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 a **specific, 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. In times past it was taught that it was capable of producing abortion, but the weight of evidence is believed by most authorities to be against this theory.

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.

There are now eight official preparations of quinine—Quinine Bisulphate, Dihydrochloride, Hydrobromide, Hydrochloride, Salicylate, Sulphate, and Tannate, all of which except the last have an average dose of gr. 1½–0.1 Gm. as tonics, and gr. xv.–1 Gm. daily as antimalarial remedies. The dose of the tannate is gr. iii.–0.2 Gm.

Last is a preparation for hypodermic use, Quinine and Urea Hydrochloride. Average daily dose, gr. xv.–1 Gm.

Quinine is 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 anything 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.

Warburg's Tincture. Not official.

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, ℥ ss.–15 mils.

Ipecacuanha, Ipecac.

The dried root of *Cephaelis Ipecacuanha*, of Brazil. Ipecac contains from ¼ to 1 % 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. ¼) 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 **cholagogue,** increasing the flow of bile, and a **diaphoretic.**

Preparations.

Pulvis Ipecacuanhæ et Opii.
Powder of Ipecac and Opium. See Opium.

Average dose, gr. xv.–1 Gm.

Syrupus Ipecacuanhæ.
Syrup of Ipecac.

Strength, 7 parts fluid ext. to 100. Dose, expectorant, ♏ xv.–1 mil; emetic, ʒ iv.–15 mils.

Vinum Ipecacuanhæ. Not official.
Wine of Ipecac.

Strength, 1 part fluid ext. to 8 white wine. Dose, ♏ x.–xx. (0.65–1.3 mil.)

Fluidextractum Ipecacuanhæ.
Fluidextract of Ipecac.

Average expectorant dose, ♏ i.–0.05 mil.
Emetic dose for adult, ♏ xv.–1 mil.

Emetinæ Hydrochloridum.
Emetine Hydrochloride.

Average dose, gr. $\frac{1}{3}$–0.02 Gm.

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.

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. The plant itself is not official, but its alkaloid is so.

Caffeina.
Caffeine. Theine.

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.

Average dose of caffeine, gr. iiss.–0.15 Gm.

Official preparations of caffeine are the Citrated Caffeine, Effervescent Citrated Caffeine, and Caffeine Sodio-Benzoate.

Fam. Ternstromiaceæ.

Camellia Thea (Tea Plant). Not official.

The leaves of the tea plant, grown in China, contain theine, the active principle; tannic acid, and a volatile oil.

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.

Fam 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 **antispasmodic.** In nervous cases it sometimes acts successfully as an **hypnotic.** Large doses (ʒ ii.–iv.) may cause nausea, vomiting, and colic, a quickened pulse, and a feeling of formication in hands and feet.

Preparations.

Tinctura Valerianæ.
Tincture of Valerian.

Strength 20%. Average dose, ʒ i.–4 mils.

Tinctura Valerianæ Ammoniata.
Ammoniated Tincture of Valerian.

Strength 20%. Average dose, ♏ xxx.–2 mils.

Fluidextractum Valerianæ. Not official.
Fluidextract of Valerian.

Dose, ʒ i. (4 mils.)

Fam. Compositæ.

Santonica (Levant Wormseed).

The dried flower-heads of *Artemisia pauciflora*, 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.

Santoninum.
Santonin.

Average dose, gr. i.–0.06 Gm.

Eupatorium (Thoroughwort). Not official.

The herbal parts of a coarse plant yield this drug, whose chief action is as a **sudorific.** The infusion is given very hot, in doses of one half or one tumbler full, the patient being warmly covered in bed, and free diaphoresis results. The taste is very unpleasant.

Taraxacum, Dandelion.

The root of the dandelion is a **simple bitter** and mild **laxative.**

Fluidextractum Taraxaci.
Fluidextract of Taraxacum.

Average dose, ʒ iiss.–10 mils.

Arnica, Arnica Flowers.

The *Arnica montana*, or leopard's bane, grows in Northern Europe and Asia and in the Northwestern United States. The dried flower heads contain alkaloids, an essential oil, resins, and an ammonia compound, trimethylamine, none of which are separately recognized by the U. S. P.

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 ℥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.
Tincture of Arnica.

Strength, 20 %.

This preparation used externally must be diluted, applied on a piece of flannel to the inflamed part, and covered with a bandage.

Average dose, ♏ xv.–1 mil.

Grindelia.

The leaves and flowering tops of a California plant. It is a **stimulant expectorant** and a **diuretic**; in large doses **depressant,** causing nausea and vomiting, and lowering the rate of the heart, temperature, and respirations. It is sometimes used as an inhalation.

In cases of poisoning by *Rhus toxicodendron*, or poison ivy, it is said to be an excellent remedy, the fluid extract being applied locally, largely diluted.

Average dose of the fluid extract, ♏ xxx.–2 mils.

Fam. Lobeliaceæ.

Lobelia, Indian Tobacco.

The leaves and tops of *Lobelia inflata*, of the United States.

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.
Tincture of Lobelia.

Strength, 10%. Average dose, ♏ xv.–1 mil.

Fluidextractum Lobeliæ.
Fluidextract of Lobelia.

Average dose, ♏ iiss.–0.15 mil.

Fam. Styracaceæ.

Benzoinum, Benzoin.

The thickened juice of *Styrax Benzoin*, an Eastern tree. It is soluble in alcohol; not readily soluble in water. Benzoin is a balsamic resin, containing from 12 to 15 % 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.

Average dose, gr. viii.–0.5 Gm.

Tinctura Benzoini.
Tincture of Benzoin.

Strength, 20%. Average dose, ♏ xv.–1 mil.

Tinctura Benzoini Composita.
Compound Tincture of Benzoin.

For external use; it contains benzoin, aloes, storax, balsam of tolu, and alcohol.

$\left.\begin{array}{l}\textbf{Ammonii}\\ \textbf{Sodii}\end{array}\right\}$ **Benzoas.**

Benzoate of $\left\{\begin{array}{l}\textbf{Ammonium.}\\ \textbf{Sodium.}\end{array}\right.$

Average dose, gr. xv.–1 Gm.

Fam. 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.

Fam. Loganiaceæ.

Spigelia, Pink-Root.

Spigelia is an anthelmintic and purgative, and acts on the round worm.

Fluidextractum Spigeliæ.
Fluidextract of Spigelia.

Average dose, ʒ i.–5 mils.

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 **antispasmodic**, 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.

Gelsemium relieves obscure pains and is used in a great many quack-cures for rheumatism, which are especially dangerous because of this drug and the ignorance of the laity in regard to it.

Symptoms of Poisoning.

Poisonous doses (ʒ i. of the fluidextract) 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.

Fluidextractum Gelsemii.
Fluidextract of Gelsemium.

Average dose, ♏ ½–0.03 mil.

Tinctura Gelsemii.
Tincture of Gelsemium.

Strength 10%. Average dose, ♏ iv.–0.25 mil.

Nux Vomica.

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 averted, 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 extremities 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 with 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.

Extractum Nucis Vomicæ.
Extract of Nux Vomica.

Average dose, gr. $\frac{1}{4}$–0.015 Gm.

Tinctura Nucis Vomicæ.
Tincture of Nux Vomica.

Between 0.237 Gm. and 0.263 Gm. of the alkaloids of nux vomica are contained in 100 mils of tincture.
Average dose, ♏ viii.–0.5 mil.

Fluidextractum Nucis Vomicæ.
Fluidextractum of Nux Vomica.

Average dose, ♏ i.–0.05 mil.

Extractum Nucis Vomicæ.
Extract of Nux Vomica.

Average dose, gr. $\frac{1}{4}$–0.015 Gm.
All preparations of nux vomica are given before meals.

Preparations of Strychnine.

Strychninæ Sulphas.
Strychnine Sulphate.

Average dose, gr. $\frac{1}{40}$–0.0015 Gm.

Strychninæ Nitras.
Strychnine Nitrate.

Average dose, gr. $\frac{1}{40}$–0.0015 Gm.

Fam. Gentianaceæ.

Gentiana, Gentian.

The root of *Gentiana lutea*, the yellow gentian of the Alps, furnishes an efficient **simple bitter** and **stomachic tonic.**

Preparations.

Tinctura Gentianæ Composita.
Compound Tincture of Gentian.

Strength 10%. Average dose, ʒ i.–4 mils.

Fluidextractum Gentianæ.
Fluidextract of Gentian.

Average dose, ♏ xv.–1 mil.

Extractum Gentianæ.
Extract of Gentian.

Average dose, gr. iv.–0.25 Gm.

Fam. Convolvulaceæ.

Scammoniæ Radix. Scammony Root.

The root of *Convolvulus Scammonia* yields an exudate from which is obtained a resin, having properties as a **drastic purgative.** The chief ingredient of the resin is called jalapin, and is probably the same as the convolvulin of jalap.

The average dose of the resin of scammony is gr. iii.–0.2 Gm.

Jalapa, Jalap.

Obtained from the dried tuberous root of *Exogonium Purga*. The active principle is a double resin, or one separable into two, called jalapin and convolvulin, the latter being the more important. Jalap is a **hydragogue cathartic,** and creates a feeling of nausea. In overdoses it causes severe vomiting and purging. The stools produced by its action are large and watery. It is seldom used alone, but is often combined with calomel. Average dose, gr. xv.–1 Gm.

The compound powder, Pulvis Jalapæ Compositus, contains jalap and cream of tartar.

Fam. Apocynaceæ.

Strophanthus.

The seeds of *Strophanthus hispidus* or *S. Kombe*. The active principle is a glucoside named strophanthin. It exists in the seeds in a strength of 8 or 10 %.

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.
Tincture of Strophanthus.

Average dose, ♏ viii.–0.5 mil.

Strophanthin, for hypodermic use.

Average dose, gr. $\frac{1}{80}$–0.00075 Gm.

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Fam. 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: belladonine, 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, glycerin, 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 unstriped or involuntary muscular fibre; and its **sedative, anodyne** actions are directed toward the motor system. It is a **mydri-**

atic, 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 atropine 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 $\frac{1}{2}°$ 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

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[1] Having the appearance of being formed by exceedingly minute dots or points of red.

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. $\frac{1}{20}$–$\frac{1}{10}$ 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 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.

Preparations of Belladonna.

Tinctura Belladonnæ Foliorum.
Tincture of Belladonna Leaves.

Average dose, ♏ xii.–0.75 mil.

Extractum Belladonnæ Foliorum.
Extract of Belladonna Leaves.

Average dose, gr. $\frac{1}{4}$–0.015 Gm.

Fluidextractum Belladonnæ Radicis.
Fluidextract of Belladonna Root.

Average dose, ♏ i.–0.05 mil.

Emplastrum Belladonnæ.
Belladonna Plaster.

Contains 30% of extract of belladonna leaves. There is also a 10% ointment of belladonna.

Atropina.
Atropine.

Average dose, gr. $\frac{1}{120}$–0.0005 Gm.

Atropinæ Sulphas.
Atropine Sulphate.

Usually given hypodermically, being very soluble in water. Average dose, gr. $\frac{1}{120}$–0.0005 Gm.

Homatropinæ Hydrobromidum.
Homatropine Hydrobromide.

An alkaloid obtained by the condensation of atropine and mandelic acid, resembling atropine in action, but being less toxic and the symptoms passing off more quickly. It is used as a mydriatic and anhydrotic.
Average dose, gr. $\frac{1}{120}$–0.0005 Gm.

Stramonium.

Jamestown Weed.

The leaves and seeds of *Datura 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 (Powdered).
Extract of Stramonium.

Average dose, gr. $\frac{1}{6}$–0.01 Gm.

Unguentum Stramonii.
Stramonium Ointment.

Strength, 10%.

Tinctura Stramonii.
Tincture of Stramonium.

Strength, 10%. Average dose, ♏ viii.–0.5 mil.

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 hyoscine, 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 hyoscine, which is supposed to be much stronger than hyoscyamine, and to have marked qualities as a **cerebral sedative.**

Like the former two 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.

Tinctura Hyoscyami.
Tincture of Hyoscyamus.

Made in a strength of 10%. Average dose, ♏ xxx.–2 mils.

Fluidextractum Hyoscyami.
Fluidextract of Hyoscyamus.

Average dose, ♏ iii.–0.2 mil.

Hyoscyaminæ Hydrobromidum.
Hyoscyamine Hydrobromide.

Average dose, gr. $\frac{1}{200}$–0.0003 Gm.

Scopolaminæ Hydrobromidum.
Scopolamine, or Hyoscine Hydrobromide.

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.

Average dose, gr. $\frac{1}{200}$–0.0003 Gm.

Capsicum, Cayenne Pepper.

The fruit of *Capsicum frutescens*, the African pepper. The active principle is a very acrid oleoresin which is powerfully irritant, being capable of destroying the skin if applied to it. Capsicum is a **stimulant stomachic,** giving, in moderate doses, a pleasant feeling of warmth. In overdose it may cause severe pain and inflammation, with vomiting and purging. It is useful as a corrective in flatulence and slight diarrhœa.

Preparations.

Tinctura Capsici.
Tincture of Capsicum.

Strength, 10%. Average dose, ♏ viii.–0.5 mil.

Emplastrum Capsici.
Capsicum Plaster.

Tabacum (Tobacco). Not official.

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, muscarine, and sparteine; also the alkaloidal compound trimethyamine.

Tobacco 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.

Fam. Scrophulariaceæ.

Digitalis, Foxglove.

The well dried leaves of *Digitalis purpurea*, native of Great Britain, and cultivated in this country.

The active principle, digitalin, is one of several important and complex principles of difficult analysis. 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 excessible amount is taken, signs of over-stimulation 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 eliminated 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.

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.

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.

Recent experiments prove that digitalis does not increase the strength or force of the heart's beats, but simply the extent of the contraction is increased. The heart cavity is more nearly closed and the contraction of the heart-muscle is more nearly complete than is normally the case.

Hypodermic injections of digitalis or of strychnine act in case of shock by a redistribution of the blood in different parts of the body, thus restoring function. Digitalin has been used in cases where digitalis cannot be taken by mouth. Dose, $\frac{1}{60}$–$\frac{1}{75}$ gr. American digitaline, or $\frac{1}{12}$–$\frac{1}{2}$ gr. Merck's German digitaline, injected deep into the muscles of the thigh, which are then to be rubbed thoroughly for at least five minutes to hasten absorption and prevent abscess formation.

Preparations of Digitalis.

Infusum Digitalis.
Infusion of Digitalis.

More diuretic than stimulant. To be largely diluted. Average dose, ℨ i.–4 mils.

Tinctura Digitalis.
Tincture of Digitalis.

Strength, 10%. Average dose, ♏ viii.–0.5 mil.

Fluidextractum Digitalis.
Fluidextract of Digitalis.

The tincture and fluidextract are more stimulant than diuretic, and are only slightly diluted when given.

The variability of different preparations of digitalis, resulting in disappointing or in injurious action when prescribed in medicine, has caused the narrowing down to the now brief list of official preparations of the drug.

Digitalin was formerly recognized by the U. S. P. It has been used hypodermically, but was found to be irritating and liable to cause abscesses. This, with the uncertainty of exact composition brought it into disfavor, and artificial preparations are equally unsatisfactory.

Fam. Labiatæ.

Oleum Lavandulæ, Oil of Lavender, Oil of Lavender Flowers.

An oil obtained from the flowers of *Lavandula officinalis.*

Tinctura Lavandulæ Composita.
Compound Tincture of Lavender.

May be pleasantly used, in small quantity, added to water for bathing.

Spiritus Lavandulæ.
Spirits of Lavender.

A **stomachic** and **cordial.** Average dose, ʒ ss.–2 mils.

Oleum Menthæ Piperitæ, Oil of Peppermint.

The oil of the fresh flowering peppermint.

Aqua Menthæ Piperitæ.
Peppermint Water.

Used as a **carminative.** Average dose, ʒ iv.–15 mils in water.

Menthol.
(Peppermint Camphor.)

A secondary alcohol obtained from peppermint oil or other mint oils. Used as a **local anæsthetic** in headache, in the form of a pencil. It is also given internally as a **carminative.**

Average dose, gr. i.–0.06 Gm.

Thymol.

A phenol occurring in the volatile oils of *Thymus vulgaris* and other herbs. It is an antiseptic and germicide resembling carbolic acid and oil of turpentine in action.

Average dose, antiseptic, gr. ii.–0.125 Gm.

Average dose, anthelmintic, gr. xv.–1 Gm. per day.

Fam. Polygonaceæ.

Rheum, Rhubarb.

The root of *Rheum officinale*, 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 **astringent** 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.

Fluidextractum Rhei.
Fluidextract of Rhubarb.

Average dose, ♏ xv.–1 mil.

Syrupus Rhei.
Syrup of Rhubarb.

Average dose, ʒ iiss.–10 mils.

Tinctura Rhei.
Tincture of Rhubarb.

Average dose, ʒ i.–4 mils.

Fam. Lauraceæ.

Camphora, Camphor.

Obtained from the wood of *Cinnamomum 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.
Camphor Water.

Eight Gm. in 1000 mils. Average dose, ʒ iiss.–10 mils.

Spiritus Camphoræ.
Spirit of Camphor.

Strength, 1 to 10. Average dose, ♏ xv.–1 mil.

Linimentum Camphoræ.
Camphor Liniment.

Cotton-seed oil, 8 parts; camphor, 2 parts.

Linimentum Saponis.
Soap Liniment.

Soap, 60 Gm.; camphor, 45 Gm.; alcohol, oil of rosemary, and water to make 1000 mils.

Oleum Camphoræ.
Oil of Camphor. Not official.

More stimulating than the other preparations. Average dose, ♏ v.–0.3 mil.x.). (0.3–0.65 Cc.)

Cinnamomum (Cinnamon).

The bark of different varieties of the genus Cinnamon. It contains tannic acid and a yellowish volatile oil, oleum cinnamomi. This has a fragrant and pleasant taste, and is used to mitigate that of disagreeable drugs. The preparations of cinnamon are used as **carminatives.**

Pulvis Aromaticus.
Aromatic Powder.

Is composed of cinnamon, ginger, cardamom, and nutmeg. It is given in an average dose of gr. xv.–1 Gm.

Fam. Aristolochiaceæ.

Serpentaria, Texas or Virginia 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.** Its only official use is in the compound (Tr. of Cinchona).

Preparations.

Tinctura Serpentariæ. Not official.
Tincture of Serpentaria.

Strength, 20%. Dose, ʒ i.–4 mils.

Fluidextractum Serpentariæ. Not official.
Fluidextract of Serpentaria.

Dose, ♏ xv.–1 mil.
To be given half an hour before meals.

Coto Bark. Not official.

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 **astringent** action. It is irritant to the skin and mucous membranes.

Fluidextractum Coto.
Fluidextract of Coto Bark.

Average dose, ♏ viii.–0.5 mil.
Should be given in wine or other dilute alcohol, as it does not combine with water, but forms a precipitate.

Cotoin.

Average dose, gr. i.–0.06 Gm.
Paracotion, active principle of a similar bark, is given in larger dose.

Fam. Euphorbiaceæ.

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 glycerin, 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 cicatrices 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.

Physiological Actions.

Externally castor oil is very soothing, and may be applied to the eye, or the surface, as a sedative and protective if perfectly pure.

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 glycerin, or given in a little hot coffee, or in soda water, or in brandy; first wetting the sides of the glass, and pouring the oil carefully in the centre of ʒ 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.

Average dose, ℥ ss.–15 mils.

Dose for infant one year old, ʒ i.–4 mils.

The castor bean is very poisonous. The leaves have been used as a poultice, applied to the breasts to increase the flow of milk.

Fam. 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 **antipyretic** and **antiseptic.** Its qualities resemble, though in a very mild degree, those of salicylic acid, which is derived from it. Salicin is not poisonous. It is very insoluble, and is given dry on the tongue or in capsules.

Dose, gr. xv.–1 Gm.

Oleum Gaultheriæ, Oil of Gaultheria. Oil of Wintergreen.

A volatile liquid of penetrating odor, found in nature in the wintergreen, *Gaultheria procumbens*, called the teaberry, and in the sweetbirch, *Betula lenta.* It is composed chiefly of methyl salicylate, and this is the official form in which these oils are listed. Methyl salicylate, besides being distilled from the plants, may also be made artificially, and its label must now indicate its natural or synthetic character. The artificial oil is now largely used instead of the natural oil.

The physiological actions of the oil of gaultheria are the same as those of salicylic acid.

It is given in emulsion or capsules.

Average dose, ♏ x.–0.65 mils.

Fam. Zingiberaceæ.

Zingiber, Ginger.

The dried root-stock of *Zingiber officinale* of the East and West Indies. The active principles are an aromatic resin and a volatile oil. Ginger is a **stimulant** and **carminative,** and is given for colic or cramp. The tincture is used in doses of from ʒ ss.–i.–2–4 Gm., in hot water; the fluid extract, ♏ v.–x.–0.3–0.65 mil.

Cardamomi Semen. Cardamom Seed.

The dried seeds of *Elettaria Cardamomum* contain a fixed and also a volatile aromatic oil.

Cardamom is a pleasant **stomachic,** less heating and stimulating than others of its class.

The tincture is given in doses of ♏ xxx.–2 mils, and is also used as an ingredient in tonic mixtures.

Cannabis.

Various forms of hemp are sold and used in the East as **narcotic stimulants.** The dried plant is sold in Calcutta for smoking, and is called Gunjah. Churrus is the resinous exudation with scrapings of the leaves, and Hashish is an Arabian preparation. The U. S. P. now recognizes the dried flowering tops of two varieties of the plant, cannabis sativa and indica.

Physiological Actions.

Cannabis indica in full doses causes a mental state of joyous exhilaration. The subject may fall into a revery, while beautiful visions pass before the eyes, or he may laugh loudly and give other manifestations of being in an ecstatic state. The pupils dilate and the pulse-rate rises. Partial anæsthesia, local spasms, and convulsions may be noticed. After the first stage the subject falls into a heavy sleep. The Hindoos are said to induce a state of catalepsy by the use of hemp.

It is not an acute poison, and does not endanger **life**, even when the symptoms produced by it are of an alarming character. There are not the unpleasant after-effects of opium. The stomach is not affected, nor is there constipation. The urine, rather than decreasing, is increased by this drug.

It has been used to some extent in the treatment of insanity, and, aside from that, for the relief of pain and as a hypnotic. Various quack medicines advertised as "pain killers" contain cannabis.

The action of the different preparations is variable, and it is supposed that much of the supply loses its strength during the ocean voyage, and becomes inert.

Preparations.

Tinctura Cannabis.
Tincture of Cannabis.

Strength, 10%. Average dose, ♏ xii.–0.75 mil.

Fluidextractum Cannabis.
Fluidextract of Cannabis.

Average dose, ♏ iss.–0.1 mil.

Fam. Moraceæ.

Humulus, Hops.

The dried strobiles[1] of *Humulus Lupulus*, or hop vine, cultivated in England. They contain an aromatic volatile oil, resins, an acid, and an alkaloid called lupuline.

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.

[1] Cones; from the Latin word meaning a pine cone.

Hops are used externally for the relief of pain, either as a means of applying moist heat, when they are put into bags and wrung out of hot water; or as dry heat when—also in bags—they are heated through. Hop pillows may be used as a means of inducing sleep. The crackling of the hops, which may annoy, can be stopped by sprinkling them with alcohol.

Lupulinum. Not official.
Lupulin.

Average dose, gr. vi.–0.01 Gm.

Fluidextractum Lupulini. Not official.
Fluidextract of Lupulin.

Average dose, ♏ viii.–0.5 mil.

Nat. Ord. Coniferæ.

Pix Liquida, Tar, Pine Tar.

Tar is a product obtained by the destructive distillation of the wood of several varieties of pine. It contains pyroligneous acid, methylic alcohol, acetic acid, creosote, and several hydrocarbons, one of which is called toluene, also oil of tar, with other oily bodies, and pyrocatechin.

The rectified oil, oleum picis liquidæ rectificatum, is used locally and by inhalation. It contains a large number of compounds, among which are creosote and carbolic acid.

Tar ointment has 50% of tar. The syrup of tar has 5 Gm. in 1000 mils. Average dose, ʒ i.–4 mils.

Oleum Terebinthinæ, Oil of Turpentine.

The oil distilled from turpentine, which is obtained from several varieties of pines, chiefly those growing in the South. Called also "Spirits of Turpentine."

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 applications 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 ℥ vi., but recovery has taken place in other cases after doses nearly as large.

Oleum Terebinthinæ Rectificatum.

Rectified Oil of Turpentine.

Average dose, ♏ v.–0.3 mil.

It may be given on a lump of sugar. Turpentine liniment is made of oil of turpentine and rosin cerate.

Sanitas. Not official.

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.

A volatile oil from the ripe fruit of *Juniperus communis.*

Juniper resembles turpentine in many of its actions, but it is less powerful and also less disagreeable. It is a **stomachic stimulant** and **diuretic.** In large doses it inflames the kidneys and produces strangury.

Average dose, ♏ iii.–0.2 mil.

Other Vegetable Oils.

The U. S. P. gives a long list of volatile and aromatic or fixed oils of vegetable origin; among them are: Oil of Anise, Oleum Anisi; Oil of Orange, Oleum Aurantii; Oil of Caraway, Oleum Cari; Oil of American Wormseed, Oleum Chenopodii; Oil of Coriander, Oleum Coriandri; Oil of Fennel, Oleum Foeniculi; Oil of Lemon, Oleum Limonis; Oil of Nutmeg, Oleum Myristicæ; Oil of Allspice or Pimenta, Oleum Pimentæ; Oil of Rosemary, Oleum Rosmarini; and Oil of Sassafras, Oleum Sassafras. All these mentioned are given in an average dose of ♏ iii.–0.2 mil, showing their potent and concentrated qualities.

Fam. Liliaceæ.

Scilla, Squill.

Part of the bulb of *Urginea 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 quantites 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.
Tincture of Squill.

Strength 10%. Average dose, ♏ xv.–1 mil.

Fluidextractum Scillæ.
Fluidextract of Squill.

Average dose, ♏ iss.–0.1 mil.

Syrupus Scillæ.
Syrup of Squill.

Average dose, ♏ xxx.–2 mils.

Syrupus Scillæ Compositus.
Compound Syrup of Squill.

Contains squill, senega, and tartar emetic. Average dose, ♏ xxx.–2 mils.

Sarsaparilla, Sarsaparilla.

The varieties of sarsaparilla used in medicine are obtained from the dried root of *Smilax officinalis* and other varieties of smilax. The drug contains three glucosides: parillin, saponin, and sarsaponin.

Sarsaparilla is widely used, yet no definite physiological actions can be claimed for it. Whatever value it may have is as an **alterative.** The syrup is sometimes used to disguise the taste of potassium iodide.

Preparations.

Syrupus Sarsaparillæ Compositus.
Compound Syrup of Sarsaparilla.

Contains sarsaparilla, liquorice root, senna, oil of sassafras, oil of anise, and oil of gaultheria.

Average dose, ℥ ss.–15 mils.

Fluidextractum Sarsaparillæ Compositum.
Compound Fluidextract of Sarsaparilla.

Contains sarsaparilla, liquorice root, sassafras, and mezereum.

Average dose, ♏ xxx.–2 mils.

Aloe.

Aloes.

The thickened juice of the leaves of different aloes 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 extent, 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 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, 10%. Average dose, ♏ xxx.–2 mils.

Tinctura Aloes et Myrrhæ. Not official.
Tincture of Aloes and Myrrh.

Strength, 10% of each. Average dose, ʒ ss.–2 mils.

Pilulæ Aloes.
Pills of Aloes.

Average dose, 2 pills.

Fam. Liliaceæ.

Convallaria (Lily of the Valley). Not official.

The rhizome and roots 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.

Fluidextractum Convallariæ. Not official.
Fluidextract of Convallaria.

Average dose, ♏ viii.–0.5 mil.

Convallamarinum. Not official.
Convallamarin.

Average dose, gr. ss.–0.03 Gm.

Fam. Phytolaccaceæ.

Phytolacca (Poke). Not official.

The root of *Phytolacca decandra.* Phytolacca is depressing to the heart and respirations, and is to some extent narcotic. It is an **alterative,** and promotes absorption of fatty tissue. "Anti-fat" remedies sometimes contain phytolacca. It is useful as a local medicament, and is used in various skin disorders.

Average dose of the fluid extract, alterative, ♏ iss.–0.1 mil.

Fam. Liliaceæ.

Veratrum Viride, American Hellebore.

The dried rhizome and roots of *Veratrum viride*, a plant belonging to the Northern States of the United States.

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 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 10%. Average dose, ♏ viii.–0.5 mil.

Fluidextractum Veratri Viridis.
Fluidextract of Veratrum Viride.

Average dose, ♏ iss.–0.1 mil.

Norwood's Tincture is a saturated tincture and is unofficial.

Veratrina, Veratrine.

A compound of alkaloids contained in the seed of *Asagræa officinalis*, a plant of the veratrum group.

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 official ointment usually requires dilution.

Preparations.

Unguentum Veratrinæ. Not official.
Veratrine Ointment.

Strength, 4%. For external use.

Oleatum Veratrinæ. Not official.
Oleate of Veratrine.

Strength, 2%. For external use.

Colchici Semen, Colchicum Seed.

Colchici Cormus, Colchicum Corm.

The dried ripe seeds and corm[1] of *Colchicum autumnale*, found in Europe. The active principle is called colchicine.

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.

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[1] A part of the stem which is underground, yet not the actual root—a bulb.

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 ss–ii. 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.

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 borborygmi; or rectal tenesmus may be observed.

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[1] A poison which is irritant, and which also acts on the brain and spinal cord.

Preparations of Colchicum.

Tinctura Colchici Seminis.
Tincture of Colchicum Seed.

Strength, 10%. Average dose, ♏ xxx.–2 mils.

Fluidextractum Colchici Seminis.
Fluidextract of Colchicum Seed.

Average dose, ♏ iii.–0.2 mil.

Colchicina.
Colchicine.

Average dose, gr. $\frac{1}{120}$–0.0005 Gm.

Fam. Gramineæ.

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.

Fluidextractum Ergotæ.
Fluidextract of Ergot.

Average dose, ♏ xxx.–2 mils.

Ergotin. Not official.

Ergotin is prepared under trade names according to different formulæ. It is unreliable and often inert. When 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.

Fam. Compositæ

Pyrethrum, Pyrethrum, Pellitory Root.

Is the root of a perennial plant growing in northern Africa. It contains a volatile oil, resin, and pyrethrin, and is similar in nature to black pepper. It is a local irritant. It is a specific for bed-bugs, and the best remedy ever used for their destruction (Stiles). The pyrethrum powder, pyrethrum roseum, is dusted wherever the bugs exist, and they are exterminated. It should be used once every week for three weeks, in order to kill any bugs that may have hatched out in the meantime.

Fam. Filices.

Aspidium, Male Fern.

The root-stock of *Dryopteris filix mas*, a European fern. The medicinal principle of fern is an oleoresin of a bitter, nauseous taste.

It is an **anthelmintic**, specially destructive to the tape-worm. 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.

Fam. 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.

Diastasum, Diastase.

A mixture obtained from an infusion of malt, which has the power of converting 50 times its own weight of potato starch into sugars.

Average dose, gr. viii.–0.5 Gm.

THE ANIMAL KINGDOM.

Adeps Lanæ Hydrosus, Hydrous Wool Fat, 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, Lactose.

A crystallized sugar obtained by evaporation from the whey of milk, and specially suitable for use in preparing baby foods. 1 Gm. dissolves in 2.6 mils of boiling water. It readily absorbs odors.

Pepsinum, 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 pig.

It is made by cleaning the mucous lining, scraping it, drying the pulp at a temperature of 100° F., and pulverizing it. The power 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.

Average dose, gr. viii.–0.5 Gm., with meals or immediately after.

Pancreatinum. Pancreatin.

A preparation made from the pancreas of the pig. Pancreatic extract digests starchy and proteid 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.

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 or complete.

The ferments, pepsin, pancreatin, and diastase, which promised so much for dyspepsia, and all the ills of bad digestion, have passed into disuse, and even the use of alkalies and acids is not so prevalent as it once was, many physicians preferring to use remedies that strengthen the digestive organs and add to their normal function by putting them into a condition to furnish the ferments in proper consistency and proportion. Many of the patented digestive compounds contain diastase, and, while aiding the breaking up of starch in the alimentary canal, are detrimental to the cells and the function of the parts. Average dose, gr. viii.–0.5 Gm.

Adeps, Lard.

Lard consists of a fluid oil, olein, with stearin and palmitin, which are solid oils.

It is used as the basis of various official ointments.

Benzoinated Lard.

Ten Gm. of benzoin in 1000 Gm. of lard.

Adeps Lanæ. Wool Fat.

The fat of the wool of sheep.

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 codfish. An exceedingly complex substance, containing glycerin, 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. This is the official variety,

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.

When cod-liver oil cannot be taken by mouth it may be administered by inunction, a few drams of the oil being rubbed into the skin of the chest or abdomen at night before retiring. When used in this way it is especially valuable for children with malnutrition.

Average dose, ℨ iiss.–10 mils, 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 spangles 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.

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. There is frequently salivation with swelling of the salivary 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 glycerin 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.

Thyroideum Siccum.

Dried Thyroids.

The thyroid glands of animals used for food by man, dried and powdered, producing a yellowish powder, with a slight, peculiar odor, and soluble, partially, in water. Average dose, gr. iss.–0.1 Gm.

Suprarenalum Siccum. (See p. 286.) Dried Suprarenals.

The suprarenal glands of animals used as food, dried and powdered, producing a yellowish-brown powder, partially soluble in water.

Average dose, gr. iv.–0.25 Gm.

Hypophysis Sicca. Desiccated Pituitary Body.

Manufactured from a small gland at the base of the brain of the ox.

The corresponding gland in man secretes a substance which contracts the blood-vessels and acts as a stimulant to the uterine muscle.

Uses.

To aid in the control of hemorrhage and to overcome uterine inertia.

Ovarian Extract. Not official.

Prepared from the ovaries of pigs. Used to relieve the symptoms of the menopause when induced artificially: *e. g.*, by extirpation of the ovaries.

Serum Antidiphthericum.

Antidiphtheric Serum. Diphtheria Antitoxin.

A fluid separated from the coagulated blood of a horse, immunized by inoculation with diphtheria toxin. It is a yellowish-brown powder, odorless, and slightly transparent. It loses strength, and the date of its manufacture should be known, also its strength, the name of the preservative, and the date beyond which it will not retain its strength. The standard must be that approved by the United States Public Health service. It must have a potency of not less than 250 antitoxic units per mil.

Average dose, hypodermic, 10,000 units.

Average dose, protective, 1000 units.

The U. S. P. also recognizes the Purified Antidiphtheric Serum, Diphtheric Antitoxin Globulins, a solution in physiological solution of sodium chloride, of certain antitoxic substances obtained from the blood serum or plasma of the horse or other large domestic animal which has been properly immunized against diphtheria toxin; and the Serum Antidiphthericum Siccum, Dried Diphtheria Antitoxin, which must be hermetically sealed. The average dose of each is the same as of diphtheria antitoxin. (See p. 283.)

Virus Vaccinicum, Vaccine Virus, Glycerinated Vaccine Virus, Smallpox or Jennerian Vaccine.

The pustules of vaccinia or cowpox from healthy vaccinated cows or calves. (See p. 285.)

Lactic Acid Bacilli.

Bacillus Bulgaricus. Not official.

Cultures of these bacilli in solid or liquid form are given to lessen intestinal fermentation and to relieve various conditions resulting from it.

A number of preparations of milk containing bacilli bulgaricus are on the market, as Fermillac, etc.

POISONS AND THEIR TREATMENT.

Poisons may be conveniently classified in three groups:

1. *Corrosives*, or those which act rapidly at the point of contact with the tissues, causing erosion. Such are:

Acids, alkalies, corrosive salts, animal and vegetable poisons, and gases.

2. *Irritants*, or those which irritate the tissues at the point of contact, and may cause erosions if concentrated for any length of time on the tissues. This group includes alcohol, ether, the metals, and some salts, carbon monoxide, phosphorus, and turpentine.

3. *Functional*, or those which act upon the function of organs or systems. Here we have aconite, belladonna, chloral, CO_2, gelsemium, lobelia, strychnine, opium, hemlock, mushrooms.

In group 1 death is usually sudden. If not immediate, then administer by mouth the antidotal treatment. Do not use the stomach-tube unless there is little erosion. Emetics are employed with great risk in these cases. The stomach-pump is always preferable, even with great erosion.

In group 2 the first thing to do is to insert the stomach-tube and wash out the stomach thoroughly. Emetics may be employed instead. Cathartics may be given and antagonistic treatment if necessary. Oils, milk, eggs, and demulcent drinks are useful.

In group 3 treatment should proceed according to the drug that caused the poisoning, and according to the symptoms that develop.

In poisoning from snake bite or scorpion sting, use a one-per-cent. solution of chromic acid locally, and give strychnine hypodermically. Use no alcohol.

In any case, *keep cool;* take *one minute* to collect yourself, then go to work. *Command others.* The result may surprise you, even in the most hopeless cases.

A TABLE OF POISONS,

THEIR ANTIDOTES AND ANTAGONISTS.

Antidotes act upon the poisons in the alimentary canal, and by combination or removal prevent their toxic action.

Antagonists counteract the effect of the poison upon the system, and may be used after its absorption, when antidotes are too late.

POISON.	CHARACTERISTIC EFFECT.	ANTIDOTAL TREATMENT.	ANTAGONISTIC TREATMENT.
Acids— Sulphuric. Nitric. Hydrochloric. Phosphoric.	Local action—corrosive.	Alkalies—as Soda, Magnesia, Chalk, Lime-water, White-wash, Soap. Oil; Albumen; Milk. Demulcent drinks.	Stimulants. Opium for pain.
Carbolic.	Rapid action—collapse.	50% alcohol. Stomach-tube. Lime-water; Syrup of Lime. Milk. Vegetable demulcent drinks. *No* oil.	Atropine. Chloral? Stimulants. External heat.
Oxalic. Tartaric. Acetic.	Frequent accidental mistake — Epsom salt. 60% die.	Stomach-tube. Lime with water or milk. Emetics. Bland drinks.	Stimulants. External heat.
Hydrocyanic.	Acts too quickly for any antidote to be of use.	Stomach-tube. Emetics.	Artificial respiration. Stimulants, hypodermically and by inhalation. Cold water to head and spine.
Aconite.	A few drops kill! Tingling sensation.	Stomach-tube. Empty and wash out stomach.	Recumbent position. Artificial respiration. Heat. *Atropine.* Hypo Ether, Digitalis.

POISON.	CHARACTERISTIC EFFECT.	ANTIDOTAL TREATMENT.	ANTAGONISTIC TREATMENT.
Alcohol.	Acute—maiden-blush. Chronic—nosegay.	Stomach-tube. Emetics.	Cold to head; heat to extremities. Inhalation of Ammonia. Electricity. Coffee.
Alkalies— Ammonia. Caustic Potash. Caustic Soda. Lime.	Dissolve tissues. Cause rupture or stricture.	Dilute acids. Vinegar. Lemon juice. Milk. Oil.	For Ammonia— Aconite. Digitalis. Cold air.
Anæsthetics— Chloroform. Ether, etc.	Produce sleep.	Remove anæsthetic.	Artificial respiration. Inversion of patient. Atropine; Strychnine. Stimulants. Heat.
Antimony— Tartar Emetic. Wine of Antimony. Syrup of Squills.	Rarely used. Cause vomiting.	Stomach-tube. Wash out stomach. Tannic acid—as tea, etc. Demulcent drinks.	Opium for pain. Alcohol.
Arsenic— Fowler's Solution. Paris Green. Rough on Rats. Arsenous Acid.	Acute—"rice water stools." Chronic—puffy eyes.	Stomach-tube. Emetics. Hydrated Oxide of Iron with Magnesia. Dialyzed Iron. Demulcent drinks.	Stimulants. Opium for pain.
Belladonna— Atropine. Hyoscyamus and Stramonium.	"Wild as a hare, dry as a bone, red as a beet!"	Stomach-tube. Emetics. Tannic acid.	Chloroform, Ether, Caffeine. Artificial respiration. External stimulants.
Chloral.	With alcohol—"knock-out drops."	Wash out stomach with tea or coffee and give these per rectum.	Heat. Mustard applications. Artificial respiration. Alcoholic stimulants. Atropine (carefully).
Cocaine.	Hypodermic habit. Two grains poison.	Remove cause. Stomach-tube.	Alcohol. Opium. Chloroform. Nitrite of Amyl.
Copper. Bluestone, etc.	Causes vomiting.	Albumens—egg, milk. Wash out stomach after. Demulcents.	
Digitalis.	Irregular circulation.	Stomach-tube. Emetics. Tannic acid.	Recumbent position. Aconite? Stimulants.

POISON.	CHARACTERISTIC EFFECT.	ANTIDOTAL TREATMENT.	ANTAGONISTIC TREATMENT.
Gases— Illuminating. Carbon dioxide. Chlorine. Nitrous Oxide.	Anæsthetic.	Remove patient from gas.	Fresh air. Artificial respiration. Stimulants. Oxygen inhalation. Friction of body surface.
Gelsemium— Coniine. Sparteine.	Depressing heart and respiration.	Emetics. Stomach-tube.	Opium? Stimulants. Artificial respiration. Heat. Electricity.
Iodine.	Colored vomitus.	Starch or flour with water. Stomach-tube. Emetics.	Stimulants hypodermically.
Lead— Sugar of Lead, etc.	Acute—causes vomiting. Chronic—colic, paralysis, blue gums.	Dilute sulphuric acid and lemon juice. Magnesia. Albumens. Stomach-tube. Emetics.	Opium for pain. External heat.
Lobelia.	Causes vomiting.	Tannic acid to wash out stomach.	Stimulants. Strychnine.
Mercury— Corrosive Sublimate, etc.	Acute—corrosive. Chronic—salivation, etc.	White of an egg to 4 gr. of the poison. Milk, flour. Stomach-tube.	
Mushrooms (non-edible).	Lake the blood. Paralyze the heart.	Wash out stomach. Cathartic.	Atropine. Stimulants. Salt infusion.
Nitrate of Silver—"Lunar Caustic."	Scarification.	Common salt. Stomach-tube.	
Opium— Laudanum. Paregoric. Morphine, etc.	"Pin-point pupils." Odor of breath.	Stomach-tube. Emetics. Permanganate of Potassium.	Artificial respiration. Electricity. External heat (carefully). Coffee by mouth and rectum. Atropine (with care).
Phosphorus.	Garlic odor.	Stomach-tube. Emetics. Copper Sulphate. *No* fats or oils. *Old* oil of Turpentine.	Alkalies. Heat.
Strychnine.	Convulsions.	Tannic acid. Stomach-tube or emetic quickly.	Quiet. Chloroform for convulsions. Chloral. Opium.

POISON.	CHARACTERISTIC EFFECT.	ANTIDOTAL TREATMENT.	ANTAGONISTIC TREATMENT.
ADDENDA. Chlorates.	Depression. Lake the blood.	Stomach-tube.	Stimulants. Alkaline drinks. Diuretics. Water.
Coal Tar Antipyretics— Antifebrin. Antipyrin. Acetanilid, Phenacetin, etc.	Depression. Lake the blood.	Stomach-tube. Stop drug.	Stimulants. Heat. Oxygen inhalation.
Cantharides.	Blisters.	Stomach-tube. Emetics. Epsom salt. Demulcents. *No* oil.	Stimulants. Heat to abdomen. Opium for pain.

EMETICS.

The use of drugs to produce emesis is not so prevalent as it was years ago, and if it becomes necessary to cause vomiting, the simpler means (such as drinking large draughts of tepid water and putting one's finger down the throat) should be tried whenever possible.

Stomach-tube.—We have at present in the stomach-tube an efficient means of emptying the stomach, and one that is simple, easily accomplished, and does not cause the patient great inconvenience and danger as in the use of zinc or copper sulphate, ipecac or tartar emetic, provided one is acquainted with the use of the stomach-tube. For ordinary stomach washing, etc., the patient should be seated in a chair and a rubber sheet placed around the neck, the end of the sheet resting in a basin between the patient's feet. The tube should be taken from cold water and passed carefully and rapidly down into the stomach, the operator standing behind the patient and grasping the tube firmly with the fingers of the two hands. The patient should be told to hold the head forward and allow the tube to pass down the throat. As soon as a feeling of choking or shortness of breath is experienced a deep breath should be taken. The tube should enter to a distance of about 30 cm. The stomach may then be washed out with warm water, and such drugs as necessary administered, leaving them in the stomach. While operating, the tube should be held firmly just at the patient's teeth that it be not forced out by reflex peristalsis of the œsophagus, or by other means.

Mustard.—One teaspoonful of mustard to a teacupful of warm water may be given to produce vomiting.

Repeat in ten minutes, if necessary, and keep on repeating until the desired effect is produced. Be sure that the mustard is removed from the patient's stomach before leaving him. Mustard should not be used in any condition of inflammation of the stomach.

Soap-suds; Salt.—Either of these in small amounts with tepid water will prove effective in producing vomiting and is to be used in preference to more drastic remedies.

Ammonium Carbonate.—This is a very safe and effective emetic, being at the same time a rapidly diffusible stimulant and expectorant. It may be given in doses of gr. 30, 2 Gm., largely diluted, and in milk.

Ipecacuanha.—The action of this drug is similar to that of the above, but it is slower in its action. It is used as an aid to other emetics, or for children to assist expectoration, or in old persons, or those who are very weak. It is safe and not depressing. Dose, 4–6 fl. dr., 15–20 Gm., of the wine of ipecac, given every quarter of an hour until the desired effect is produced. Large draughts of tepid water hasten its action.

Apomorphine. — Apomorphine is injected hypodermically when rapid action is necessary, when the stomach is inflamed, or if the patient is unable to swallow. It should not be given unless the nervous mechanism is intact. After irritant, corrosive, or narcotic poisons the stomach-tube is better. Dose, gr. $\frac{1}{10}$–$\frac{1}{6}$, 0.006–0.01 Gm. Vomiting usually takes place in from four to ten minutes. Repeat with caution, if necessary.

Sulphate of Zinc.—This is a specific emetic, acting promptly, without absorption, and causes little nausea or depression. Dose, gr. 15–20, 1.0–2.0 Gm., largely diluted with warm water and repeated in fifteen minutes if necessary.

Sulphate of Copper.—This is rarely employed as an emetic, but is rapid in its action when used. It is extremely irritant and should not be repeated if not at first effective.

Tartar Emetic.—This old remedy has fallen into disuse on account of its depressing effect and slow results. Any dose large enough to produce emesis also produces depression both before and after the act of vomiting, and the patient is usually left in an exhausted if not critical condition. Dose, gr. $\frac{1}{12}$–1, 0.003–0.06 Gm.

HYPODERMIC ADMINISTRATION OF DRUGS.

This method of giving drugs is growing steadily in favor. The best location for the injection of a drug is in the extensor surfaces of the extremities, and in the back, chest, or abdomen, avoiding the region of large blood-vessels and nerves. The amount administered is about one half the dose usually given by mouth. Nearly all drugs used hypodermically are put up in tablet form, being made readily soluble and especially for the purpose. The nurse becomes familiar with the various forms and sizes of syringes in use for the giving of hypodermics, and the care and sterilization of these is a part of her instruction from nursing textbooks and in practice in the wards of her hospital.

There are two ways of making the injections, superficial and deep. In the first, after having used at least two successive applications of alcohol by means of a sterile sponge or a bit of absorbent cotton to cleanse the part, the skin is grasped between the thumb and fingers of the left hand while the needle is thrust with the right hand on a slant to the depth of one centimetre, when it is withdrawn a short distance and the fluid is slowly forced into the tissues. Gentle kneading around, but not on, the point of injection and slight pressure over the part will aid in the absorption of the fluid, help to prevent abscess formation, and allay pain.

The second method, deep or intramuscular injection, is useful with irritant drugs, and with the same precautions as in the other method the needle is inserted deeply and swiftly into the muscular tissues of the back, chest, abdomen, buttocks, or preferably the anterior surface of the thigh, to the depth of three to five cm., at the same time stretching the skin tight over the part. The fluid is forced quickly out of the syringe, and the tissues around the point of its insertion are kneaded deeply for about five minutes.

Morphine and Strychnine.—These drugs are usually injected superficially about the fleshy part of the shoulder. They may be put in lower down on the arm or in other parts of the body.

Cocaine.—This is usually administered as a local anæsthetic, and in this way may be injected into any part of the body, or dropped into the eye or ear, or sprayed into the nose or throat. For hypodermic injections, the needle should be inserted along the line of the proposed incision—when one is to be made—and the cocaine forced in, a little at a time, removing the needle and reinstating it within the limit of anæsthesia with every mil of the fluid used. The injection should be completed at least five minutes before the incision is made. Not more than two grains of cocaine should be administered at one time for fear of poisoning.

Antitoxin.—One usually administers this remedy into the tissues of the back, buttocks, or thigh, preferably between the shoulder-blades or in the lumbar muscles. Rubbing and kneading the region adjacent to the point of injection is an aid to the efficiency of the injection.

Salt Solution.—The apparatus necessary for this is a graduated bottle, a rubber tube, and a needle. Sterilized normal salt solution (.9 of 1 %) should be kept on hand, and when wanted for use heated to a temperature of 110° F. and maintained at that point, employing a thermometer to register it. The bottle should be suspended at a height of three to six feet above the patient. The fluid is injected into the tissues behind the breast or into the thigh. The needle should be inserted well into the tissues, and withdrawn a little way. An adhesive strip may be used to hold it in place. Do not become alarmed if a large swelling occurs. Persistent kneading of the tissues *around* this will reduce it. A linen band may be placed about the patient's chest to prevent swelling, but this is unnecessary. Twenty minutes to one-half hour is usually required for 500 mils. to infiltrate the tissues.

Mercury is used in the form of the bichloride, or gray oil, and is injected deep into the buttocks, as a rule.

Ether, *camphor*, *ammonia*, *alcohol*, and *caffeine* are all injected into the muscles and are so used to obtain the rapid stimulating effect of the drugs.

Digitaline, *ergotine*, and *arsenic* in the form of atoxyl, are put in deep.

Atropine, *quinine*, *nitroglycerin*, *pilocarpine*, *adrenalin*, *hyoscine*, and *eserine* are also used hypodermically, and may be administered superficially.

Gelatin has been injected subcutaneously, but its use is becoming limited. Other drugs may be used hypodermically.

Piqures.

The Italians administer iron, arsenic, and strychnine, as well as guaiacol and other drugs, as tonics by hypodermic injection, calling the custom the giving of "piqures." The drug is prepared and hermetically sealed in a thin glass tube about 3 cm. long and containing 3 mils. of the fluid ready to be used in the syringe after the neck of the tube is broken off by snipping it with a pair of scissors. One injection is given each day into the gluteal muscles, on alternate sides. The injection is administered deep as above described. About 30 minims or an ordinary syringeful is the amount given, and the fluid is forced in rapidly, the quicker the less painful. Abscesses are not known to occur except through gross carelessness in technique. Strict asepsis is, of course, necessary.

SERUM THERAPY.

The revival of an ancient principle of treatment practised by Mithridates in his empire is of recent occurrence. We read that "Mithridates believed it possible to render himself proof against all forms of poison by the constant and daily use of small doses of various poisonous principles, and he compounded a general antidote by combining all forms of poison then known. He mixed with this the blood of geese and used the remedy for snake bite, reasoning that the geese must have some antidote for snake venom in their blood, because one of the chief articles of their diet was the viper, to whose bite they were very resistant." At the present time we use the serum from the blood of animals that have been treated with a killed culture of bacteria, or the toxins caused by bacteria, until the animals become immune to the kind of bacteria or toxins used. Ehrlich explains this immunity by his *side-chain theory*. His idea is that the body cells have groups of characteristics which may link them to certain substances. Toxins contain two groups of properties, the *toxaphore* group, which exerts its influence on the body cells, and the *haptophore* group, which combines the *toxaphore* group or toxic element with the *haptophore* group in the tissue cells, forming a side chain to the cells. The *haptophore* groups of the cells are destroyed, but nature quickly replaces them, producing more than were destroyed, the excess being liberated into the blood. This excess is called antitoxin. The antitoxin has an affinity for the *haptophore* group in the toxin, and by combining with the latter in the circulation protects the tissue cells by rendering the toxin inert. The injection of antitoxin gives immunity—as in tetanus—if administered before the toxin is introduced into the system, or cures—as in diphtheria,—in some cases, if administered after the toxin has entered the system. This is *antitoxic immunity*. *Bactericidal immunity* is more complex. When bacteria enter the body they cause the tissue cells and other cells to throw off an *immune body* (amboceptor) which can destroy the bacteria only by linking them to the *complement* which is contained in the bodies of all beings. The *immune body* is the protective agent. Much could be hoped from bactericidal sera could they be obtained so readily as antitoxin, but great difficulty has been experienced in procuring such sera. We have then two kinds of sera: antitoxic, such as antitetanus, antidiphtheritic, and anticellular; and antibacterial, such as antipneumococcic, antityphoid, and antiplague.

Classifications of Antitoxins, Serums, Vaccines, and Extracts.

A. Vaccines.

1. Cultivations.
   - *a.* Containing pathogenic micro-organisms; such as anthrax, one form of cancer vaccine, cholera vaccine, Coley's fluid, Haffkine's plague vaccine, tuberculin and T. R. of Koch, typhoid vaccine of Wright.
   - *b.* Containing toxins only; such as one form of cancer remedy, diphtheria toxin, mallein, tetanus toxin, and tuberculin Koch (?).
2. *a.* Tissues of animals suffering from an infectious disease; such as malignant œdema and rabies.
   - *b.* Fluids of animals suffering from an infective disease; such as vaccine lymph, and glycerinated calf lymph.

B. Anti-Serums — Anti iphtheritic and Antitetanic Serums.

1. Antitoxins; such as antipneumonia, antivenene, and diphtheria and tetanus antitoxins.

2. Antibacterial; such as cancer antibacterial serum, cholera antibacterial serum, antileprosy serum, antitubercular serum, antirabic serum, antistreptococcic serum, antityphoid serum, and Yersin's plague serum.

C. Animal Tissue Extracts—Organo-Therapy. Bone marrow, thyroid extract, and suprarenal extract are the chief of these.

(Sims Woodhead's Classification.)

Diphtheria antitoxin is prepared as follows: A colony of diphtheria bacilli, after being placed in a suitable medium and under favorable conditions, multiply with great rapidity, secreting at the same time their poison or toxins. After a few weeks, when sufficient of the toxin has formed, the bacilli are destroyed by means of carbolic acid, and by filtering through porous plates of clay the dead bacilli are removed from the solution of toxins. Of this solution small amounts are injected into the blood of a healthy horse, producing a mild attack of the disease; this procedure is then repeated for several months, the doses of toxin being steadily increased until the animal becomes habituated to the poison. Then a quantity of blood is withdrawn from the animal, and the serum, or aqueous portion, is separated from the red blood corpuscles, this serum constituting a light yellow liquid which contains the antitoxin of diphtheria. The serum is standardized by determining the quantity required for injection to neutralize a fatal dose of diphtheritic poison in a guinea-pig; the ratio between the quantity of antitoxin and the body weight of the animal furnishes a means of indicating in definite units the strength of the solution.

Behring's.—No. 1 equals 600 immunizing units; No. 2, 1000; No. 3, 1500. In ½ oz. vials, varying measure but full unit value.

Gibier's (N. Y. Pasteur Institute).—Identical with *Roux's.* Immunizing power, 1:100,000—*i. e.*, ½ mil, prophylactic up to 110 pounds; regular treatment, 5–15 mils a day.

Roux's.—Same description as *Gibier's.*

Schering-Aronson.—Supplied in vials containing 5 mils, equivalent to 500 antitoxic normal units.

Every case of diphtheria should be treated with the antitoxin as early as possible, 3000 units being an average first dose. All persons exposed should be given an immunizing dose of 500 units, except children under two years, with whom 300 units is sufficient, repeating the dose every three weeks in any case, until all danger is past. The antitoxin is used as directed under "Hypodermics."

Rabies Antitoxin, for Hydrophobia.—Pasteur founded the system of treating rabies by the injection of an emulsion of the spinal cord, believed to contain the poison, no bacilli being yet found. The rabies poison having a special affinity for the spinal cord, rabbits are inoculated with poison obtained from sections of the spinal cord at different stages of treatment. In the end an immunity is set up in the animals; an anti-rabic virus is obtained and injected into persons bitten by mad dogs. Pasteur Institutes, where treatment is provided for those bitten by animals, are located at convenient points throughout the United States. The treatment costs about one hundred dollars.

Tetanus Antitoxin has not proved satisfactory as a curative agent, but has been of some benefit, and is very effective as a prophylactic. Its method of preparation is analogous to that of diphtheria antitoxin, and it is similar to this in nature and action. The U. S. P. recognizes the tetanus antitoxin, *Serum Antitetanicum*, and also the refined concentrated serum and the dry form. The average dose is: hypodermic, 10.000 units, protective, 1500 units. The dry antitoxin is designated as a hundred-fold normal antitoxin—*i. e.*, 1 Gm. is sufficient to neutralize 100 Gm. of the normal poison of tetanus. It is put up in 5 Gm. vials, this quantity being theoretically sufficient to effect a cure. The vialful is dissolved in 30 mils of sterilized water at 40° C., and injected hypodermically at a single dose. The liquid form is of fivefold normal strength, and is employed hypodermically in cases of wounds where there is reason to fear development of tetanus, in quantity proportionate to the condition of the patient and the length of time elapsed since the injury. The antitoxin should not be kept long because it spoils readily. It should be injected in the same way as diphtheria antitoxin. Large doses used thoroughly will influence many cases of tetanus favorably if anything will.

Antityphoid Serum is prepared in much the same way that the antitoxins are prepared, but the immunizing period in the horse is much longer, being about one year. In cases of typhoid fever the Chantemesse serum is injected into the flexor surface of the elbow, about the plexus of large veins, in doses of 8–10 mils, and in a week, if the fever persists, 4–10 mils are again injected. A prophylactic dose of 2 mils may be used for those exposed to the disease.

Antiplague Serum made by Yersin has proved of value in treating the bubonic plague. It is given in doses of 150–300 mils.

Tubercular Serum (Behring, Koch, Fisch, or Maragliano) is used in the treatment of early cases of tuberculosis where there is no mixed infection, in a gradually increasing dose of 0.2–2 mils over a period of two years. Tuberculin (Koch), prepared by extraction of pure cultures of tubercle bacilli with 40–50 % glycerin and repeated precipitation with alcohol, as a snow-white mass soluble and stable in 50 % glycerin, is used in the diagnosis of local and pulmonary tuberculosis. The characteristic reaction to an injection of tuberculin shows itself locally by increased heat and systemically by a rise in temperature, usually in 12 hours. It is injected between the shoulder-blades at night in doses of $\frac{1}{250}$–$\frac{1}{65}$ gr., $\frac{1}{4}$–1 mil.

Vaccine Virus.—This comes in small sealed glass tubes in sterile form and is the official lymph for vaccination. Only such vaccine virus may be sold as has been made in places licensed by the Secretary of the Treasury of the U. S. The tubes may be large or small and will vaccinate from 2 to 80 persons, depending upon the size of the tube used.

Antivenene (*sérum antivénéneux*, Calmette) is prepared from the blood of asses and horses which have been immunized against snake poison. The power of immunization is 1 in 10,000. It should be carried by all persons going to a district infested with snakes, especially in India. The dose for adults is 20 mils; for children, 10 mils; in very dangerous cases the dose is doubled.

Antistreptococcus and *Antipneumococcus* sera have not proved to be distinctly valuable, although the former may do good, and can do no harm in general infections, erysipelas, and scarlet-fever. Large and frequent doses are required.

Many other sera have been exploited, among them anticholera, antidysentery, antiscarlatina, and those for the cure of yellow fever, anthrax, glanders, leprosy, whooping-cough, erysipelas, syphilis, malaria, and hay-fever, but none of these has yet proved of marked practical value.

Red Bone Marrow Extract.—The marrow of ox-bone and sheep-ribs has been used as a remedy for chronic debilitating blood diseases. It comes in the form of tablets containing one grain of the desiccated marrow, equal to twenty grains of the substance in its natural state. Each tablet weighs three grains. Dose, 1–3 tablets.

Dried Suprarenals.—This is now an official product, as given on page 268.

The active principle of the gland, *epinephrin*, has been isolated by Abel and Crawford, but it is not used in therapeutics. The dried extracts of the whole gland, or a liquid extract, or *adrenalin* may be used. These preparations are notable for causing contraction of small blood-vessels when applied locally, blanching the skin or mucous membrane, and for a general tonic effect on the heart and arteries when given internally.

They strengthen the heart's action and slow and regulate the pulse, causing a rapid rise in blood pressure.

Adrenalin Chloride Solution. Not official.

Average dose, ♏ xv.–1 mil by the mouth. Diluted with normal salt solution ten times it is used as a hypodermic injection, and has been suggested for intravenous injection. It is injected with cocaine and eucaine to cause anæsthesia and bloodless operations. For spray inhalations the strength of 1 to 2500 or 1 to 5000 is effective. The solution is easily oxidizable and should be kept closely stoppered and away from the light.

ELECTRO-THERAPEUTICS AND RADIOLOGY

The use of electricity as a therapeutic agent in disease requires special training and study and should not be attempted by an unskilled person. It is desirable, however, that nurses should be cognizant of the various forms such treatment may take in order that they may intelligently prepare their patients for such treatment and if necessary assist in administering it.

It would be impossible within the limits of a brief chapter to do more than indicate the various phases of such a far-reaching subject. The aim of the accompanying outline, therefore, is to emphasize, for the benefit of the nurse in general practice, a few practical points commonly overlooked, and to serve as a point of departure for those desiring to make further study of the subject.

Among the more common types of electric current used for therapeutic purposes are the following: Galvanism, faradism, the static and high-frequency currents.

Galvanism.

This form of current is commonly applied by means of two moistened electrodes attached to the storage cells of a battery. This current is continuous and its application is therefore usually painless, except at the time of the "make" and "break"—*i. e.*, at the time of the application of the electrodes and of their removal. Movement of the electrodes from one point to another on the skin should be effected by sliding them along the surface of the body and not by abruptly removing them from one spot and applying them to another, thus avoiding the production of a somewhat painful electric shock. The current should be turned on gently at first and increased in strength as the treatment progresses, and at the termination of the treatment it should gradually be lessened in strength and not abruptly shut off. The apparatus is simple and its detail can easily be mastered by a careful study of the switches and of the rheostat—a device for regulating current. The application of this form of electrical treatment will frequently be left to the nurse and it would be advisable for her to experiment upon herself with the electrodes before applying them to her patient, thereby familiarizing hereself with the sensations likely to be produced by the current at various strengths.

Uses.

The galvanic current is employed in the treatment of paralyzed muscles to improve their nutrition by means of the improved blood supply, which is one of the effects of the current, and to directly stimulate the muscle cells themselves, upon which the current has a marked effect.

Faradism.

In this case the electric current is passed through an induction coil and an interrupter which "makes and breaks" the current. Its application is therefore somewhat more painful than that of galvanism. Its mode of application is similar and portable batteries usually provide for the production of both kinds of current.

Uses.

Its chief use also consists in its beneficial influence on paralyzed muscle.

Static and High-Frequency Currents.

These are both produced by complicated apparatus and are forms of high-potential electricity which can be safely administered only by an expert. A nurse's duty will consist in preparing a patient for such treatment by seeing that she is appropriately dressed in loose warm clothing, free from all metal such as hair pins, brooches, safety pins, etc., which tend to "spark" and alarm the patient unnecessarily.

Uses.

The high-frequency current is widely employed in various conditions. Its most marked therapeutic actions seem to be in the reduction of blood pressure, relief of neuralgic pain, and in conditions where absorption of inflammatory conditions is required, as in eczema, lupus, and acne.

The X-Rays.

In 1895 Professor Roentgen discovered the existence of X-rays during the course of an experiment with cathode rays which had previously been discovered by Crookes, an English observer, in 1849. The X-rays, though invisible to the eye, have the property of penetrating solid substances to a considerable degree and are capable of affecting a photographic plate. The value of such a discovery to surgical and medical diagnosis is at once apparent. By these rays fractures can be accurately portrayed, foreign substances located, and many obscure conditions cleared up.

Preparation of a patient for X-ray examination consists in the removal of metal splints, pins, and adhesive plaster from the area to be examined, as these substances are more or less opaque to the rays and will cast confusing shadows on the photographic plate, thereby impairing its usefulness. If a wound exists in the field, any bismuth or iodoform dressing must be removed, since these substances also are non-permeable.

For diagnostic purposes, it is frequently desirable to radiograph the stomach or intestine. Since these organs are more or less permeable to the rays, it is necessary that some metallic substance, such as bismuth, be ingested shortly before the exposure is made, in order that the outline of the organs may be more clearly defined. Some cereal mixed with bismuth is frequently employed for this purpose. In searching for calculus in the kidneys, ureters, or gall-bladder, it is highly important that the colon should be empty and that a large meal be not taken for some hours prior to exposure. A cathartic is frequently administered the previous day and a cleansing enema given, so as to avoid the possibility of the presence of fæcal masses, which will seriously obscure the plate.

Therapeutic Action of X-Rays.

The X-rays have been found to have a marked curative effect on some forms of lupus, eczema, and epithelioma. It is sometimes desired to push their use until a reaction occurs, known as an X-ray burn, and it is necessary that a nurse should be able to recognize the symptoms of such reaction, which may be delayed and may not appear for days or even weeks after the exposure has been made. It is characterized by marked reddening of the part exposed, accompanied by some pain and slight swelling. If the "burn" be not severe, the redness disappears in a few days and the part desquamates. In severe cases the condition goes on to vesication and even to severe sloughing and destruction of the tissue accompanied by agonizing pain.

It should be remembered that some persons exhibit a marked idiosyncrasy to the rays and will develop a burn after a few seconds' exposure for radiographic purposes. The main points to be remembered are that the reaction is never apparent at the time and may be considerably delayed, and that any reddening of the part is a danger signal that should not be overlooked so that it may be immediately reported and appropriate treatment instituted.

Radium.

The use of this substance as a therapeutic agent is still in the experimental stages. Its existence was first demonstrated by the Curies in France in 1898, and was proven to be radio-active, *i. e.*, to have the power of emitting rays without relation to the sun or other external conditions. Experiments are being made as to its effects on the physiological processes of the body. It is known that it causes the blood-vessels to dilate, is possibly bacteriacidal, has some electrical action, and influences quickly growing tissues such as cancerous growth. Its future as a remedial agent in these conditions remains to be determined.

MINERAL WATERS.

Aix-les-Bains (Savoy) contains sulphur and a curious organic matter called Barègine, which renders it easy of digestion, oily, and suitable for massage. It is anti-rheumatic in action. The resort is open nearly all the year; the season of greatest benefit is from April 1st to November 1st.

Aix-la-Chapelle (Aachen, Prussia) is a sulphurous saline water containing sodium chloride, sodium bicarbonate, sodium and potassium sulphates, sulphuretted hydrogen, and carbonic acid. The water may be imported, and is drunk or used for baths. The two seasons extend from May 15th to September 30th, and from September 15th to March 31st.

Alexanderbad (Bavaria) is a chalybeate water containing iron and manganese. The season extends from May 15th to October 1st.

Alexisbad (Germany) has three springs of chalybeate water: Alexisbrunnen, Schönheitsquelle, and Stahlbrunnen or Grotte. Open from May 20th to September 20th. The water contains iron, manganese, potassium chloride, and free carbonic acid.

Allevard (Isère, France) is a carbonated sulphurous water containing calcium and magnesium bicarbonates, sodium chloride, calcium, sodium, and magnesium sulphates, free sulphuretted hydrogen, carbonic acid, and nitrogen. The water may be imported and the season at the spring is from June 1st to September 1st.

Apenta (near Budapesth) is an aperient water containing magnesium, sodium, and calcium sulphates, sodium chloride, with small quantites of lithium and potassium sulphates. It is imported.

Apollinaris (Neuenahr, Germany) is a stable acidulated alkaline water and contains sodium chloride, calcium and magnesium bicarbonates, with a large excess of carbonic acid. It is imported.

Arabella (Hungary) is a saline aperient water used as a mild purgative and contains magnesium and sodium sulphates similar to *Apenta*. It is imported.

Baden-Baden (Germany) is a lithiated arsenical water. The season at the springs is summer, and the water is imported.

Baden (near Vienna) is a sulphurous water containing calcium and sodium sulphates. It rises warm and has in it free carbonic acid. The place is open throughout the year.

Bath (Somersetshire).—The only true thermal water in England. Saline, 21 grains in 20 oz. Chiefly calcium sulphate and small quantities of sodium sulphate and magnesium chloride, with carbonic acid gas and nitrogen. Several baths varying in temperature from 88° to 120° F. (31.1° to 48.8° C.). For chronic rheumatism, gout, and paralysis. The water is aërated and sold in bottles under the name of Sulis Water. Radium has been discovered in the waters of Bath and Buxton.

Bethesda (Wisconsin, U. S. A.) is an alkaline water which is bottled for use. It contains calcium and magnesium bicarbonates.

Buda-Pesth, St. Lucasbad (Hungary) is a warm sulphurous water which contains potassium, sodium, and calcium sulphates and sulphuretted hydrogen. It is used for bathing (sulphur mud baths) and the hot water is taken internally. The place is frequented all the year.

Buffalo Lithia (Mecklenburg Co., Va., U. S. A.) is an alkaline lithiated table water. There are three springs, of which No. 2 is the chief. The water contains calcium bicarbonate and sulphate, carbonic acid, and sulphuretted hydrogen. The place is open from June 15th to October 1st, or the water may be obtained bottled.

Buxton (Derbyshire) is a slightly saline water containing sodium chloride, magnesium carbonate, calcium carbonate, free nitrogen, and carbonic acid. The place is open all the year round or the water may be bottled.

Carlsbad (Bohemia) is a lithiated alkaline water from a number of springs practically all the same; that known as Sprudel is the most important. The water contains sodium bicarbonate, sulphate, and chloride, lithium and calcium bicarbonates, and carbonic acid. Season all the year round, principally in July. The water may be imported. Carlsbad Sprudel Salts (dry and crystals) are also supplied.

Condillac (France) is an imported alkaline acidulated table water.

Driburg (Westphalia) is a chalybeate, tonic, aperient water containing sodium sulphate, magnesium sulphate, bicarbonate of calcium and magnesium, some iron and magnanese, and carbonic acid. Season from May 1st to October 10th, or the water may be imported.

Eaux Bonnes (Basses-Pyrénées, France) is a mild sulphurous water similar to Barèges and Cauterets. It contains sodium sulphate and chloride, calcium sulphate, and sulphuretted hydrogen. Principal season from June 1st to October 1st, or the water may be imported.

Ems-Bad (Germany) is an alkaline saline water that rises warm and contains sodium, calcium, and magnesium bicarbonates, sodium chloride, and free carbonic acid. Season May 1st to September 30th, or the water may be imported.

Fontalis is a pure alkaline table water, aërated and bottled at Harrogate. It contains chlorides and carbonates free from lime and magnesium salts.

Friedrichshall (Saxe-Meiningen, Germany) is an active diuretic and aperient water that is imported. It contains magnesium and sodium sulphates, sodium chloride, and magnesium chloride.

Harrogate (Yorkshire) is a sulphurous water containing sodium sulphate, sodium, magnesium, and calcium chlorides, calcium carbonate, magnesium bromide, and sulphuretted hydrogen. It possesses aperient and diuretic properties. The season is summer and winter or the water may be had in bottles.

Hunyadi Janós (Buda-Pesth) is an imported aperient water containing large percentages of magnesium and sodium sulphates, sodium chloride, and sodium and calcium bicarbonates.

Kissingen (Bavaria, Germany), Rakoczy and Pauden springs, is a saline aperient water containing sodium and potassium chlorides, and iron and calcium bicarbonates. It is imported.

Kissingen (Bavaria) Bitter Water is an aperient containing magnesium and sodium sulphates and carbonic acid.

Leamington is a bottled saline water containing sodium, magnesium, and calcium sulphates, sodium, calcium, and magnesium chlorides, and ferrous carbonate.

Malvern (Worcestershire) is a bottled water practically free from saline matter, and contains no organic matter.

Marienbad (Bohemia). There are several springs, alkaline, saline, chalybeate, and acidulated. The waters contain sodium sulphate, chloride, bicarbonates of alkaline earth metals, ferrous iron, and free carbonic acid. It is supplied in powder or crystals, and tablets are also made. The season is summer, or the water may be imported.

Nauheim (Germany) is a chalybeate iron and lithia water used in skin and rheumatic affections and heart diseases.

Nordhall (Lincolnshire) is a bromo-iodized water containing bromine, iodine, sodium chloride, and arsenic. The place is open from March 31st to October 31st.

Salutaris is pure distilled water, still or aërated, for table use.

Saratoga (U. S. A.) is an alkaline saline water from the "Congress" or "Hathorn" springs. It contains sodium chloride and iodide, bicarbonates of calcium and magnesium, and free carbonic acid. It is a mild aperient. The place is open all the year round, or the water may be obtained in bottles.

Selters, or Seltzer Water (on the Lahn, Nassau), Ober and Nieder springs, is an alkaline acidulated table water containing sodium chloride, bicarbonates, and carbonic acid. It is imported.

Spa (Belgium) is an imported ferruginous water containing ferrous bicarbonate and free carbonic acid. The season is summer.

Sulis (Bath Water, aërated) is an aperient table water containing calcium and sodium sulphates, magnesium, and sodium chloride.

Vichy (Allier, France) is an imported alkaline, acidulated water from one of the springs: Grande-Grille, Hôpital, Célestins, or Parc. The place is open from May 15th to September 30th.

Wiesbaden (Nassau) Kochbrunnen is an antacid water containing sodium and potassium chlorides, magnesium and sodium bicarbonates, and free carbonic acid. The place is open all the summer or the water may be imported.

UNCLASSIFIED DRUGS (ALPHABETICALLY ARRANGED).

Acetal is a derivative of alcohol, employed as a sedative and hypnotic. It is usually given as an emulsion.

Average dose, ʒ i.–4 mils.

Acetone (official) is prepared by the dry distillation of calcium acetate. It is a colorless liquid with a peculiar ethereal odor, and sharp, biting taste. Miscible with water, alcohol, and ether. Employed as a nervine, as an intestinal antiseptic and anthelmintic.

Acetozone is a proprietary form of benzoyl-acetyl peroxide, and is used as an intestinal antiseptic and antipyretic.

Airol (bismuth oxy-iodo-gallate), or dermatol oxidized with the addition of iodine, forms a greenish gray, fine, voluminous, inodorous, and tasteless powder. Moisture causes it to turn red with loss of iodine. Soluble in dilute acids and alkalies. Used as a dusting powder in place of iodoform.

Albolene, a refined product of petroleum that cannot become rancid. Used as a basis for ointments. *Albolene liquid* is a colorless, odorless, tasteless fluid, very light and diffusible. Used as a solvent for drugs in oleaginous solution for sprays.

Analgen is a remedy used as an antineuralgic, antipyretic, and analgesic.

Average dose, gr. viii.–0.5 Gm., repeated in three hours.

Anesthol is an anæsthetic, composed of chloroform, ether, and ethyl chloride in the proportions respectively of 1, 2, 3, which corresponds closely to the A. C. E. mixture.

Antinervin contains ammonium bromide, salicylic acid, and acetanilid. It is used as an anodyne and antineuralgic.

Average dose, gr. viii.–0.5 Gm.

Apiol is a steroptene derived from garden parsley. *Apioline* is claimed to be the true active principle of parsley. Each acts as a stimulating emmenagogue. Average dose, ♏ v.–0.3 mil. Continued use may bring on headache, giddiness, ringing in the ears, and mild intoxication. The U. S. P. admits the oleoresin.

Apocodein hydrochloride is an amorphous yellowish powder used as an expectorant. Hypodermic dose, gr. i.–0.06 Gm.

Argyrol is a combination of silver with the yolk of eggs, containing 30 % of silver. It is used as an antiseptic in inflammatory affections of the mucous membranes. Solution 5–20 %.

Aristol (*Annidalin*).—The essential constituent of aristol is iodine, of which it contains about 45 %, other substances entering into its composition being thymol and sodium. It is odorless, and is used as a substitute for iodoform. As an antiseptic it is not strong and has no poisonous qualities. It is used in dusting powders, ointments, and solutions in oil, ether, or collodion, usually in a strength of from 5–10 %.

Asaprol has analgesic properties. It also checks hemorrhage, lowers temperature, and lessens nervousness and insomnia. It increases the amount of urine, and sometimes gives rise to profuse perspiration. Internally gr. v.–0.3 Gm. may be given in a day. It is soluble in water and in alcohol, and is incompatible with quinine, iodide of potassium, and the soluble sulphates. For lotions or irrigation it is prepared in a strength of 1–5%.

Asparagin is a derivative of marshmallow root and is also contained in asparagus. It is used as a diuretic. Average dose, gr. ss.–0.03 Gm.

Aspirin.—Compound made chemically from salicylic acid. Action similar to that of sodium salicylate, but more lasting.

Average dose, gr. viii.–0.5 Gm.

Atoxyl is an amido-benzene compound of arsenic, administered in the form of a hypodermic in place of arsenic by mouth.

Bebeerin, an alkaloid in the form of a white amorphous powder with a bitter taste, used as a substitute for quinine. Average dose, gr. ss.–0.03 Gm.

Benzonaphthol is a white, crystalline powder, used as an intestinal antiseptic and disinfectant. Average dose, gr. v.–0.3 Gm.

Benzosol is a compound of guaiacol. A colorless, inodorous, tasteless powder, insoluble in water. It contains about 50% of guaiacol.

Average dose, gr. v.–0.3 Gm.

Betol or Naphthalol is a compound analogous to salol, but containing 10 % less of salicylic acid, and being correspondingly less active and less effective. In the intestines it decomposes into naphthol and salicylic acid. It is used in the same way as salol. It is best given in pill or emulsion.

Average dose, gr. iii.–0.2 Gm.

Bismuton is a canary-yellow powder containing bismuth, resorcin, and tannin. Average dose, gr. viii.–0.5 Gm.

Bismutose is a fine greenish yellow powder, with astringent taste, odorless and insoluble. It contains 22% bismuth in albumin and sodium chloride. Used as an antacid and antidiarrhœa remedy. It acts more quickly than other bismuth compounds but is more constipating. Average dose, gr. xv.–1 Gm.

Boro-salicylate of Glycerin is a compound of boric and salicylic acids in concentrated form in which all their antiseptic and microbicide powers are retained, and is miscible with water in all proportions. Five mils of the compound contains 1 Gm. each of salicylic and boric acids.

Bromal Hydrate is made by the action of bromine on alcohol. It is similar to chloral hydrate in its actions, being antispasmodic and hypnotic, but is more powerful than chloral and more direct and dangerous in its influence over cardiac muscle. Large quantities may cause death, preceded by anæsthesia and convulsions.

Average dose, gr. iss.–1 Gm.

Bromidia is said to contain potassium bromide and chloral-hydrate, of each 30 parts; extract of hyoscyamus and extract of cannabis indica, of each 0.25 parts; fluid extract of liquorice, 90 parts; and oil of orange peel, 5 drops.

Brominol, *Bromipin*, is a substitute for the bromides in the form of bromine 10 % in sesame oil, in which the properties of bromine are retained without any taste or odor of it or the resulting rash or depression after large doses. Average dose, ʒ iss.–6 Gm.

Bromocoll is a combination of bromine, tannin, and gelatin, containing 20% of bromine and used as a substitute for the bromides.

Bromoformum (official) (*Bromoform*) is an analogue of chloroform, and contains bromine. It is soluble in alcohol; only slightly so in water. It is quite powerful in its actions, which are antispasmodic, analgesic, and antiseptic. Average dose, ♏. iii.–0.2 mil.

Cacodyl (*Arsenic*) *Derivatives.*—Cacodylic acid and sodium cacodylate and their combinations with mercury have been used extensively in anæmic and cachectic conditions, internally and as a lotion for the eyes or for sores elsewhere. Average dose, gr. i.–0.06 Gm., hypodermically. Sodium cacodylate is official.

Cetrarin is a bitter principle obtained from Iceland moss, and used as a stomachic. It increases peristalsis, likewise the secretion of saliva, bile, and pancreatic juice. Average dose, gr. iss.–1 Gm.

Chaulmoogra Oil is a frothy substance obtained from seed of *Gynocardia odorata;* used in the treatment of leprosy and tubercular conditions. Average dose, ♏ xv.–1 mil.

Chloralformamidum is a preparation made by the interaction of chloral and formamid, in the form of colorless crystals, employed as a substitute for chloral, being not so depressing as the latter, yet less certain in its hypnotic action. Average dose, gr. xv.–1 Gm.

Chloralose is a compound of chloral with grape sugar in the form of fine colorless crystals, with a bitter taste, freely soluble in hot liquids, but slightly so in cold water. It is used as a hypnotic, but is not so reliable as chloral. Average dose, gr. iii.–0.2 Gm.

Chloretone is a compound formed by the action of caustic potash on equal parts of chloroform and acetone. It is used as an antiemetic in pregnancy, seasickness, and menstrual sickness, as a hypnotic and external antiseptic. Average dose, gr. xv.–1 Gm.

Chrysarobin is a principle obtained from goa powder found in the stems and branches of *Andira arabolea*, in the form of a light yellow crystalline powder, and is employed in the treatment of various skin diseases in an ointment of 10%.

Condurango is the herb of *Gonololus condurango*, used as an alterative. Average dose of fluid extract, ♏ xv.–1 mil.

Cornutin is one of the active principles of ergot, a reddish to yellowish product (Kobert's) or white crystals (Keller's), used in place of ergot. Dose, gr. $\frac{1}{12}$–0.005 Gm.

Coronillin is a glucoside from the seeds of *Coronilla scorproides* forming a pale yellow, bitter powder, used to strengthen heart action and increase diuresis. Average dose, gr. iii.–0.2 Gm.

Credé's Ointment contains 15% soluble metallic silver and is employed in septic inflammation and erysipelas.

Creolin is an emulsion of cresol, a derivative of carbolic acid. It mixes in all proportions with chloroform, ether, and alcohol, and with water forms a milky solution. It is used locally in a variety of ways.

Cresol. Is official and is derived from coal tar. It has the medicinal qualities of its group, and is slightly soluble in water, more freely so in glycerine, alcohol, or ether.

Average dose, ♏ i.–0.05 mil.

Dermatol contains about 55% of the oxide of bismuth. It is a yellow, odorless powder, insoluble. It is an excellent antiseptic, used in place of iodoform. It is also used internally. It is officially listed as bismuth subgallate.

Average dose, gr. viii.–0.5 Gm.

Locally it is used as a powder, in gauze, emulsion, or ointment. Strength, 10–20 %.

Diabetin is a trade name for lævulose or fruit sugar.

Dionin is the hydrochloride of a preparation of morphine, appearing in a fine white crystalline powder, possessing the narcotic properties of morphine without attaining its intensity. Toleration is not established by its use, hence it is used for the morphine habit. Its properties are similar to codeine. Average dose, gr. $\frac{1}{4}$– 0.015 Gm.

Eucaine, now in the U. S. P. as *Betaeucaine Hydrochloride*, is a synthetic alkaloid, in action like cocaine. It is irritant and must be used with care.

Eudoxin is artificially produced in the search for inodorous iodine compounds. It contains iodine and bismuth and shares their qualities.

Average dose, gr. iii.–0.2 Gm.

Eugenol (official) is an aromatic phenol obtained from oil of clove and other sources. It must not be exposed to air.

Average dose, ♏ iii.–0.2 mil.

Euphthalmin is a synthetic alkaloid of complex derivation, sometimes used as a mydriatic, usually in 2% solution.

Europhen is a powder containing about 27 % of iodine, and used as a substitute for iodoform. It is soluble in alcohol, ether, chloroform, and oil. As a dusting powder it is used in a strength of from 5–10, % and hypodermically solutions in olive oil are used in from 3–10 % strength.

Ferratin.—This organic preparation of iron is made commercially by heating animal or vegetable albumin until the slimy consistency is lost, when an acid is added and a ferric compound of the albuminoids is formed. This after drying is readily soluble in alkaline solutions. It is absorbed more rapidly, and is less irritant than the inorganic preparations. Contains 7 % of iron. Average dose, gr. viii.–0.5 Gm.

Glutol is formaldehyde gelatin, exhibited as a powder and used as an antiseptic.

Hæmogallol is obtained by oxidizing the hæmoglobin of the blood by the action of pyrogallol (a derivative of gallic acid). It is a reddish brown powder, easily assimilated. It is insoluble in water, and is given in tablets or in wine.

Average dose, gr. iii.–0.2 Gm.

Hæmoglobin is the red coloring matter of the blood corpuscles. It forms a red powder, soluble in water.

Average dose, gr. ii.–0.125 Gm.

Helmitol is a compound of a preparation of citric acid and urotropin in the form of odorless and colorless crystals with a slightly acid taste, acting as diuretic and antiseptic. Average dose, gr. viii.–0.5 Gm.

Hemol.—Obtained from hæmoglobin by reduction with zinc dust. Contains 0.2 % of iron. A number of combinations of hemol with other metals are in use, possessing the tonic properties of the former with the medicinal properties of the latter. Arsen-hemol contains 1 % of arsenous acid. Iodo-hemol contains 16.6 % of iodine. Zinc hemol contains 1 % of zinc.

Holocain is obtained by uniting phenacetin and para-phenetidin in the form of insoluble crystals of bitter taste, and used as a local anæsthetic in ophthalmology in solution of 1 %.

Iodoformogen is an odorless compound of albumin and iodoform. It is dry, impalpable, does not form lumps, and is three times lighter than iodoform, in place of which it is used.

Iodothyrin is obtained from the thyroid gland of the sheep in the form of an amorphous brown powder, as a milk-sugar trituration; used as an alterative in an average dose of gr. xv.–1 Gm. Contains 3% iodine.

Jequirity is the seed of *Abrus precatorius*, the active principle of which is *abrin* or jequiritin, which is used as an irritant in chronic conjunctivitis. It is extremely poisonous.

Kola contains the alkaloids theobromine and caffeine, and a principle known as kolanin. It is used internally as an astringent. It lessens tissue waste, is a tonic stimulant to the circulation, and aids the alcoholic subject in resisting the craving for liquor.

Lecithin is a phosphate obtained from the yolks of eggs, and is used in nervous affections. Average dose, gr. iii.–0.2 Gm.

Listerine is an American specialty used as a lotion or mouth wash, and contains approximately boric acid 25, benzoic acid 1, thymol 1, eucalyptol 1, oil of gaultheria 2, oil of peppermint ½, tincture of baptista 15, alcohol (90 %) 325, and water to make 1000.

Litmus Paper for the testing of urine, etc., is colored blue by impregnation with a solution of litmus, which is a dye prepared from lichens with an alkali. Dipped into an acid the paper turns red, and the color is restored by an alkali.

Losophan is a preparation containing about 78 % of iodine. It is used in powder, ointment, and solution, in from 10–20 %, in the treatment of skin diseases.

Lysoform is a combination of lysol and formaldehyde used in solution of 5 to 10 % as a disinfectant and antiseptic.

Lysol is a derivative of carbolic acid, containing 50 % of cresols. It forms a soapy liquid with water, and combines with alcohol and glycerin. It is used as a disinfectant for the skin, in 1 % solution, and for wounds and abscesses in from 1–3 %.

Magma Bismuthi, Milk of Bismuth (official), contains bismuth subnitrate, nitric acid, and ammonium carbonate. Average dose, ʒ i.–4 mils.

Magma Magnesiæ, Milk of Magnesia (official), contains magnesium carbonate and sodium hydroxide. Average dose, ʒ iiss.–10 mils.

Marrubin, or the glycerine extract of the red bone marrow, may be used. Average dose, ʒ i.–4 mils.

This is given as a nutrient substitute for cod-liver oil.

Mel Rosæ, Honey of Rose, is made of fluidextract of rose and clarified honey. Average dose, ʒ i.–4 mils. Official.

Methacetin is a compound analogous to phenacetin. It is tasteless and colorless, soluble in alcohol, glycerin, and oil; also slightly soluble in water. It has been used as an antiseptic, analgesic, and antipyretic. It is rather depressing, and has sometimes caused collapse. Large doses may bring on convulsions, followed by death.

Average dose, gr. ii.–0.125 Gm.

Methylal is a local anæsthetic and hypnotic, derived from alcohol. It is soluble in water and alcohol, and has an aromatic odor and taste. The sleep produced by it is sound but of short duration. It is depressing in large doses. It has been used in cases of insanity and delirium tremens.

Average dose, ♏ iii.–0.2 mil.

Methylthionine Chloride—Methylene Blue (official)—is one of the "aniline dyes." It is slightly soluble in water. It is a bluish powder, and has been used as an antipyretic and antiseptic. It is also considered a good antiperiodic. It is given in wafers or capsules, and hypodermically. It colors the urine blue or greenish blue.

Average dose, gr. iiss.–0.15 Gm.

Migranin is an antipyrin preparation containing antipyrin, caffeine, and citric acid.

Average dose, gr. viii.–0.5 Gm.

Novaspirin.—Also a compound of sodium salicylate. Less nauseating.

Average dose, gr. v.–0.3 Gm.

Novocaine.—Artificial alkaloid used as a local anæsthetic. Action similar to cocaine but is less poisonous.

Average dose, gr. ss.–0.03 Gm.

Nuclein is a phosphorated proteid obtained from the spleen and other organs in the form of a pale yellow powder, soluble in alkaline solutions but insoluble in water and alcohol. It is said to increase the number of white blood cells and so destroy bacteria.

Average dose, gr. iii.–0.2 Gm.

Orexin is a derivative of chinolin. It is a gray powder of bitter taste, soluble in water and alcohol. It is used as an appetizer and stomachic tonic, but is somewhat irritating, and should not be given on an empty stomach.

Average dose, gr. iii.–0.2 Gm., in capsule, at meal-time, or accompanied by food or some nourishing drink.

Oxygen.—A constituent of the atmosphere forming 20% of its volume. Stored under pressure in metal tanks for use (official).

Action: Antiseptic. Improves condition of blood and stimulates all activity.

Chief use in pneumonia when patient becomes cyanotic due to imperfect oxygenation of the blood.

Pellotine, an alkaloid obtained from a Mexican plant and used in the form of the hydrochloride as a hypnotic.

Average dose, gr. ss.–0.03 Gm.

Pental is a hydrocarbon obtained from fusel oil as a colorless liquid and used as a general and local antiseptic. It is depressing.

Peronin is a hydrochloride of the benzyl ether of morphine, the action of which is between that of morphine and codeine. Average dose, gr. ss.–0.03 Gm.

Picric Acid, *Trinitrophenol*, an explosive combination of carbolic, sulphuric, and nitric acids, is official. It is a yellow, crystalline powder, soluble in water. Its action is antiseptic, astringent, and slightly irritant. Applied to suppurating burns through wet gauze it cleans and heals them readily. It should be applied thoroughly in all cases, the acid being removed frequently until the coagulated lymph covers the sore. It may also be applied to mucous membrane, in the form of a douche. It is sometimes rapidly absorbed and causes poisoning, the characteristic symptom being the yellow color of the skin, mucous membranes, and urine. Convulsions and collapse may occur.

Piperazine is a drug formed by the action of ammonia upon ethylene bromide. It is used as a diuretic, its active properties arising from its capacity for dissolving uric acid.

It is not irritant nor poisonous.

Average dose, gr. x.–0.3 in carbonated water.

Protargol.—A silver compound containing 8.3% of metallic silver combined with protein. It is antiseptic, slightly astringent, non-irritant, and free from all caustic or corrosive effects, even on sensitive membranes. It is used in ¼ to 2% solutions. It should be kept in amber vials.

Pyramidon is an amido derivative of antipyrin. It is milder, more gradual, and more lasting than antipyrin.

Average dose, gr. v.–0.3 Gm.

Pyrogallol.—Pyrogallic acid is obtained by the action of heat on gallic acid. It is used in skin diseases as a local irritant, caustic, and parasiticide. It stains the skin and clothing brown. It is generally employed in the form of ointment or in flexible collodion. It may cause poisoning, manifested by headache, diarrhœa, chills, vomiting, a reddish color to the skin, dark brown urine, rapid heart and respiration, restlessness, convulsions, coma, and death. Official.

Salipyrin.—This drug is the salicylate of antipyrin. It is considered an efficient antipyretic.

Average dose, gr. viii.–0.5 Gm.

Salophen is a derivative of salol, introduced as a substitute for the latter in order to avoid effects arising from the liberation of phenol in the organism, which occurs when salol is used. Its physiological actions are similar to those of salol.

Dose, gr. viii.–0.5 Gm.

Salvarsan, Called "606" or Arsenobenzol.—A complex organic arsenic salt put up for use. It is a yellow powder sealed in glass tubes.

Action: As a specific in syphilis, by destroying the organism, *Spirocheta pallida*, and neutralizing its poisons.

Administration: A suitable dilution of the drug in distilled water is administered by venous transfusion. Occasionally this solution is administered by deep injection into the muscles.

Average dose, gr. viii.–0.5 Gm.

The administration of the drug produces reaction of more or less severity in some cases. There may be a chill with accompanying high temperature. Blindness has resulted and the usual signs of arsenical poisoning may make their appearance.

Sanatogen is a combination of sodium-glycero-phosphate and casein, used as a nutrient tonic.

Somatose is a preparation of meat in such a way as to be readily digestible, five parts of the preparation representing thirty parts of meat. Iron somatose and milk somatose are preparations with iron and from milk, respectively.

Somnal is made by the combination of chloral, alcohol, and urethan. It is a colorless liquid which will not mix with cold water, but dissolves in alcohol, or hot water. It is quite an efficient hypnotic, and usually prompt in its action. Its effects are considered less depressing than those of chloral, and more active than those of urethan.

Average dose, ♏ xv.–1 Gm., usually given in syrup of tolu.

"*Stypticin*," no longer so-called, is officially *Cotarnine Hydrochloride.* It is obtained from narcotin, one of the alkaloids of opium. It is given in solution, or in powder, wrapped in wafers, or best, in gelatine pearls. It may also be used hypodermically.

Average dose, gr. i.–0.06 Gm.

Taka-diastase is a starch-digesting ferment obtained from fungus grown on wheat bran. Average dose, gr. v.–0.3 Gm.

Tannalbin is a red brown product made by combining tannin and albumin, and used as an intestinal astringent. Average dose, gr. x.–0.65 Gm.

Terebenum (*Terebene*) is a colorless liquid, of hot taste, obtained by chemical process from oil of turpentine. It is used as a stimulant expectorant. Official.

Average dose, ♏ iv.–0.25 mil, in an emulsion or in capsule.

Terpini Hydras, *Terpin Hydrate* (official), is made from turpentine but has no odor of turpentine. It is used as an expectorant.

Average dose, gr. iv.–0.25 Gm., given in tablets or syrup.

Terpinol is an oily liquid, obtained by combining terpine and hydrochloric acid. It has the same stimulant and expectorant properties as terpin hydrate, and is used under similar circumstances.

Average dose, ♏ viii.–0.5 mil.

Tetronal is a compound allied to sulphonal, and in general similar to trional.

Average dose, gr. viii–0.5 Gm.

Theophylline (official) formerly known by the name theocin. It is obtained from the teaplant and is also produced chemically. It has diuretic qualities.

Average dose, gr. iv.–0.25 Gm.

Thymacetin is a derivative of thymol, and related to phenacetin. It is used as an analgesic and hypnotic. The after-effects are sometimes unpleasant.

Average dose, gr. v.–0.3 Gm.

Thymol Iodide contains about 43% of iodine, and is used as a substitute for iodoform. It is not poisonous. It is official.

Trional, now officially *Sulphonethylmethane*, is chemically allied to sulphonal, and is given as a hypnotic, and also as an antihydrotic. When it is successfully given it produces a quiet sleep and a natural awakening, but if, after being given twice in succession, no results follow, it is useless to try it further. When it acts, it acts quickly, and sleep comes on within a short time. It is not given for more than five or six nights in succession, as it sometimes causes prostration. It is apt to accumulate in the blood, and to avoid this, mineral waters are taken in conjunction with it. It causes constipation, and this must be watched for and overcome. It is given in hot milk just before retiring.

Average dose, gr. xii.–0.75 Gm.

Tropococain is an alkaloid from a variety of coca, used lik cocaine as a local anæsthetic. It is very costly.

Tussol is anti-pyrinin-mandelate, and is used as an antispasmodic. Average dose, gr. i.–0.06 Gm.

Urotropin is now officially *Hexamethylenamine* and has lost its trade name. Formed by the action of formaldehyde and ammonia. It is a urinary antiseptic, sterilizing the urine by giving off some of its formaldehyde. It increases the flow of urine and the excretion of uric acid, the solution of the urates beginning within twenty-four hours after the ingestion of the drug.

Average dose, gr. iv.–0.25 Gm.

Veronal is a hypnotic which in excess may cause a rash, neuralgic pains, or loss of muscular control. Over-use induces constipation and diminishes excretion from the kidneys. Large doses have caused death.

Average dose, gr. iv.–0.25 Gm.

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