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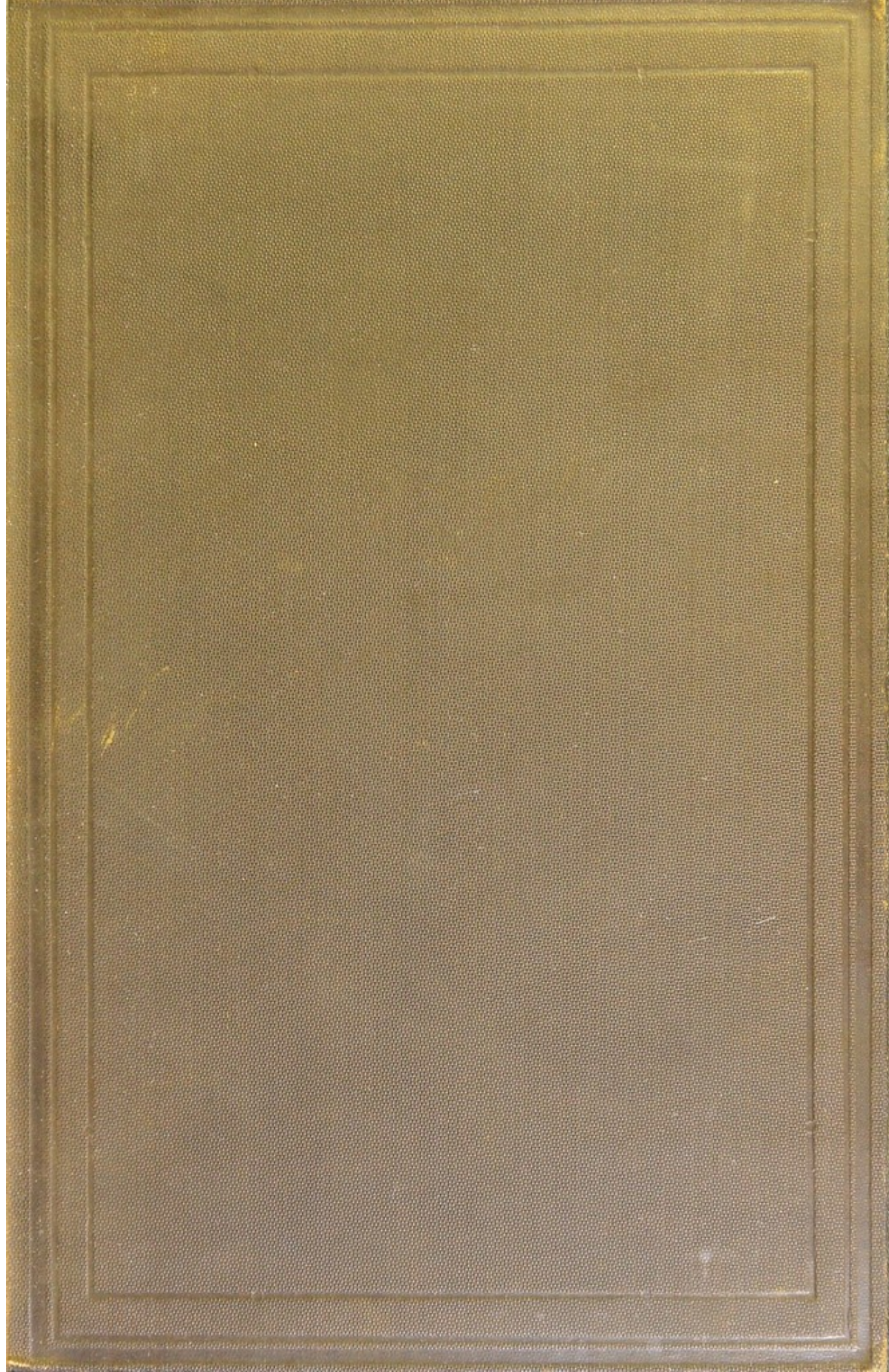
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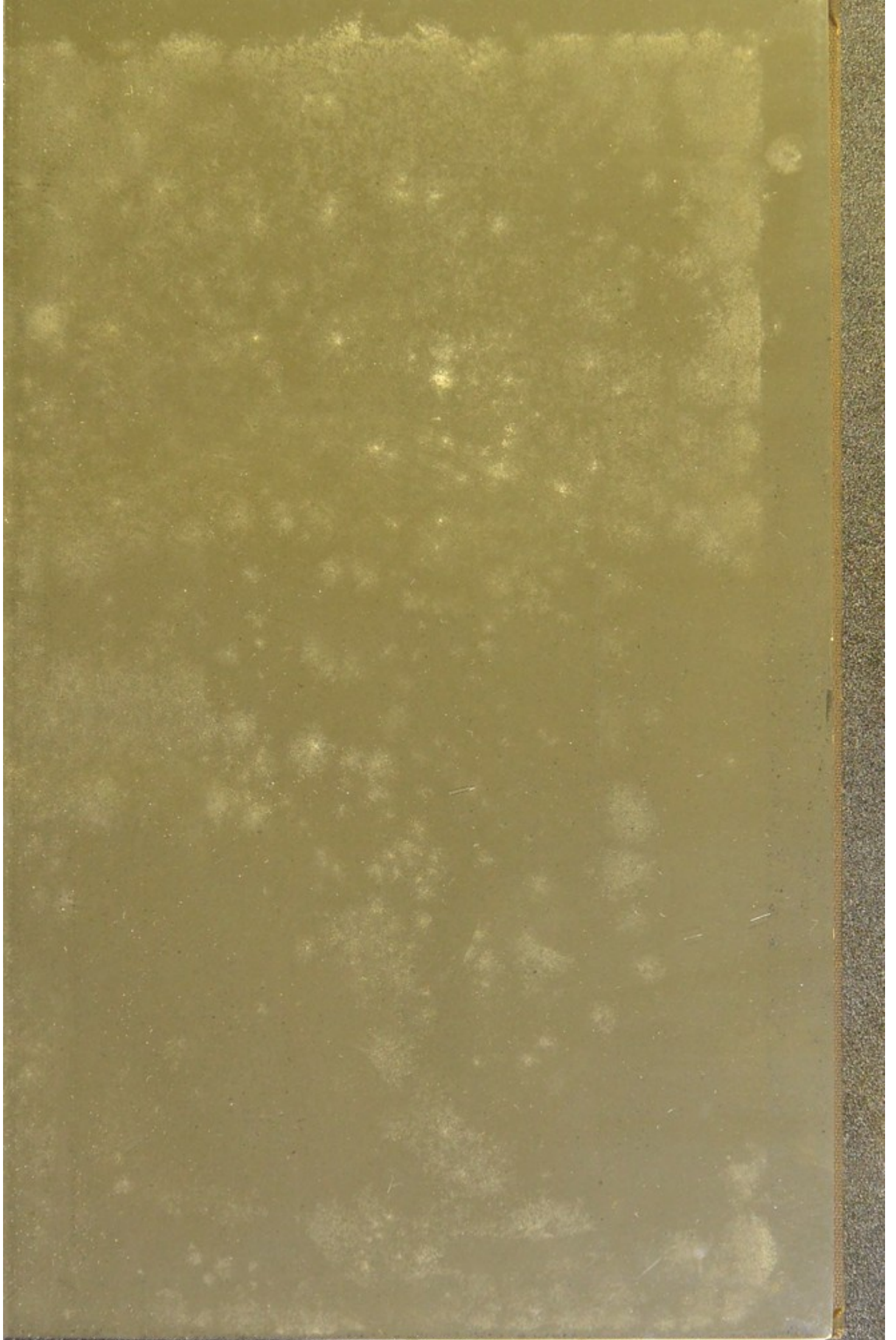




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THE
GALENICAL PREPARATIONS OF THE
BRITISH PHARMACOPŒIA



THE
GALENICAL PREPARATIONS
OF THE
BRITISH PHARMACOPŒIA

A HANDBOOK FOR MEDICAL AND
PHARMACEUTICAL STUDENTS

BY

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PREFACE.

THIS small volume contains the facts that have formed the basis of a short course of lectures with practical demonstrations which it has been my duty and privilege for several years to deliver to students in the Glasgow School of Medicine. The selection of the facts has been determined by the consideration that the medical student is, in his future, to be engaged in the application and administration of medicines as remedies, and not in the purchasing of drugs or in the actual manufacture of their preparations. Hence, whilst he may reasonably be expected to be acquainted generally with the materials used as remedies, and with the principles of the processes by which preparations suitable for employment in treatment are obtained, he cannot be expected to be familiar with drugs in their commercial aspect, or to burden his memory with the details—quantitative and otherwise—of all their preparations. Important as these details are to the manufacturing pharmacist, they are of purely subordinate interest to the physician. I have therefore endeavoured here to explain the nature of the official preparations and the principles which underlie their manufacture, and not to provide a manual of practical directions for their actual successful production. The skill necessary to secure this latter result can only be attained by attention to the detailed directions of the Pharmacopœia, by careful study of the recognised com-

mentaries on that volume, and by prolonged experience in a pharmaceutical laboratory. It is sufficient for the physician to know the nature of the materials he is prescribing and the proportions of the active ingredients in the preparations which he orders for his patients. Even thus limited, the official preparations impose a severe burden on the memory of the student of medicine. An endeavour is here made, by the explanation of principles, by the introduction of a few elementary therapeutic facts, and by careful classification, to reduce this burden, and to render the study of Pharmacy both interesting and of practical value.

Whilst principally intended for students of medicine, it is possible that such an arrangement of the official preparations as is here displayed may also prove useful to pharmaceutical students, as an introduction to those larger and more detailed treatises which are the necessary guides of the practical pharmacist.

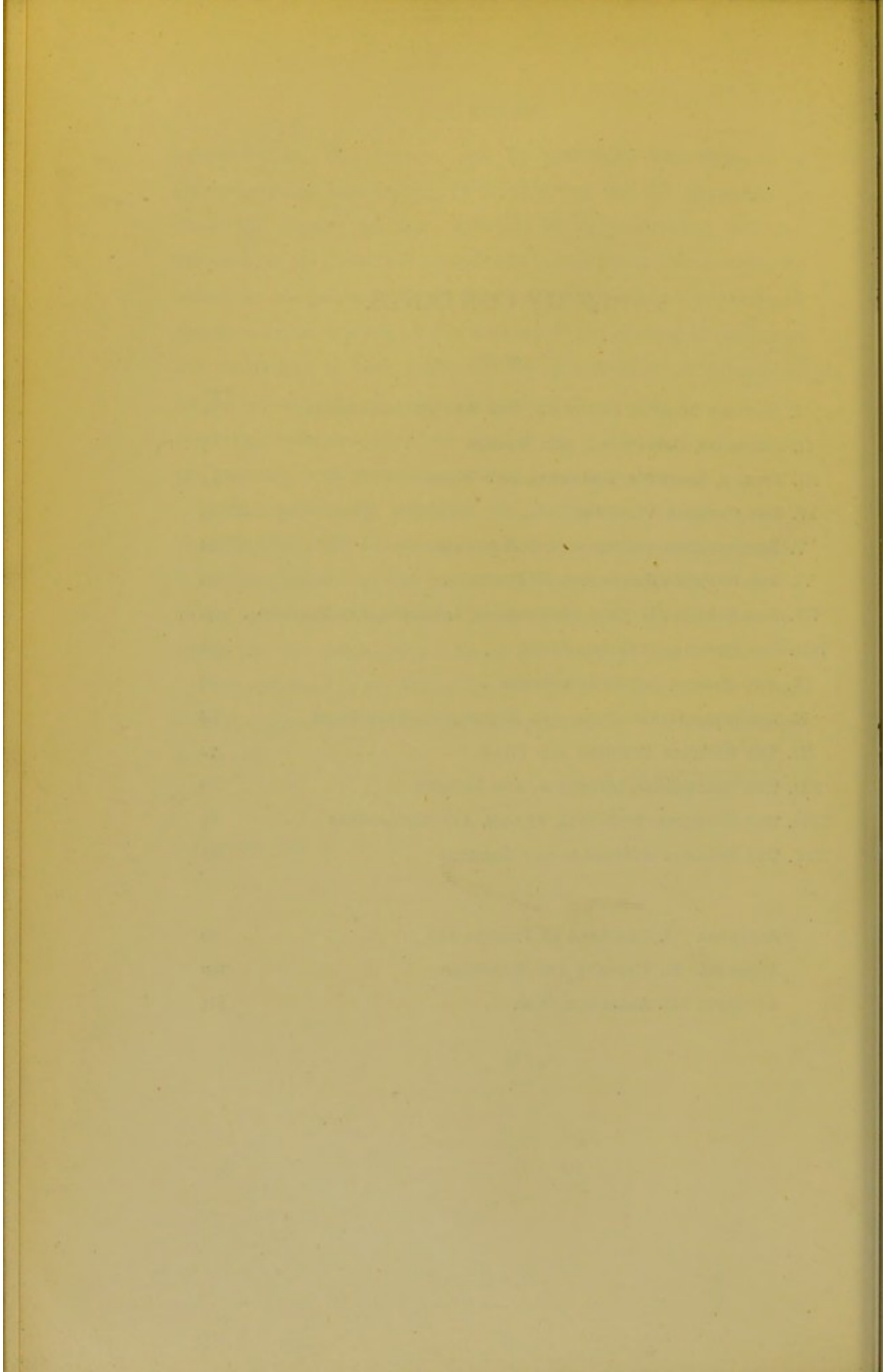
I am indebted to my friend Dr. George S. Middleton for many helpful suggestions and for assistance in passing the book through the press.

C. O. HAWTHORNE.

December, 1894.

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THE GALENICAL PREPARATIONS

OF THE

BRITISH PHARMACOPŒIA.

I.—MATERIA MEDICA, PHARMACY, AND THE PHARMACOPŒIA.

Materia Medica, in its widest sense, may be defined as the study of medicinal substances or remedies. The term is, however, generally limited to the study of the natural history of these substances,—their natural and geographical sources, modes of collection and preservation, and their physical and chemical properties.

Pharmacodynamics is the term applied to the effects produced by medicinal substances upon the healthy human body. It is the study of the physiological action of these agents. The word **Pharmacology** is used in the same sense.

Therapeutics considers the use of remedies in the treatment of disease,—the effects they produce, their doses, and modes of application and administration. It also includes the employment of all other measures, *e.g.*, diet, climate, nursing, etc., necessary to secure the welfare of the patient.

Pharmacy is the art by which, from remedies in their natural or crude state, *preparations* suitable for employment as medicines are produced; in addition, it includes the compounding and dispensing of medicines. Those preparations obtained from the mineral kingdom by definite chemical processes, *e.g.*, the salts of the metals, are known as *chemical* preparations, whilst mere

mechanical mixtures, and preparations derived from the organic kingdoms by such methods as solution, etc., are termed *galenical** preparations. The line of distinction, however, is not, in practice, very firmly drawn.

Practitioners of the art of pharmacy are **Pharmacists**. Their legal designation is "Chemist and Druggist," † or "Pharmaceutical Chemist," according as they have passed the "Minor" or "Major" examination of the Pharmaceutical Society. They alone have the right to assume these titles, to keep open shop for the dispensing of physicians' prescriptions, and to sell (under certain conditions) those substances scheduled as "Poisons" in the Pharmacy Act, 1868. (See Appendix I.)

The British Pharmacopœia is a book published under the direction of the General Medical Council, in compliance with, and under the sanction and authority of Act of Parliament. It names those substances which are more or less generally used by physicians as remedies. Each substance is carefully defined and described, and, for the most important, chemical tests are provided. The pharmacist is thus supplied with a standard by which to test the genuineness and purity of his medicines. He also receives exact directions for making the various chemical and galenical preparations, and he is bound by law to follow the directions of the Pharmacopœia. He is also bound, in dispensing prescriptions, to supply medicines of the quality and strength defined in the Pharmacopœia. This is indeed the main purpose of the volume.

* "Formerly, that is in the time of the early medical writers, among whom Galen, (a native of Pergamos in Asia Minor) who lived in the second century, was one of the most celebrated, medicines were for the most part derived from the vegetable kingdom. At a later period, in the fifteenth century, Basil Valentine, and after him Paracelsus, introduced chemical medicines of mineral origin. Much contention long continued to prevail among the respective advocates of these two classes of remedial agents, the former of which came to be designated galenical and the latter chemical. . . . Their [galenical preparations] indefinite character, as mere mixtures of ingredients which cannot be chemically defined, constitutes their distinguishing feature." (Professor Redwood, *Pharmaceutical Journal*, No. 3, vol. xvi. p. 1010.)

† Probably the opposition just referred to, between remedies of mineral and those of organic origin, may still be traced in the term "Chemist and Druggist" as applied to an individual engaged in the sale of chemicals and drugs. For *chemicals* were originally, and are even yet in the popular sense, substances of mineral origin, and a *drug*, in the strict meaning of the term, is an herb dried for use as a medicine.

By providing an authoritative definition of each medicinal substance and preparation, it secures a correct and uniform appreciation of the physician's directions. To every pharmacist, each name in the prescription will convey one and the same meaning. The last edition of the Pharmacopœia was published in 1885, and a small volume of "Additions" was issued in 1890.

Those remedies and their preparations named and defined in the Pharmacopœia are *official*; all others are *non-official*. The term *officinal*, is properly applied to medicines which are commonly found in chemists' shops, prepared in accordance with the directions of some well-known physician or the practice of some particular pharmaceutical laboratory (*officina*, a workshop), although no official description of them exists in the Pharmacopœia. By some writers, however, official and officinal are employed as synonymous terms.

The Official Galenical Preparations.—As already indicated, these are mainly, but by no means entirely, prepared from remedies belonging to the organic (principally the vegetable) kingdoms. Some of them are made by merely *mixing* two or more substances, *e.g.*, the compound Pills and Powders, the Ointments and Suppositories. In some cases the mixture is attended with *solution*, as in the Glycerines, and many of the Liquors. Another class is obtained by *pressing the juice out of fresh plants*, *viz.*, the official Juices, whilst, by *evaporation* of the greater portion of the water from such an expressed juice, a solid residue termed an Extract is formed. The Fixed Oils constitute another group of preparations obtained by *expression*. A very considerable number of galenical preparations are made by bringing portions of dried plants (and in a few instances animal substances) into contact with some fluid which has the power of dissolving some, or all, of the constituents of the drug that possess medicinal value. The drug is thus *exhausted*, and a solution of one or more of its active principles obtained. A fluid used to secure this end is termed a *menstruum*. Various menstrua are employed, *e.g.*, water, alcohol, wine (sherry and orange), acetic acid, etc., according to the nature of the substances to be dissolved. The process of exhaustion is generally aided by *bruising, or breaking up* the drug, and by occasional *agitation* of the mixture. In some instances too, heat is used to procure or facilitate exhaustion, in such processes as

distillation, infusion, digestion, and ebullition or boiling, the object in every case being the complete removal from the drug of all the soluble material which it is desired the galenical preparation shall contain.

If the drug is heated with a fluid in some convenient apparatus (a retort or still) so that the vapour which rises may be condensed and collected, the method of exhaustion is termed **distillation**. It is employed to obtain active principles which are volatile, *e.g.*, the Volatile Oils.

When the drug is simply allowed to steep or soak in a menstruum at the *ordinary temperature*, the process is known as **maceration**. If the fluid, at the *commencement of the process*, is at a *raised temperature*, the method is that of **infusion**, whilst if the elevated temperature is *maintained throughout*, the process is **digestion**,—when the temperature is below 212° F.,—or **ebullition**, when the boiling point is the standard.

It is clear, that, when, by any of these latter processes, the active principles of a drug have been dissolved out, the next step will be to separate the solution so obtained from the insoluble or exhausted portions of the drug. This will be accomplished by **filtration**, *i.e.*, the passage of a liquid through a porous substance for the purpose of separating from the liquid some suspended solid material.* When the porous material employed is of comparatively open texture (*e.g.*, muslin), obviously only correspondingly coarse suspended particles will be filtered out, and the process is, for distinction, termed **straining**. After filtration or straining has been performed, the insoluble portion of the drug (say root, bark, leaves, etc.), remaining on the filter—the *marc* as it is called—will still retain a greater or less amount of fluid, and this may, if desired, be recovered, by subjecting the marc to pressure. This process is spoken of technically as **expression**.

In making, therefore, a galenical preparation from any drug by exhausting the drug by means of a fluid, there are, it may be said, as a rule, three stages:—

* As a rule, porous substances only retain or filter out *undissolved* or *suspended* solid particles, but certain of their number (*e.g.*, animal charcoal), have the power of retaining some solid materials (*e.g.*, colouring matters), even though these exist in the fluid in a *state of solution*.

- I. Exhaustion, by submitting the drug to the influence of some suitable menstruum (*i.e.*, one which will dissolve out the medicinal material required), adopting the process which will best aid solution.
- II. Filtration or straining, to remove the insoluble portions of the drug.
- III. Expression, to recover the fluid which is retained in this insoluble portion.

According to the nature of the menstruum, and according also to the processes employed for the purpose of securing exhaustion, there are different classes of fluid preparations produced. Thus, in the case of Infusions, Decoctions, and Waters, the menstruum is water; in the Vinegars it is acetic acid, more or less dilute; in the Wines, sherry or orange wine; and in the Spirits and Tinctures, a mixture of alcohol and water.

A number of fluids obtained by methods similar to those just described are concentrated by evaporation to form Liquid Extracts, whilst in others, the evaporation is carried to a further extent, leaving a more or less firm, solid residue—a solid Extract. Hence, in the preparation of these, there is, in addition to the above stages, a further process, *viz.* :

- IV. Evaporation, by which the solution of the medicinal principles obtained by exhaustion is either concentrated, or reduced to a solid residue.

II.—INFUSIONS, DECOCTIONS, AND WATERS.

These fluid preparations have this feature in common, that the menstruum employed in preparing them is Water.

Infusa. Infusions. (*Infusum*, *i. second decl., neuter.*)

The official Infusions are aqueous preparations obtained by pouring distilled water (generally boiling) upon some vegetable substance, *e.g.*, root, bark, leaves, etc., allowing the two to remain in contact for a short time, and then straining. The *marc* left upon the strainer is not subjected to pressure. The operation should be conducted in an earthenware vessel provided with a lid—an Infusion pot. The lid keeps out dust, and in the case of drugs (*e.g.*, chamomile flowers, orange peel, etc.), containing volatile

materials, prevents loss of these volatile principles. Iron vessels should not be used, lest the astringent matter (tannic acid or an allied substance) of the drug combine with the metal and the infusion be discoloured.

The B. P.* orders all the official Infusions to be made with boiling water and to be strained, with the following exceptions:—

Two are made with Cold Water, viz.

Inf. Calumbæ, (Calumba Root).

Inf. Quassiæ, (Quassia Wood).

The process in the case of these two "Infusions," is not *infusion* but *maceration*.

Two are made with water at 120° F., viz.

Inf. Chiratæ, (Chiretta).

Inf. Cuspariæ, (Cusparia Bark).

One is not strained, viz.

Inf. Cusso, (Kousso, $\frac{1}{2}$ an ounce in eight fluid ounces).

Infusion of Calumba is made with cold water in order to avoid solution of the starch, of which the drug contains a large proportion. The starch would not increase the value of the infusion and would facilitate decomposition.

Cold water will dissolve the medicinal principles of Quassia: hence it is unnecessary to use hot water to make the "infusion." Made with hot water, the preparation has been known to cause vomiting.

The infusions of Chiretta and Cusparia are more palatable when made with water at 120° F. than when boiling water is employed.

Infusion of Kousso is not strained, in order that the patient may swallow the drug itself. It is used in the treatment of tape-worm. The dose is 4 to 8 fluid ounces.

The other official infusions are made with boiling distilled water and are strained.

Two are compound, viz.

Inf. Aurantii Compositum, (Bitter Orange Peel, Fresh Lemon Peel, Cloves).

Inf. Gentianæ Compositum, (Gentian Root, Bitter Orange Peel, Fresh Lemon Peel).

* British Pharmacopœia.

Two contain a small quantity of Acid, viz.

Inf. Cinchonæ Acidum, (Red Cinchona Bark, Aromatic Sulphuric Acid).*

Inf. Rosæ Acidum, (Dried Red Rose Petals, Dilute Sulphuric Acid).

The Acid is a powerful solvent of the alkaloids (Quinine, etc.) contained in Cinchona Bark, and so makes the extraction of these more complete than if boiling water alone were employed.

In the infusion of Roses, the acid promotes exhaustion of the drug, and also improves the appearance of the infusion by making the red colouring matter of the petals more brilliant. Both infusions are incompatible with alkalies.

The remaining infusions are simply made from the drug indicated by the name by infusing it in boiling distilled water and straining. The following three, however, though not called "compound," contain each a small quantity of drug other than the one giving its name to the infusion.

Inf. Catechu, (Catechu, with a little Cinnamon Bark).

The Cinnamon gives an aromatic quality to the infusion.

Inf. Lini, (Linseed, with a little dried Liquorice Root).

Liquorice Root is added for flavouring purposes.

Inf. Sennæ, (Senna Leaves, with a little Ginger).

The Ginger neutralises the griping tendencies of the Senna.

The other infusions in the B. P. are :—

Inf. Anthemidis, (Chamomile Flowers).

Inf. Aurantii, (Bitter Orange Peel).

Inf. Buchu, (Buchu Leaves).

Inf. Caryophylli, (Cloves).

Inf. Cascariellæ, (Cascarilla Bark).

Inf. Digitalis, (Dried Foxglove Leaves, 56 grains to a pint).

Dose.—2 to 4 fluid drachms.

Inf. Ergotæ, (Ergot).

Inf. Jaborandi, (Jaborandi).

Inf. Krameriæ, (Rhatany Root).

* ACIDUM SULPHURICUM AROMATICUM. Syn., Elixir of Vitriol. This is an official preparation made by diluting sulphuric acid with rectified spirit and adding spirit of cinnamon and strong tincture of ginger. 1 of acid in 14.
Dose.—5 to 30 minims.

- Inf. Lupuli, (Hop).
- Inf. Maticæ, (Matico Leaves).
- Inf. Rhei, (Rhubarb Root).
- Inf. Senegæ, (Senega Root).
- Inf. Serpentariæ, (Serpentary Rhizome).
- Inf. Uvæ Ursi, (Bearberry Leaves).
- Inf. Valerianæ, (Valerian Rhizome).

In the directions for preparing the Infusions, the B. P. orders the drug in some cases to be bruised, in some to be "cut small," and in others "in coarse powder." The barks are ordered in "No. 40 powder." This phrase means that the drug is to be reduced to such a state of division, that the particles may be passed through a sieve having 40 "parallel wires of ordinary thickness within a linear inch."* Linseed must not be bruised. The Infusion is intended to be used as a demulcent drink, and its efficacy depends upon its mucilaginous properties. The mucilage is obtained from the coat or *testa* of the seed, to which the hot water has free access. In the interior of the seed is a quantity of fixed oil. This would escape if the seed were bruised, and the infusion would consequently be greasy.

The *quantity* of drug used in making the Official Infusions varies in different cases from $\frac{1}{4}$ to 1 ounce to 1 pint of water. Infusion of Senna has 2 ounces of the Leaves to 1 pint of water.

The *length of time* during which the process of infusion is conducted varies from $\frac{1}{4}$ to 1 hour. Infusion of Linseed is ordered to be infused for two hours, the mucilaginous material being only slowly soluble.

Most of the Official Infusions are used as vehicles in which to administer other and more active medicines. They may be given in doses of 1 to 2 fluid ounces. Infusion of Digitalis, however, is a decidedly active preparation—its dose is 2 to 4 fluid drachms. Infusion of Linseed may be taken *ad lib.*

* Exact and detailed directions tend to secure one of the main purposes of the Pharmacopœia, viz., a definite strength of each official preparation by whomsoever prepared. As each pharmacist in making, say, Infusion of Cinchona must have the bark in "No. 40 powder," there is in every case the same amount of surface offered to the action of the solvent, and so the opportunities for solution are equal. If no such exact directions were given, one pharmacist might divide the bark very finely, and another use it in large pieces. Thus, the two preparations, though bearing one and the same name, might differ widely in the proportion of medicinal matter they contained.

As a rule the Infusions contain tannic acid and should not be prescribed with salts of iron, as the resulting tannate of iron renders the mixture black and unsightly. The infusions of Calumba and Quassia do not contain tannic acid and may therefore be ordered with preparations of iron.

Concentrated infusions are frequently used by pharmacists, being prepared for convenience in dispensing. They are usually eight times the strength of the official preparations and contain a little alcohol, or other substance, added to preserve them. They do not satisfactorily represent the B. P. infusions, which ought to be freshly prepared when required.

Decocta. Decoctions. (*Decoctum*, i. *second decl., neuter.*)

These, like the Infusions, are aqueous solutions of the medicinal principles of various vegetable substances. They are obtained by *boiling* the drugs with distilled water, straining, and then pouring distilled water over the contents of the strainer to compensate for the water lost during the process. A covered enamelled saucepan is a suitable vessel in which to conduct the operation. The lid prevents excessive loss of water, and so there is no danger of the decoction "boiling dry," whilst the enamelled lining protects the astringent drugs from contact with the metal. Drugs containing volatile active principles cannot be made into decoctions. The heat of the process would drive off volatile materials.

Two of the Official Decoctions are Compound, viz.

Decoctum Aloes Compositum.

Extract of Socotrine Aloes,
Extract of Liquorice,
Myrrh, Saffron,
Carbonate of Potassium,
Comp. Tinct. of Cardamoms,
Distilled Water.

The ingredients, with the exception of the Saffron and the Tincture, are boiled together for 5 minutes, then the Saffron is added, and when the fluid is cool, the Tincture: after maceration for two hours, the decoction is strained. Neither the Saffron nor the Tincture is boiled, as they both contain volatile materials: the Saffron is added to the *hot* fluid, in order to secure the extraction of its aromatic constituents. The Tincture is already a solution of the active principles of certain drugs, and thus it is merely mixed with the decoction. Carbonate of Potassium assists in the solution of the resinous constituent of the aloes. The decoction contains 4.3 grains of Extract of Aloes in one fluid ounce (= 1 per cent.) *Dose.*— $\frac{1}{2}$ to 2 fluid ounces.

Decoctum Sarsæ Compositum.

Jamaica Sarsaparilla,
 Sassafras Root, Guaiacum Wood,
 Dried Liquorice Root, Mezereon Bark,
 Boiling Distilled Water.

The ingredients are infused for one hour, then boiled for ten minutes, and strained in the usual way.

The remaining official decoctions are :—

- D. Cetrariæ, (Iceland Moss).
- D. Cinchonæ, (Red Cinchona Bark).
- D. Granati Radicis, (Pomegranate Root Bark).
- D. Hæmatoxyli, (Logwood and a little Cinnamon Bark).
 To prevent dissipation of its volatile oil, the Cinnamon is added towards the end of the boiling.
- D. Hordei, (Pearl Barley). *Synonym*, Barley Water.
- D. Papaveris, (Poppy Capsules).
- D. Pareiræ, (Pareira Root).
- D. Quercûs, (Oak Bark).
- D. Sarsæ, (Sarsaparilla Root).
- D. Scoparii, (Broom Tops).
- D. Taraxaci, (Dandelion Root, dried).

The drugs used in making the official decoctions are ordered to be bruised or sliced, and Cinchona Bark is to be in "No. 20 powder." The quantity used to make 1 pint of decoction varies from 1 to 2½ ounces. Boiling is maintained, in different cases, from 5 to 20 minutes; in the decoction of Pomegranate Root, no definite time is stated, but 2 ounces of the drug are to be boiled with 2 pints of water until the volume is reduced to 1 pint.

The process of straining is performed when the fluid is hot, except in the decoctions of Aloes, Cinchona, and Sarsaparilla. In these, the hot fluid dissolves certain materials which are precipitated as the temperature falls; hence if strained when hot, the decoctions would on cooling become muddy. In the case of Aloes, maceration for two hours follows the process of boiling; in both the Sarsaparilla decoctions there is a preliminary infusion for one hour.

The decoctions (with the exception of Aloes) are generally used as vehicles for other medicines. They may be administered in doses of 1 to 2 ounces; the decoctions of Sarsaparilla are

ordered freely (2 to 10 ounces). The decoction of Poppy is used as a sedative fomentation to allay pain and inflammation; that of Oak Bark as an astringent* lotion.

Aquæ. Waters. (Aqua, æ. *first decl., feminine.*)

The term "Aqua" is defined in the B.P. as "natural water, the purest that can be obtained, cleared if necessary by filtration." From this, by a process of distillation, "Aqua Destillata" is obtained.

Distillation is the conversion of a fluid into vapour by the application of heat, the condensation of the vapour by the application of cold, and the collection of the fluid—the distillate—so obtained. Various forms of apparatus are employed, known as retorts, stills, etc. Each consists essentially of (1) a vessel in which the fluid to be distilled can be placed and to which heat can be applied, (2) a tube—the *condenser*—leading from this, and sometimes coiled so as to form a spiral or *worm*, and (3) a *receiver* in which the condenser terminates. When heat is applied to the first vessel, the volatile portions of its contents rise as vapour, which passes into the condensing tube; arrangements exist for keeping this cool, and consequently the vapour is reconverted into fluid, which trickles down the tube and is collected in the receiver.

Fractional Distillation is the separation, by distillation, of a mixture of volatile substances which rise in vapour at different temperatures. Different degrees of heat are successively applied, and each substance, passing over by itself, is collected in a separate receiver.

Rectification is the re-distillation of a previously distilled fluid. Rectified Spirit is an example. (See p. 14.)

Sublimation is the conversion of a solid into vapour, and its subsequent condensation in the solid form. Calomel and Corrosive Sublimate are prepared by sublimation.

In *Destructive Distillation* heat is applied to a non-volatile organic substance, in which, as a result, chemical changes occur. Some of the new substances so produced are volatile; these pass

* *Astringents* are agents which, when applied to the skin or to a mucous membrane, condense and harden the tissues; they also check secretion.

over and are collected in the receiver. The production of Acetic Acid by the destructive distillation of wood, and the manufacture of illuminating gas from coal, are examples.

The application of heat produces merely *physical* changes in all the above processes with the exception of destructive distillation. In this, *chemical* changes occur, and new substances are produced.

Aqua Destillata.—In the preparation of Distilled Water, the B. P. orders 10 gallons of water to be placed in a “copper still connected with a block tin worm.” The first $\frac{1}{2}$ gallon that passes over is rejected as it contains volatile impurities such as Carbonic Acid Gas, etc. When 8 gallons have been collected, the process is stopped. The water remaining in the still will contain such fixed impurities as Lime, Magnesia, etc. In dispensing, distilled water should always be employed.

Two of the OFFICIAL MEDICATED WATERS, viz., Camphor Water and Chloroform Water, are prepared by *solution*. The others are saturated aqueous solutions of volatile oils obtained by *distillation*.

The usual method is to bruise the part of the plant containing the volatile oil, to place it with a considerable quantity of water in a still, and to drive over a portion only of the water. If too much of the water were removed from the still, the heat would decompose the organic vegetable substances, and the volatile products of decomposition would pass into the receiver and contaminate the distillate. Under the influence of the heat, the volatile oil of the drug rises in vapour and passes over with the steam, so that an aqueous solution of the oil collects in the receiver. Usually more oil is liberated than the water can dissolve. This excess, in most cases, floats on the surface of the aqueous solution, and can be separated by a separating funnel or similar mechanical contrivance. Hence, by the one operation, there is obtained, not only one of the official medicated waters, but also a quantity of the corresponding volatile oil. Two of the waters, viz., Peppermint and Spearmint, are made by distilling the volatile oils, not the plants yielding them, with water.

The following are the official waters prepared by distillation:—

From the Fruit :—

- Aq. Anethi, (Dill Water).
- Aq. Anisi, (Anise Water).
- Aq. Carui, (Caraway Water).
- Aq. Fœniculi, (Fennel Water).
- Aq. Pimentæ, (Pimento Water).

From the Flowers :—

- Aq. Aurantii Floris, (Orange Flower Water).
The oil obtained from the flowers of the orange tree is known as Oil of Neroli.
- Aq. Sambuci, (Elder-flower Water).

From the Petals :—

- Aq. Rosæ, (Rose Water).

From the Bark :—

- Aq. Cinnamomi, (Cinnamon Water).

From the fresh leaves :—

- Aq. Laurocerasi, (Cherry-Laurel Water).

From the Volatile Oil :—

- Aq. Menthæ Piperitæ, (Peppermint Water).
- Aq. Menthæ Viridis, (Spearmint Water).

In most of the above, about 1 pound of the drug is added to 2 gallons of water, and 1 gallon is distilled; in the last two, $1\frac{1}{2}$ fluid drachms of the oils are used with $1\frac{1}{2}$ gallons of water to obtain 1 gallon.

Cherry-Laurel Water is made by crushing one pound of the fresh leaves, placing them in a retort with $2\frac{1}{2}$ pints of water, and distilling one pint. The distillate is filtered and then, either by dilution or addition of hydrocyanic acid, made of such a strength that it contains 0.1 per cent. of real hydrocyanic acid. Neither acid, nor volatile oil exists in the leaves, but in the presence of water both these are produced by a chemical reaction between two of the constituents of the drug. The dose of the preparation is $\frac{1}{2}$ to 2 fluid drachms.

Aqua Camphoræ. *Syn.*, Mistura Camphoræ.—This is prepared by solution. A little Camphor is enclosed in a muslin bag, and this is sunk by means of a piece of glass in a quantity of distilled

water. The water at the bottom of the vessel, becoming saturated with the camphor (a volatile oil), rises, and fresh water takes its place. Hence the retention of the camphor at the bottom of the fluid is the best method of securing saturation of the entire menstruum. A period of two days is sufficient to accomplish this. Camphor Water contains about $\frac{1}{2}$ a grain of camphor in 1 fluid ounce.

Aqua Chloroformi.—Prepared by dissolving 1 fluid drachm of Chloroform in 25 fluid ounces of distilled water, solution being facilitated by agitation. Strength 1 in 201.

The official waters are generally used as vehicles for stronger medicines. They can be given in doses of 1 to 2 fluid ounces, except Aq. Laurocerasi, the dose of which is $\frac{1}{2}$ to 2 fluid drachms. Rose Water and Elder-flower Water are often employed as vehicles in various lotions, eye-washes, etc.

III.—SPIRITS, ESSENCES, TINCTURES, AND WINES.

These are fluid preparations, the menstruum in each case being alcoholic in character. In preparing the Spirits, Essences, and Tinctures, Rectified or Proof Spirit is employed; whilst the official Wines are made either with Sherry or Orange Wine.

Spiritus. Spirits. (*Spiritus, ûs. fourth decl., masculine.*)

In the B.P., there are three "Spirits" made official in order that they may be used in the manufacture of various preparations. They are Rectified Spirit, Proof Spirit and French Brandy.

Spiritus Rectificatus. *Syn., Spirit of Wine; S.V.R.*

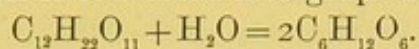
This consists of Alcohol (ethylic), with 16 per cent. of water. It is obtained by the distillation of fermented saccharine fluids.

Fermentation may be produced in a solution of sugar by the action of yeast. Yeast consists essentially of a fungus—the *Saccharomyces cerevisiæ*—and by the growth and development of this, chemical changes are produced which result in

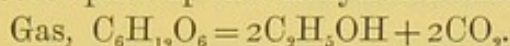
the formation of ethylic alcohol. The fungus develops most satisfactorily at 70° to 75° F. If the temperature is much above this, the organism is killed, and fermentation ceases. Similarly, a decided reduction of temperature suspends the process, because it checks the growth of the fungus. Even at 32° F., however, the organism is not killed; on raising the temperature its activity is resumed, and fermentation again proceeds.

The chemical changes produced are, in the main, as follows:—

Cane Sugar is converted into grape sugar (*glucose*),



Glucose splits up into Ethylic Alcohol and Carbonic Acid



Besides alcohol and carbonic acid gas, small quantities of acetic acid, succinic acid and other compounds are produced. The proportion of alcohol formed in the fluid by the process of fermentation will not exceed 20 per cent., because a larger proportion of alcohol checks the development of the organism on which fermentation depends.

The mixture of water, alcohol, etc., is now distilled. The water and alcohol distil over, yeast and any unchanged sugar remaining in the retort. By again distilling (rectification) the collected fluid, and stopping the process when the rectified product is of specific gravity 0.838, the official rectified spirit is obtained. If rectification is stopped too soon, the spirit will contain an excessive proportion of alcohol, because alcohol, being more volatile than water, will pass over mainly in the earlier portion of the distillate. Conversely, if rectification is too long continued, an undue proportion of water will be present in the spirit. The sp. gr. (0.838) indicates when the right proportions are present.

Rectified spirit is used in the B. P. to make the other official Spirits, many Tinctures, the Essences, several Extracts, etc. From it also, by removal of the water, there is obtained,

Alcohol Ethylicum. *Syn.*, **Absolute Alcohol.**

This, as the name indicates, is pure ethylic alcohol. It has great affinity for water, and to obtain it from Rectified

Spirit, it is necessary to shake up the spirit with anhydrous carbonate of potassium, and then to mix it with fused chloride of calcium and to distil. These salts retain the water, and the pure alcohol distils over. But it cannot long be kept "absolute," as it will absorb moisture from the atmosphere. Hence the B. P. states that it contains "one, or at most, two per cent. of water." Sp. gr. 0.797 to 0.800. It should not cause anhydrous sulphate of copper (CuSO_4) to assume a decided blue colour, even after the two have been well shaken together. If excess of water is present, the crystalline blue sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) will be formed.

It is used in making *Liq. Sodii Ethylatis*. (See p. 36.)

Spiritus Tenuior. Proof Spirit.*

Made by mixing 5 pints (100 fluid ounces) of Rectified Spirit with 3 pints (60 fluid ounces) of distilled water. The product measures only 156 fluid ounces, contraction in volume taking place; at the same time heat is developed. The B. P. Rectified Spirit would be described as 56 "over proof" (O.P.), because, in order to reduce it to the strength of Proof Spirit, it is necessary to add to 100 volumes sufficient water to make them measure 156, *i.e.*, 56 over 100. In other words, 100 vols. of a spirit which is 56 O.P. contain as much alcohol as is present in 156 vols. of Proof Spirit.

Proof Spirit contains 49 per cent. by weight of alcohol. Sp. gr. 0.920.

It is used in making a large number of the official Tinctures.

Spiritus Vini Gallici. French Brandy.

This is a spirit distilled from French Wine. Its flavour depends upon various volatile constituents derived from the wine, and its light sherry colour is due to the casks in which it has been kept. It contains from 45 to 55 per cent.

* Formerly a very rude mode of ascertaining the strength of spirit was practised called the *proof*; the spirit was poured upon gunpowder in a dish and inflamed. If at the end of the combustion the gunpowder took fire, the spirit was said to be *above* or *over* proof, but if the spirit contained much water the powder was rendered so moist that it did not take fire; in this case the spirit was said to be *below* or *under* proof. (Pereira's *Materia Medica*.)

of alcohol. Used to make *Mistura Spiritus Vini Gallici*. (See p. 39.)

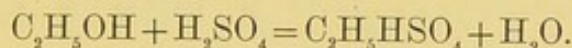
There are five of the **Official Medicated Spirits** prepared by *distillation*, viz. :

Sp. Ætheris Compositus. *Syn.*, **Hoffman's Anodyne.**

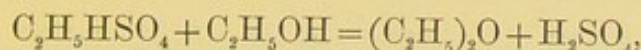
Distil a mixture of Sulphuric Acid and Rectified Spirit until the fluid in the retort begins to blacken. The distillate will contain ether, ethyl sulphate, ethylene sulphate, and other ethereal compounds, with some free acid. It is shaken with lime water to neutralise the acid, and the clear fluid decanted from the precipitated sulphate or sulphite of calcium. The clear liquid is then exposed to the air for some hours, to allow the escape of ether and other volatile compounds, and the remaining fluid—known as *heavy oil of wine*—is dissolved in a mixture of ether and rectified spirit.

Note.—The above is the result when sulphuric acid and rectified spirit in nearly equal volumes are distilled together, but if arrangements are made to keep the rectified spirit *in excess*, the distillate consists mainly of Ether (Oxide of Ethyl). The main reactions in this case are as follows :

Ethyl alcohol and sulphuric acid = Ethylhydrogen sulphate and water,



Ethylhydrogen sulphate and alcohol = Ether and sulphuric acid,

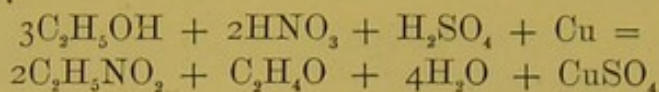


The distillate, purified from acid, etc., is official as **Æther**. (*Syn.*, **Sulphuric Ether**). It contains about 8 per cent. of alcohol. From this it may be freed by shaking with water, which dissolves out the alcohol, and subsequently distilling from a mixture of fresh lime and chloride of calcium. These retain the water, and the distillate is pure ether (**Æther Purus**, B. P.).

Sp. Ætheris Nitrosi. *Syn.*, **Sweet Spirit of Nitre.**

Made by heating together a mixture of Nitric and Sulphuric acids, Rectified Spirit and Copper wire; collecting the distillate, and dissolving it in rectified spirit. It contains nitrous ether (nitrite of ethyl), aldehyde, and various nitrous

compounds. The main reactions which occur are as follows :



When recently prepared, it should be almost neutral in reaction, but after a time it becomes acid, the aldehyde being oxidised into acetic acid. (See p. 29.) It sometimes also contains free nitrous acid. It is a popular *diuretic*, that is, it is an agent used to increase the secretion of urine. When prescribed with Iodide of Potassium, it should be first neutralised by the addition of Carbonate of Potassium. Otherwise, the free acid will decompose the Iodide, and Iodine will be liberated.

Note.—When alcohol is distilled under certain conditions with acetic acid, the distilled product is acetate of ethyl ($\text{C}_2\text{H}_5\text{C}_2\text{H}_3\text{O}_2$). This is official as **Æther Aceticus**.

Sp. Ammoniaë Aromaticus. *Syn.*, Spirit of Sal Volatile.

Distil volatile oils of Nutmeg and Lemon with a mixture of Rectified Spirit and Water, and dissolve Carbonate and Strong Solution of Ammonia in the distillate.

It is used as a menstruum in the preparation of the *Ammoniated Tinctures of Guaiacum and Valerian*. (See p. 24.)

Sp. Ammoniaë Fœtidus.

Distil Asafœtida and Rectified Spirit, and add Strong Solution of Ammonia to the distillate.

Sp. Armoraciaë Compositus.

Distil scraped Horseradish Root, Bitter Orange Peel, and Nutmeg, with a mixture of Proof Spirit and Water. Horseradish Root yields a volatile oil by a reaction analogous to that by which the oil of Cherry-Laurel is formed. (See Aq. Laurocerasi, p. 13.)

The remaining official Spirits are made by direct *solution* in Rectified Spirit. They are :

Sp. Camphoræ, (Camphor, S.V.R.). 1 in 10. *Dose*, 10 to 30 minims.

Sp. Chloroformi, (Chloroform, S.V.R.). 1 in 20. *Dose*, 20 to 60 minims. *Syn.*, Chloric Ether; Spirit of Chloric Ether.

Sp. *Ætheris*, (Ether, S.V.R.). 1 in 3. *Dose*, 30 to 90 minims.

Sp. Cajuputi, (Cajuput).

Sp. Cinnamomi, (Cinnamon).

Sp. Juniperi, (Juniper).

Sp. Lavandulæ, (Lavender).

Sp. Menthæ Piperitæ, (Peppermint).

Sp. Myristicæ, (Nutmeg).

Sp. Rosmarini, (Rosemary).

Dissolve 1 part of the corresponding volatile oil in 49 parts of S.V.R. 1 in 50. *Dose*, $\frac{1}{2}$ to 1 fluid drachm.

The maximum dose of Sp. *Ætheris* Co., Sp. *Ætheris* Nitrosi, and Sp. *Armoraciæ* Co. is 2 fluid drachms; of Sp. *Camphoræ*, $\frac{1}{2}$ fluid drachm; of the others, 1 fluid drachm.

It is convenient to place here two solutions of volatile oils in rectified spirit termed in the B. P.

Essentiæ. Essences. (*Essentia, æ. first decl., feminine.*)

Essentia Anisi, (Oil of Anise, S.V.R.).

Essentia Menthæ Piperitæ, (Oil of Peppermint, S.V.R.).

In each case the strength is 1 part of the oil to 4 of rectified spirit, and the dose is 10 to 20 minims.

Note on the Official Alcohols.

The term "Alcohol," when used without qualification, is generally applied to ethylic alcohol. But, strictly speaking, the word signifies a substance formed by the displacement of one or more hydrogen atoms from a hydrocarbon by one or more hydroxyl groups (OH). The alcohols, in short, are hydrates of certain organic radicals (unsaturated hydrocarbons).

Some of them are of considerable pharmaceutical interest, and will now be briefly considered.

C_2H_5OH . **Ethyl Hydrate, Ethylic Alcohol.**

(See Rectified Spirit, p. 14.)

By oxidation this is converted into Acetic Acid. (See

Vinegar, p. 29.) The oxide of ethyl ($C_2H_5)_2O$ is official as *Ether*; ethyl acetate ($C_2H_5C_2H_3O_2$) as *Acetic Ether*; and ethyl nitrite ($C_2H_5NO_2$) as *Sp. Ætheris Nitrosi*. (See pp. 17-18.)

$C_5H_{11}OH$. **Amyl Hydrate, Amylic Alcohol.** *Syn., Fousel Oil.*

This is official as *Alcohol Amylicum*. It is produced by the fermentation of sugar and especially of sugar derived from potato-starch. It is converted by oxidation into Valerianic Acid. ($C_5H_{11}OH + O_2 = HC_5H_9O_2 + H_2O$). The acid so obtained is official in the form of *Valerianates of Sodium* and *Zinc*. Amylic Alcohol yields also another official compound, viz., *Nitrite of Amyl* ($C_5H_{11}NO_2$).

C_6H_5OH . **Phenyl Hydrate, Phenic Alcohol.** *Syn., Phenol.*

The official *Acidum Carbolicum* consists largely of Phenol.

$C_3H_5(OH)_3$. **Glyceryl Hydrate, Glyceric Alcohol.**

This is the substance known as *Glycerine*, and official under that name. (See p. 53.)

CH_3OH . **Methyl Hydrate, Methylic Alcohol.** *Syn., Wood Spirit; Wood Naphtha.*

The methylated spirit of commerce is rectified spirit containing 10% of crude wood spirit, with other substances which communicate to the spirit a disagreeable flavour. It is issued from bond duty free. Hence the use of spirit for various trade purposes is not interfered with by a prohibitive duty, whilst the nauseous taste of the mixture prevents its use as a beverage, and so the revenue is protected. It is mentioned here because the authorities allow some few of the B. P. liniments to be made with methylated, instead of rectified spirit. This saves expense and so makes these preparations freely available for hospital practice, etc. Wood Spirit is a product of the destructive distillation of wood, purified by rectification, etc. It is not official in the B. P.

$C_6H_8(OH)_6$. **Mannite.**

This forms from 60 to 80 per cent. of the substance named

in the B. P. *Manna*, and defined as "a concrete saccharine exudation from the stems of cultivated trees of *Fraxinus Ornus*." The tree is cultivated in Calabria and Sicily, and the *Manna* exudes when incisions are made in the stems.

Tincturæ. Tinctures. (*Tinctura*, æ. *first decl., feminine.*)

The great majority of the official Tinctures are prepared by exhausting drugs of vegetable origin by suitable treatment with a spirituous menstruum, so as to obtain a spirituous solution of the medicinal principles of the drug. Some few of the Tinctures, however, are made, not by exhausting crude drugs, but by direct solution of active principles themselves, these active principles having been previously separated from the drugs yielding them by other (official) processes.

The following Tinctures are prepared by *Solution* :

Two are Solutions of Quinine, viz. :

Tr. Quininæ.—Hydrochlorate of Quinine in Tinct. of Orange Peel. 1 grain in a drachm. *Dose*, $\frac{1}{2}$ to 2 fl. drachms.

Tr. Quininæ Ammoniata.—Sulphate of Quinine in Proof Spirit, and a little solution of Ammonia added. 1 grain in a drachm. *Dose*, $\frac{1}{2}$ to 2 fl. drachms.

One is a Solution of Podophyllum Resin, viz. :

Tr. Podophylli.—Resin of Podophyllum in S.V.R. 1 grain in a drachm. *Dose*, 15 to 60 minims.

Two are Solutions of official Extracts, viz. :

Tr. Cannabis Indicæ.—Extract of Indian Hemp in S.V.R. 1 in 20. *Dose*, 5 to 20 minims.

Tr. Nucis Vomicaæ.—Extract of Nux Vomica in S.V.R. with a little water. 1 fluid ounce contains 1 grain of the alkaloids of Nux Vomica. *Dose*, 10 to 20 minims.

The following, also prepared by *solution*, contain inorganic ingredients :

Two are Solutions of Iron Salts, viz. :

Tr. Ferri Acetatis.—Strong Solution of Acetate of Iron and a little free Acetic Acid, in a mixture of S.V.R. and

water. 1 of the Strong Solution of Acetate of Iron in 4.
Dose, 5 to 30 minims.

Tr. Ferri Perchloridi. *Syn.*, Tr. Ferri Sesquichloridi; Tinct. of Steel: Steel Drops.—Strong Solution of Perchloride of Iron in a mixture of S.V.R. and water. 1 of the Strong Solution of Perchloride of Iron in 4.
Dose, 5 to 30 minims.

One is a Solution of Iodine, viz. :

Tr. Iodi.—Iodine dissolved in S.V.R. with the aid of Iodide of Potassium. 1 in 40. *Dose*, 5 to 20 minims.

Two are Solutions of Chloroform, viz. :

Tr. Chloroformi Co.—Chloroform in S.V.R. with Compound Tinct. of Cardamoms added. 1 in 10. *Dose*, 20 to 60 minims.

Tr. Chloroformi et Morphinae. *Syn.*, Chlorodyne.—This is a mixture of Chloroform ($1\frac{1}{4}$ min.), Hydrochlorate of Morphine ($\frac{1}{8}$ gr.), Ether ($\frac{1}{3}$ min.), and dilute Hydrocyanic Acid ($\frac{5}{8}$ min.), with Syrup, S.V.R., and Treacle; Extract of Liquorice and Oil of Peppermint are added as flavouring agents. *Dose*, 5 to 10 min. The amounts noted are contained in a 10 minim dose.

As further exceptions to the statement that the official Tinctures are obtained from vegetable drugs, it is to be noted that *two are of animal origin, viz. :*

Tr. Cantharidis.—Cantharides, Proof Spirit. Macerate and filter. 1 in 80. *Dose*, 5 to 20 min.

Tr. Cocci.—Cochineal, Proof Spirit. Macerate and filter. Used as a colouring agent.

The remaining Tinctures are of vegetable origin and are prepared by exhausting the corresponding drugs by means of a spirituous menstruum. The processes employed to secure this exhaustion differ in different cases. But, on consulting the B.P., it will be found that one large group is prepared by *Maceration* followed by *Filtration*, and another by *Maceration* and *Percolation*.

Percolation is a process in which a menstruum is allowed to gradually descend or soak its way through a drug, so that it may remove all the soluble material of the drug. It is conducted in a

vessel called a *Percolator*. This consists of two chambers, the upper or *percolating chamber* fitting into the mouth of the lower or *receiver*. The floor of the upper chamber is formed of some strong but porous material, and above this the drug to be exhausted is uniformly and firmly *packed*. The solvent is now poured over the upper surface of the packed layer, and, under the influence of gravity, it slowly descends through the drug, taking into solution those constituents of the drug which it is capable of dissolving. The solution so obtained—the *percolate*—drips through the porous floor of the percolating chamber and collects as a clear fluid in the receiver, the porous floor preventing the passage of any insoluble solid particles.

As a rule, the drug is macerated for a short time in the menstruum before percolation is commenced. If the drug in a dry condition were packed in the percolator, it might, when swollen by the absorption of fluid, become so tightly wedged that an impassable barrier would be formed, and the percolator thus become blocked.

The following instances may be taken as illustrative of the official directions in the two groups above alluded to:

1. **Tinctura Opii.** *Syn.*, **Laudanum.**

Opium, in powder	1½ ounce.
Proof Spirit	1 pint.

Macerate for seven days in a closed vessel, with occasional agitation; then strain, press, filter, and add sufficient proof spirit to make 1 pint. *Dose*, 5 to 40 minims.

2. **Tinctura Aconiti.**

Aconite Root, in No. 40 powder	2½ ounces.
Rectified Spirit	1 pint.

Macerate the aconite root for 48 hours in 15 fluid ounces of the spirit, in a closed vessel, agitating occasionally; then transfer to a percolator, and when the fluid ceases to pass, continue the percolation with the remaining five ounces of spirit. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and add sufficient rectified spirit to make one pint. *Dose*, 5 to 15 minims.

In most of the official Tinctures the menstruum used is either Rectified Spirit or Proof Spirit. The following are exceptions:

Two are made with Aromatic Spirit of Ammonia, viz.:

Tr. Guaiaci Ammoniata, (Guaiacum Resin).

Tr. Valerianæ Ammoniata, (Valerian Rhizome).

Note.—Two other tinctures contain Ammonia: one in the form of *solution*, viz., *Ammoniated Tincture of Quinine*, one in the form of *strong solution*, viz., *Ammoniated Tincture of Opium*.

One is made with Spirit of Ether, viz.:

Tr. Lobeliæ Ætherea, (Lobelia). *Dose*, 10 to 30 min.

One is made with Tincture of Orange Peel, viz.:

Tr. Quininæ, (Hydrochlorate of Quinine. 1 grain in a drachm).

The selection of Rectified (S.V.R.), or Proof Spirit (S.T.), in the rest of the official tinctures, is determined by the nature of the medicinal principles to be dissolved. Alcohol is a solvent more especially of resins, volatile oils, and alkaloids,* whilst water dissolves certain salts of the alkaloids, and mucilaginous and albuminous materials. Hence, for the extraction of the former, Rectified Spirit will be employed; in other cases Proof Spirit is used. Tinctures made with rectified spirit, and holding resins in solution, *e.g.*, Myrrh, Asafœtida, Cannabis Indica, Benzoin, when added to water, give a milky precipitate, the resinous materials being thrown out of solution. When prescribed in mixtures, they should be ordered with mucilage of acacia, which emulsifies and suspends the resin. (See p. 37.)

The following are **Compound Tinctures**:

Tr. Camphoræ Co. *Syn.*, Tr. Opii Camphorata; Paregoric Elixir; English Paregoric.

Opium, Benzoic Acid, Camphor, Oil of Anise, Proof Spirit (S.T.)

Contains 2 grains of the soluble matter of Opium in 1 fl. ounce, *i.e.*, 1 grain in 240 min. *Dose*, 15 to 60 min.

* See Appendix III.

Tr. Opii Ammoniata. *Syn.*, Scotch Paregoric.

Opium, Benzoic Acid, Saffron, Oil of Anise, Strong Solution of Ammonia, S.V.R.

Contains 5 grains of the soluble matter of Opium in 1 fluid ounce, *i.e.*, 1 grain in 96 min. *Dose*, $\frac{1}{2}$ to 1 fl. drachm.

Note.—Opium is also contained in Tr. Opii (*Syn.*, Laudanum).

Strength 33 grains in 1 fl. ounce, *i.e.*, $4\frac{1}{8}$ grain in 1 fluid drachm, or 1 grain in $14\frac{2}{3}$ minims.

Tr. Benzoini Co. *Syn.*, Friar's Balsam; Traumatic Balsam.

Benzoin, Prepared Storax, Balsam of Tolu, Socotrine Aloes, S.V.R. 1 of Benzoin in 10. *Dose*, $\frac{1}{2}$ to 1 fl. drachm.

Tr. Cardamomi Co.

Cardamom Seeds, Caraway fruit, Raisins (freed from their seeds), Cinnamon Bark, Cochineal, S.T.

Is of a deep lake colour. It is used in making *Decoct. Aloes Co.*, *Tr. Chloroformi Co.*, *Mistura Sennæ Co.*, and *Mistura Ferri Aromatica*.

Tr. Cinchonæ Co.

Red Cinchona Bark, Bitter Orange Peel, Serpentry Rhizome, Saffron, Cochineal, S.T. 1 in 10.

Note.—There is also a simple Tincture of Cinchona.—Red Cinchona Bark and Proof Spirit. 1 in 5.

Tr. Gentianæ Co.

Gentian Root, Bitter Orange Peel, Cardamom Seeds, S.T.

Tr. Lavandulæ Co. *Syn.*, Comp. Spirit of Lavender.

Oils of Lavender and Rosemary, Cinnamon Bark, Nutmeg, Red Sandal-wood, S.V.R.

Used to colour *Liquor Arsenicalis*. (See p. 31.)

The following, though not called "Compound," contain medicinal ingredients other than those indicated by the name.

Tr. Aloes, (Socotrine Aloes, Extract of Liquorice, S.T.).

Tr. Catechu, (Catechu, Cinnamon Bark, S.T.).

Tr. Rhei, (Rhubarb Root, Cardamom Seeds, Coriander Fruit, Saffron, S.T.).

Dose.—As a stomachic, 1 to 2 drachms; as a purgative, 4 to 8 drachms.

Tr. Sennæ, (Senna Leaves, Raisins, Caraway and Coriander Fruits, S.T.).

The simple Tinctures of the B. P. may now be enumerated, placing them in groups according to the amount of the drug used in preparing 1 pint of the tincture.

The following are made with 2½ ounces to the pint :

Tr. Aconiti, (Aconite Root, S.V.R.), 5-15 min.	Tr. Jalapæ, (S.T.).
Tr. Asafœtidæ, (S.V.R.).	Tr. Krameriæ, (S.T.).
Tr. Buchu, (S.T.).	Tr. Laricis, (S.V.R.), 5-30 min.
Tr. Calumbæ, (S.T.).	Tr. Gelsemii, (S.T.), 5-20 min.
Tr. Cascarillæ, (S.T.).	Tr. Limonis, (Fresh peel, S.T.).
Tr. Chirataë, (S.T.).	Tr. Lobeliæ, (S.T.), 10-30 min.
Tr. Cimicifugæ, <i>Syn.</i> , Tr. Actææ, (S.T.).	Tr. Lupuli, (S.T.).
Tr. Cinnamomi, (S.V.R.).	Tr. Myrrhæ, (S.V.R.).
Tr. Cocci, (Cochineal, S.T.).	Tr. Sabinæ, (S.T.).
Tr. Colchici Seminum, (S.T.), 10-30 min.	Tr. Scillæ, (S.T.), 10-30 min.
Tr. Conii, (Hemlock fruit, S.T.), 20-60 min.	Tr. Senegæ, (S.T.).
Tr. Cubebæ, (S.V.R.).	Tr. Serpentariæ, (S.T.).
Tr. Digitalis, (Leaves, S.T.), 10-30 min.	Tr. Stramonii, (Seeds, S.T.), 10-30 min.
Tr. Gallæ, (S.T.).	Tr. Sumbul, (S.V.R.), 10-30 min.
Tr. Hyoscyami, (Leaves, S.T.), 30-60 min.	Tr. Tolu, (Balsam of Tolu, S.V.R.), 20-40 min.
	Tr. Valerianæ, (S.T.).
	Tr. Zingiberis, (S.V.R.), 15-60 min.

The following is made with 10 ounces to the pint and by *percolation only* :

Tr. Zingiberis fortior, (S.V.R.). *Syn.*, Essence of Ginger. 5-20 min.

The following is made with 6 ounces to the pint :

Tr. Aurantii Recentis, (Fresh Peel, S.V.R.).

The following are made with 5 ounces to the pint :

Tr. Ergotæ, (S.T.), 5-30 min.

Tr. Jaborandi, (S.T.), 30-60 min.

The following are made with 4 ounces to the pint :

Tr. Cinchonæ, (Red Bark, S.T.).

Tr. Pyrethri, (S.V.R.).

Tr. Veratri Viridis, (S.V.R.), 5-20 min.

Tr. Guaiaci Ammoniata.

The following are made with 2 ounces to the pint :

Tr. Aurantii, (S.T.).	Tr. Hamamelidis, (Bark, S.T.), 5-60
Tr. Kino, (S.V.R., with a little water and Glycerine).	min.
Tr. Chloroformi Co., (S.V.R.).	Tr. Hydrastis, (S.T.), 20-60 min.
	Tr. Rhei, (S.T.).

The following are made with 1 ounce to the pint :

Tr. Arnicae, (S.V.R.).	Tr. Belladonnae, (Leaves, S.T.), 5-20
Tr. Cannabis Indicae, (S.V.R.), 5-20	min.
min.	Tr. Croci, (Saffron, S.T.).
Tr. Strophanthi, (S.V.R.), 2-10 min.	

In making Tincture of Strophanthus the dried seeds are first freed from fixed oil by washing with ether and then exhausted by percolation with S.V.R.

The following are made with $\frac{3}{4}$ ounce to pint :

Tr. Quassiae, (S.T.).	Tr. Capsici, (S.V.R.), 10-20 min.
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The great majority of the Tinctures may be given in doses of $\frac{1}{2}$ to 2 fluid drachms ; those which have a *maximum* dose of less than one fluid drachm are :

Tr. Strophanthi, 2-10 min.	Tr. Colchici Sem.,	} 10-30 min.
Tr. Chloroformi et Morphinae, 5-10	Tr. Digitalis,	
min.	Tr. Ergotae,	
Tr. Aconiti, 5-15 min.	Tr. Ferri Acetatis,	
Tr. Belladonnae,	Tr. Ferri Perchloridi,	
Tr. Cannabis Indicae,	Tr. Laricis,	
Tr. Cantharidis,	Tr. Lobeliae,	
Tr. Capsici,	Tr. Lobeliae Ætherea,	
Tr. Gelsemii,	Tr. Scillae,	
Tr. Iodi,	Tr. Stramonii Sem.,	
Tr. Nucis Vomicae,	Tr. Sumbul,	
Tr. Veratri Viridis,	Tr. Opii, 5-40 min.	
Tr. Zingiberis fortior,	Tr. Tolu, 20-40 min.	

Vina. Wines. (Vinum, i. *second decl., neuter.*)

These are fluid preparations in which Wine is used as the menstruum. The official menstrua, are two, viz. :

Vinum Aurantii. Made in Britain by the fermentation of a saccharine solution to which the fresh peel of the Bitter Orange has been added. It contains 10 to 12 per cent. of Alcohol.

Vinum Xericum. (Sherry.) A pale brown Spanish Wine, containing about 17 per cent. of Alcohol.

All the Medicinal Wines are made with Sherry, except *Vin. Quininæ* and *Vin. Ferri Citratis*, which are made with Orange Wine.

Those made with Sherry are :

- Vin. Aloes.** Macerate Socotrine Aloes, Cardamom Seeds, and Ginger, in Sherry. *Dose*, 1 to 2 fl. drachms.
- Vin. Antimoniale.** Tartar Emetic dissolved in Sherry. 2 grs. in 1 ounce. *Dose*, Expectorant,* 5 to 40 min. ; Emetic,† $\frac{1}{2}$ to 1 fl. oz.
- Vin. Colchici.** Macerate dried Colchicum Corm in Sherry. *Dose*, 10 to 30 min.
- Vin. Ferri.** Iron wire is macerated in Sherry for 30 days. A portion of the wire is allowed to project above the surface of the fluid, and becomes oxidised. The stopper of the bottle is frequently removed to permit oxidation to take place, and, by repeated agitation, the wine is dashed over the oxidised Iron. The acid tartrate of potassium and the organic acids of the wine dissolve, or rather combine with the oxide, forming salts, which are dissolved by the Wine. Tannate of Iron is also formed and communicates a dark colour to the preparation. *Dose*, 1 to 4 fl. drachms.
- Vin. Ipecacuanhæ.** A solid extract is obtained from 1 ounce of Ipecacuanha by exhaustion with Acetic Acid. This is dissolved in 1 pint of Sherry. *Dose*, Expectorant, 5 to 40 min. ; Emetic, $\frac{1}{2}$ to 1 fl. oz.
- Vin. Opii.** Macerate Extract of Opium, Cinnamon, and Cloves in Sherry. 22 grains of Extract in 1 ounce, *i.e.*, 1 in 20. *Dose*, 10 to 40 min.
- Vin. Rhei.** Macerate Rhubarb Root and Canella Bark in Sherry. *Dose*, 1 to 2 fluid drachms.

Those made with Orange Wine are :

- Vin. Ferri Citratis.** Citrate of Iron and Ammonium dissolved in Orange Wine. 1 gr. in 1 fl. drachm. *Dose*, 1 to 4 fl. drachms.

* *Expectorants* are remedies which modify the secretion of the respiratory mucous membrane and promote the expulsion of the secretion.

† *Emetics* are agents which cause vomiting.

Vin. Quininæ. Sulphate of Quinine dissolved in Orange Wine by the aid of Citric Acid. 1 gr. in an ounce. *Dose*, $\frac{1}{2}$ to 1 ounce.

Note.—The two Tinctures containing Quinine have each a strength of 1 gr. in a drachm.

The Wines which have a *maximum* dose of less than one fluid drachm are :

Vin. Colchici,	10 to 30 min.	} as expectorants.
Vin. Opii,	10 to 40 min.	
Vin. Antimoniale,	5 to 40 min.	
Vin. Ipecacuanhæ,	5 to 40 min.	

IV.—THE VINEGARS.

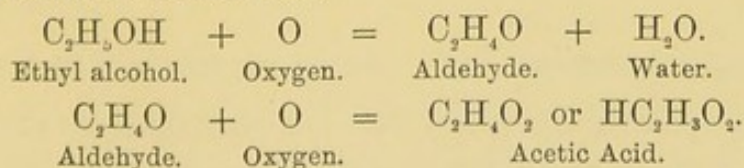
Aceta. Vinegars. (*Acetum*, i. *second decl., neuter*).

One of these, viz., *Acetum*, is the liquid familiarly known as Brown or Malt Vinegar. The others are medicated fluids prepared by exhausting certain drugs with various strengths of Acetic Acid.

Acetum. *Syn.*, Malt Vinegar; Brown Vinegar.

This is made from a mixture of malt and unmalted grain (barley) by the acetous fermentation.

Malt is barley which has been moistened, and in which the process of germination thus started has been arrested by the heat of a kiln. During germination, the gluten of the barley yields vegetable gelatine, and diastase, etc. The diastase converts starch into dextrin and sugar (Maltose). An infusion of the malt and barley is now subjected to alcoholic fermentation, unmalted grain as well as malt being employed because the diastase of the malt is capable of converting into sugar a greater amount of starch than malt itself contains. The alcoholic fluid so produced is allowed to undergo oxidation. Aldehyde is first produced, and this is subsequently oxidised into Acetic Acid.



This constitutes the *acetous* fermentation. It is due to the influence of a micro-organism—the *Mycoderma Aceti*.

The official Vinegar contains 5.4 per cent. of real acetic acid ($\text{HC}_2\text{H}_3\text{O}_2$). A small quantity of sulphuric acid (1 in 1000) is also present. The authorities permit this to be added for the purpose of preserving the vinegar.

In wine-producing countries vinegar is made by the oxidation of wine. Hence the terms *red* and *white wine-vinegar*.

Vinegar is a safe and ready antidote in cases of poisoning by alkalies; it is also popular as a "cooling" lotion. It is used in the B. P. in the preparation of *Emplastrum Saponis Fuscum*. (See p. 87.)

Acetum Cantharidis. 1 in 10.

Cantharides, digested for two hours at 200° F. in a mixture of Acetic and Glacial Acetic Acids; then percolate.

Acetum Ipecacuanhæ. 1 in 20.

Ipecacuanha (in No. 20 powder), Diluted Acetic Acid; macerate and percolate. *Dose*, 5 to 40 min.

Used as an expectorant; the acid prevents its use in doses sufficiently large to produce an emetic effect.

Acetum Scillæ. 1 in 8.

Squill (bruised), Diluted Acetic Acid: macerate and filter. *Dose*, 15 to 40 min.

Used to prepare *Oxymel Scillæ* (Vinegar of Squill and Clarified Honey), and *Syrupus Scillæ* (Vinegar of Squill and Sugar). All these preparations, containing as they do free acetic acid, are incompatible with alkaline carbonates, *e.g.*, Carbonate of Ammonium. The same is true of *Acetum Ipecacuanhæ*. If it is desired to prescribe Squill or Ipecacuanha with Ammonium Carbonate, (a common combination as an expectorant mixture) the *Tinctura Scillæ* or *Vinum Ipecacuanhæ* should be ordered.

V.—THE OFFICIAL SOLUTIONS AND MIXTURES.

These are liquid preparations containing various medicinal agents dissolved, or suspended in, for the most part, a watery fluid.

Liquores. Solutions. (*Liquor, oris. third decl., masculine.*)

The official "Liquores" are mainly solutions of definite chemical compounds—metallic salts, and salts of the alkalis, etc. The two following are exceptions:

Liquor Gutta Percha. A solution of Gutta Percha in Chloroform. Used in making *Charta Sinapis*. (See p. 89.)

Liquor Epispasticus. Blistering Liquid. Made by exhausting Cantharides by percolation with Acetic Ether. Used in preparing Blistering Collodion. (See p. 90.)

The following twelve are (with the exception of Solution of Bimeconate of Morphine) 1 per cent. solutions of active medicinal agents, *i.e.*, they contain 4.3 grains of the active ingredient in 1 fl. ounce.

Four contain Arsenical compounds, viz.:

Liq. Arsenicalis. *Syn.*, **Fowler's Solution**; **Liq. Potassæ Arsenitis.**

Arsenious Acid and a little Potassium Carbonate are dissolved in Distilled Water by the aid of heat, and, when the solution is cool, a small quantity of Comp. Tinct. of Lavender is added. The odour and red colour due to the tincture, and the alkaline reaction distinguish this solution. 1 in 100. *Dose*, 2 to 8 min.

Liq. Arsenici Hydrochloricus.

Arsenious Acid is dissolved, by the aid of heat, in Distilled Water containing a small quantity of Hydrochloric Acid. A colourless fluid with an acid reaction. 1 in 100. *Dose*, 2 to 8 min.

Liq. Arsenii et Hydrargyri Iodidi. *Syn.*, **Donovan's Solution.**

Iodide of Arsenium and red Iodide of Mercury dissolved in Distilled Water. 1 of each in 100. *Dose*, 10 to 30 min.

Red Iodide of Mercury is insoluble in water, but in this preparation a soluble double Iodide of Mercury and Arsenium is formed.

Liq. Sodii Arseniatis.

Arseniate of Sodium (anhydrous) in Distilled Water. 1 in 100. *Dose*, 5 to 10 min.

The exact amount of water of crystallization differs in different specimens of Sodium Arseniate. Hence, in order to secure uniformity in the official "Liquor," the anhydrous salt is employed.

Four are Solutions of Morphine salts, viz. :

Liq. Morphinæ Acetatis.

Liq. Morphinæ Hydrochloratis.

Liq. Morphinæ Sulphatis.

The corresponding Morphine salt is dissolved in Distilled Water, containing a little S.V.R. In the first two a little free acid (acetic in the one, hydrochloric in the other) is added. 1 in 100. *Dose*, 10 to 60 min.

Liq. Morphinæ Bimeconatis.

Freshly prepared Morphine dissolved in Distilled Water containing a little S.V.R. and Meconic Acid.

Note.— $1\frac{1}{4}$ in 100. *Dose*, 10 to 40 min.

Two others are also Solutions of Alkaloidal salts, viz. :

Liq. Atropinæ Sulphatis. Sulphate of Atropine in Camphor Water. 1 in 100. *Dose*, 1 to 4 min.

Liq. Strychninæ Hydrochloratis.

Strychnine in Distilled Water containing a little S.V.R. and Hydrochloric Acid. 1 in 100. *Dose*, 5 to 10 min.

Note.—The solutions containing salts of the alkaloids are more or less prone to decompose. Hence S.V.R. is added to preserve them. In *Liq. Atropinæ Sulph.*, Camphor fulfils this purpose. This solution is often dropped on the conjunctiva in order to dilate the pupil; S.V.R. would cause smarting and irritation.

The other 1 per cent Solutions are :

Liq. Potassii Permanganatis.

Permanganate of Potassium in Distilled Water. 1 in 100.
Dose, 2 to 4 fl. drachms.

Liq. Trinitrinæ. *Syn.*, **Liq. Nitroglycerini** ; **Liq. Glonoini.**

Pure Nitroglycerine in S.V.R. 1 in 100. Dose, $\frac{1}{2}$ to 2 min.

Two other Solutions which contain active medicines that may be administered internally are :

Liq. Cocainæ Hydrochloratis.

Hydrochlorate of Cocaine in Distilled Water, a little Salicylic Acid being added as a preservative. 1 in 10. Dose, 2 to 10 min. This solution may be painted on mucous membranes or injected subcutaneously, to produce local anæsthesia—*i.e.*, to reduce or deaden the sensibility of the surface, so that surgical operations may be performed painlessly.

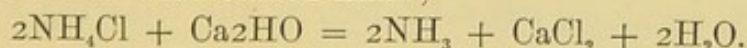
Liq. Hydrargyri Perchloridi.

Perchloride of Mercury in Distilled Water, a little Chloride of Ammonium being added to facilitate solution and to prevent decomposition. $\frac{1}{2}$ gr. in 1 fl. ounce. Dose, $\frac{1}{2}$ to 2 fl. drachms.

Note.—A double chloride of Mercury and Ammonium (*Sal Alembroth*) is formed. This is more stable than Mercuric Chloride which, in solution, is liable to decompose, Calomel being precipitated.

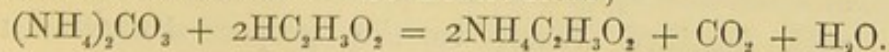
Six Solutions contain Ammonium Compounds :

Liq. Ammoniæ Fortior. Washed Ammonia gas (NH_3) dissolved in Distilled Water. The gas is obtained by heating Ammonium Chloride with Slaked Lime ;



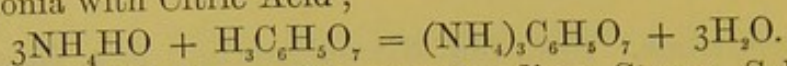
Liq. Ammoniæ. *Syn.*, Spirit of Hartshorn. One part of the Strong Solution diluted with two parts of Distilled Water.

Liq. Ammonii Acetatis Fortior. Neutralise a solution of Ammonium Carbonate with Acetic Acid ;



Liq. Ammonii Acetatis. *Syn.*, Spirit of Mindererus. The corresponding Strong Solution diluted with Distilled Water. *Dose*, 2 to 6 fl. drachms.

Liq. Ammonii Citratis Fortior. Neutralise Strong Solution of Ammonia with Citric Acid ;



Liq. Ammonii Citratis. The corresponding Strong Solution diluted with Distilled Water. *Dose*, 2 to 6 fl. drachms.

Seven Solutions contain Iron Salts :

Liq. Ferri Dialysatus. This is prepared by dialysis. Ferric Hydrate, recently precipitated, is dissolved in Strong Solution of Perchloride of Iron and the solution placed on a dialyser. It is washed in the usual way, and, as a result, hydrochloric acid is separated, leaving in the dialyser a colloid, almost tasteless fluid, free from acidity and astringency. It is a solution of highly basic oxychloride of iron. *Dose*, 10 to 30 min.

Liq. Ferri Acetatis Fortior. Dissolve fresh Ferric Hydrate in Glacial Acetic Acid.

Liq. Ferri Perchloridi Fortior.

Liq. Ferri Persulphatis.

Liq. Ferri Pernitratis.

These are solutions of the corresponding salts, made by dissolving Iron Wire in hydrochloric, sulphuric, and nitric acid respectively. In the first two, a little Nitric Acid is used to raise the Iron to the *ferric* state.

Liq. Ferri Acetatis.

Liq. Ferri Perchloridi.

To make these, dilute 1 part of the corresponding Strong Solution with 3 parts of Distilled Water. They correspond in strength to the tinctures. *Dose*, 5 to 30 min.

Of the remaining **Official Solutions**, the following are intended for internal administration :

Liq. Bismuthi et Ammonii Citratis. *Syn.*, Liq. Bismuthi.

Rub Citrate of Bismuth into a paste with a little water, and dissolve by means of Solution of Ammonia ; then dilute with Distilled Water to the proper strength. 1 fluid

drachm contains 3 grs. of Bismuth Oxide. *Dose*, $\frac{1}{2}$ to 1 fluid drachm.

Note.—Evaporated to a syrupy consistence, spread on glass plates and dried, it gives scales of the official *Bismuthi et Ammonii Citras*. *Dose*, 2 to 5 grs. *Liq. Bismuthi* (Schacht) is a well-known *officinal* preparation made by the pharmacist whose name it bears.

Liq. Calcii Chloridi.

A solution of Calcium Chloride in Distilled Water. *Dose*, 15 to 50 min.

Liq. Calcis. *Syn.*, Lime Water.

A saturated solution of Slaked Lime in Distilled Water. About $\frac{1}{2}$ gr. CaO in 1 ounce. *Dose*, 1 to 4 fl. ozs.

Liq. Calcis Saccharatus.

Slaked Lime dissolved in Distilled Water by the aid of Sugar. 7 grs. CaO in 1 ounce. *Dose*, 15 to 60 min.

The sugar promotes the solution of the lime.

Liq. Lithiæ Effervescens. *Syn.*, Lithia Water.

Liq. Sodæ Effervescens. *Syn.*, Soda Water.

Liq. Potassæ Effervescens. *Syn.*, Potash Water.

These are solutions of Carbonate of Lithium, and Bicarbonates of Sodium and Potassium, respectively, in water charged with CO₂ under a pressure of four atmospheres.

Liq. Magnesii Citratis.

A solution of Magnesium Citrate in water charged with CO₂

Note.—The above four solutions are kept in bottles securely closed, and on removal of the cork CO₂ escapes with effervescence.

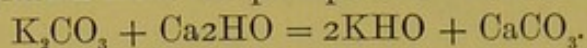
Liq. Magnesii Carbonatis. *Syn.*, Fluid Magnesia.

Suspend Carbonate of Magnesium in water and pass through the fluid CO₂, keeping excess of the gas for a time under pressure in contact with the fluid. Some of the Carbonate (about 10 grains to the fluid ounce) passes into solution. *Dose*, 1 to 2 ounces. It deposits the Carbonate on keeping in consequence of escape of the CO₂.

Liq. Potassæ,

Liq. Sodæ,

These are solutions of Potash (KHO) and Soda (NaHO), respectively, in Distilled Water. They are obtained by boiling Slaked Lime with the corresponding Carbonate and decanting the clear solution from the precipitated calcium carbonate.



Note.—These solutions are sometimes used externally as lotions in certain skin diseases; they may be given internally as antacids. *Dose*, 10 to 60 min.

The rest of the Solutions are for external application:

Five are strongly caustic, viz.:

Liq. Acidi Chromici.

Chromic Acid dissolved in Distilled Water.

Liq. Antimonii Chloridi.

Black Antimony (Sb₂S₃) dissolved in Hydrochloric Acid.

Liq. Hydrargyri Nitratis Acidus.

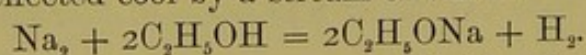
Mercury dissolved in excess of Nitric Acid.

Liq. Zinci Chloridi.

Zinc dissolved in Hydrochloric Acid and Water.

Liq. Sodii Ethylatis.

Metallic Sodium dissolved in Ethylic Alcohol. The Hydroxyl Hydrogen is replaced by Sodium, the chemical action being so energetic that it is necessary to keep the vessel in which solution is effected cool by a stream of water:



The solution is a colourless syrupy liquid. It is used for the destruction of superficial nævi, etc., being applied with a glass rod.

Three are disinfecting and deodorising† solutions, viz.:*

Liq. Chlori,

Liq. Sodæ Chlorinatæ,

Liq. Calcis Chlorinatæ,

are solutions of Chlorine, Chlorinated Soda, and Chlorinated Lime, respectively, in distilled water. The first two are sometimes given internally. *Dose*, 10 to 30 min.

* *Disinfectants* neutralise the specific poisons of communicable diseases.

† *Deodorants* are agents used to destroy foul odours.

One is counter-irritant, viz. :*

Liq. Iodi. *Syn.*, Lugol's solution.

Iodine dissolved in Distilled Water by the aid of Iodide of Potassium. 1 in 20.

Two are sedative and astringent, viz :

Liq. Plumbi Subacetatis. *Syn.*, Goulard's Extract.

Oxide and Acetate of Lead are boiled in Distilled Water. The Subacetate ($Pb_2O_2C_2H_3O_2$) is formed.

Liq. Plumbi Subacetatis Dilutus. *Syn.* Goulard's Water.

Dilute the former solution with Distilled Water and add a little S.V.R. 1 in 80.

Misturæ. Mixtures. (*Mistura, æ. first decl., feminine.*)

The official Mixtures are fluid preparations intended for internal administration. In some, the medicinal ingredients are in solution; in others, they are in suspension, forming in several cases *emulsions*.

Emulsions consist of finely divided fat, oil, or resin, diffused through a watery fluid in such a manner as to produce a milky appearance, and not readily to separate from the water. Substances which promote the formation of emulsions are termed *emulsive agents*. Gums, albumen, soaps, and alkalies, are used for this purpose. Milk is a typical emulsion. It contains finely divided fat suspended in an aqueous liquid by means of an albuminoid substance, *casein*, etc.

Gums are exudations from the stems of plants. They are either soluble in, or will freely absorb water, forming more or less viscid *mucilages*. They are insoluble in, and are precipitated by alcohol.

Examples: Gum Acacia, Tragacanth.

Resins are complex bodies formed in plants by oxidation of volatile oils (see p. 58). They are solid, brittle, non-volatile substances, insoluble in water, soluble in alcohol.

Examples: Resin, and the Resins of Guaiacum, Jalap, Podophyllum and Scammony.

* See p. 85.

Gum-Resins are exudations from plants, and consist of a mixture of gum and resin. In addition, many contain more or less volatile oil. When reduced to powder in a mortar, and mixed with water, the gum dissolves and suspends the resin forming an *emulsion*.

Examples : Ammoniacum, Asafœtida, Galbanum, Gamboge, Myrrh, and Scammony.

Oleo-Resins are natural solutions of resins in volatile oils. They exude from various trees, naturally or on incision, and are sometimes called *Turpentine*s. By distillation, the volatile oil can be separated from the non-volatile resin.

Examples : Copaiba, Canada Turpentine (both often incorrectly termed Balsams), Common Frankincense, Elemi.

Balsams are resins or oleo-resins yielding Cinnamic or Benzoic Acid.

Examples : Benzoin, Storax, Balsams of Peru and Tolu.

The following five of the **Official Mixtures** are emulsions :

Mist. Ammoniaci.

Ammoniacum (a gum-resin) with Distilled Water.

Mist. Scammonii.

Scammony (a gum-resin) with Milk. 3 grs. in 1 fl. ounce.

Mist. Guaiaci.

Guaiacum Resin, Gum Acacia, and Sugar, in Cinnamon Water.

Note.—In each of the above three a resin is emulsified by means of gum. In the first two, the gum exists naturally in the drug ; in the last, it is added artificially.

Mist. Amygdalæ.

Comp. Powder of Almonds in Distilled Water.

The gum acacia in the compound powder, and the *emulsin* (an albuminous constituent of the almond) emulsify the almond oil.*

Mist. Olei Ricini.

Castor oil (with oils of cloves and lemon as flavouring agents) is mixed with Solution of Caustic Potash. In this

* See p. 53.

way part of the oil is made into a soap and this acts as an emulsive agent for the rest of the oil. Some Syrup is added and Orange Flower Water. 2 fl. ounces = 6 fl. drachms of Castor oil.

The other B. P. Mixtures are :

Mist. Cretæ.

Prepared Chalk, Gum Acacia, Syrup, Cinnamon Water.
The gum assists in the suspension of the insoluble chalk.

Mist. Creasoti.

Creasote is dissolved in an equal volume of Glacial Acetic Acid, a quantity of Distilled Water is gradually added, and then some Syrup, and Spirit of Juniper. The latter conceals the taste of the Creasote. About 1 min. in 1 fl. ounce.

Mist. Sennæ Composita. *Syn.*, Black Draught.

Sulphate of Magnesium is dissolved in Infusion of Senna; and Tinct. of Senna, Comp. Tinct. of Cardamoms and Liquid Extract of Liquorice are added. 1 of Epsom Salts in 5. *Dose*, 1 to 1½ ounce. The Liquorice covers the nauseous taste of the Epsom Salts, and the Comp. Tinct. of Cardamoms corrects the griping tendency of the Senna.

Mist. Spiritus Vini Gallici.

The yolks of two eggs and a little sugar are rubbed together in a mortar, and 4 ounces, each, of French Brandy and Cinnamon Water added.

Note. — Cinnamon Water is used in three of the B. P. Mixtures—viz., M. Cretæ, M. Guaiaci, and M. Spiritus Vini Gallici.

Mist. Ferri Aromatica. *Syn.*, Heberden's Ink.

Iron Wire is macerated with Cloves, Calumba Root, and Red Cinchona Bark, in Peppermint Water, and, to the filtered liquid, Tinct. of Orange Peel and Comp. Tinct. of Cardamoms are added.

A small quantity of Iron combines with the organic acids and tannin present in the vegetable drugs. The tannate of iron gives a blackish appearance to the preparation.

Mist. Ferri Composita. *Syn.*, Griffiths' Mixture.

This contains Ferrous Carbonate in suspension; it is

bluish-green when recently prepared, but in time assumes a reddish appearance from the formation of ferric oxide. It is made by mixing Potassium Carbonate, Myrrh, and Sugar with Rose Water, and, to the mixture, adding a solution of Ferrous Sulphate. Ferrous Carbonate is precipitated. A little Spirit of Nutmeg is used as a flavouring agent.

Some of the Carbonate of Potassium forms with the resin of the myrrh a soapy compound, which helps to suspend the Ferrous Carbonate. The sulphate of iron is added last to avoid oxidation, and the sugar also assists in this direction.

The official Mixtures may be given in doses of 1 to 2 fluid ounces.

VI.—THE OFFICIAL JUICES AND EXTRACTS.

Succi. Juices. (*Succus, i. second decl., masculine.*)

These are the expressed juices of fresh plants preserved by the addition of rectified spirit. The portion of the plant from which the juice is obtained is bruised in a stone mortar, and the juice is expressed. An iron mortar is to be avoided lest tannate of iron should be formed and the preparation be discoloured. To every three measures of the expressed juice one measure of rectified spirit is added, and, after an interval of seven days, the preparation is filtered. The spirit precipitates albuminous and gummy materials, and these are removed by the filter. They are very liable, if retained, to undergo decomposition, and to lead to the development of moulds, etc. Hence their removal is necessary. The spirit also precipitates chlorophyll from those juices expressed from the *green* parts of plants.

The following are the B. P. Succi, with the source and dose of each :

Succus Belladonnæ (Fresh leaves and young branches of *Belladonna*). *Dose*, 5 to 15 min.

Succus Conii (Fresh leaves and young branches of *Hemlock*). *Dose*, $\frac{1}{2}$ to 1 drachm.

Succus Hyoscyami (Fresh leaves, flowering tops and young branches of *Henbane*). *Dose*, $\frac{1}{2}$ to 1 drachm.

Succus Scoparii (Fresh Broom Tops). *Dose*, 1 to 2 drachms.

Succus Taraxaci (Fresh Dandelion Root). *Dose*, 1 to 2 drachms.

There are also in the B. P. two juices obtained from ripe fruits. These are to be freshly expressed when required, and are used to make the corresponding Syrups.

Succus Limonis (Lemon Juice). Expressed from the ripe fruit of *Citrus Limonum*. It contains about 40 grains of Citric Acid in an ounce, and is used in making *Syrupus Limonis*.

Succus Mori (Mulberry Juice). Expressed from the ripe fruit of *Morus nigra*. Used in making *Syrupus Mori*.

Extracta. Extracts. (*Extractum*, i. *second decl., neuter.*)

This official group contains 50 preparations. Of these 15 are Liquid Extracts; they are distinguished by the term "Liquidum" and will be subsequently considered. The remainder are solid preparations, generally of soft consistence, each containing in a small bulk the medicinal principles of a large quantity of the drug it represents.

In the B. P. exact directions are of course given for the preparation of each of the Extracts, and it is the duty of the manufacturing pharmacist to attend to the official directions in detail. But the principles which underlie the various methods adopted may be very shortly stated:

The drug is exhausted, and the fluid so obtained is reduced by evaporation to a solid residue.

In the case of *fresh* plants, exhaustion is secured by pressing out the juice which holds the medicinal principles in solution. When the drug is part of a *dried* plant, a solution of its active principles is prepared by making an infusion, decoction, tincture, etc., with some suitable menstruum. In each case the excess of the liquid is now removed by evaporation. The solid residue—the *extract*—remains.

Most of the official Extracts are directed to be reduced by evaporation to a "soft" consistence, or until "suitable for forming pills." The following are evaporated to dryness:

Ext. Aloes Barbadosis.
Ext. Aloes Socotrinæ.

Ext. Hæmatoxyli. (Logwood.)
Ext. Krameriæ. (Rhatany.)

In one, the extract is mixed with 20 per cent. of sugar of milk, dried, and reduced to powder :

Ext. *Euonymi Siccum*. *Syn.*, *Euonymin*.

From what has been stated above, it is clear that the **Official Extracts** may be classified as follows:—

A. Liquid Extracts.

B. Extracts. (Not Liquid.)

I. Obtained by evaporation of the juice of a *fresh* plant.
The Fresh Extracts.

1. Portion of plant (leaves, young branches, etc.), contains chlorophyll. *The Green Extracts.*
2. Portion of plant (root, corm), does not contain chlorophyll. *Fresh (but not green) Extracts.*

II. Obtained by evaporation of a fluid in which some *dry* vegetable tissue has been exhausted. These may be arranged in groups according to the nature of the fluid used to secure exhaustion. (See below.)

I. Extracts obtained from the juices of *fresh* plants.

1. **The Green Extracts.** These are :

Ext. Aconiti. (Fresh leaves and flowering tops.) *Dose*, $\frac{1}{4}$ to 1 gr.

Ext. Belladonnæ. (Fresh leaves and young branches.) *Dose*, $\frac{1}{4}$ to 1 gr.

Ext. Conii. (Fresh leaves and young branches.) *Dose*, 2 to 6 grs.

Ext. Hyoscyami. (Fresh leaves, flowering tops, and young branches.) *Dose*, 5 to 10 grs.

Ext. Lactucæ. (Flowering herb of Lettuce.) *Syn.*, *Lactucarium* ; *Lettuce Opium.* *Dose*, 5 to 15 grs.

Mode of Preparation. Bruise the leaves, etc., in a *stone* mortar and press out the juice. Heat to 130° F. ; filter out and preserve the coagulated green colouring matter. Again heat the juice to 200° F. ; filter out and reject the coagulated albumen. Free the chlorophyll from clots by passing it through a hair sieve, add it to the juice and evaporate, at a temperature not exceeding 140° F., until the Extract is of a suitable consistence for forming pills.

The albumen is removed because of its proneness to decompose. It is found that chlorophyll assists in the preservation of the extract. If too high a temperature is used in evaporating the extract, the medicinal principles may be injured. Under the same influence the chlorophyll becomes brown. Hence the green tint is so far a guarantee of careful preparation.

2. **Fresh Extracts (not green).** These are three :

Ext. Colchici. (Fresh Colchicum Corm.) *Dose*, $\frac{1}{2}$ to 2 grs.

Ext. Colchici Aceticum. (Fresh Colchicum Corm.) *Dose*, $\frac{1}{2}$ to 2 grs.

Ext. Taraxaci. (Fresh Dandelion Root.) *Dose*, 5 to 30 grs.

Mode of Preparation. The juice is expressed, and heated to 212° F. to coagulate albumen. This is filtered out and the juice is evaporated. In the *Acetic Extract*, some acetic acid is added to the corms before the juice is expressed.

II. Extracts obtained by exhausting *dry* vegetable substances by suitable menstrua, and subsequent evaporation. These may be grouped according to the menstruum employed to procure exhaustion.

1. *Ether is the menstruum in :*

Ext. Mezerei Æthereum.

An Extract is obtained from Mezereon Bark by exhausting the bark with S.V.R. This is shaken up with Ether, and the ethereal solution is evaporated. The residue is of course an ethereal extract. N.B. Is not given internally. It is a vesicating agent and enters into *Lin. Sinapis Co.*

2. *Rectified Spirit is the menstruum in :*

Ext. Belladonnæ Alcoholicum. *Dose*, $\frac{1}{16}$ to $\frac{1}{4}$ gr.

This is made from Belladonna Root. It is used in preparing *Emplastrum Belladonnæ* and *Unguentum Belladonnæ*.

Ext. Gelsemii Alcoholicum. *Dose*, $\frac{1}{2}$ to 2 grs.

Ext. Cannabis Indicæ. (Indian Hemp.) *Dose*, $\frac{1}{4}$ to 1 gr.

Used to make *Tr. Cannabis Indicæ*.

Ext. Physostigmatis. (Calabar Bean.) *Dose*, $\frac{1}{16}$ to $\frac{1}{4}$ gr.

Physostigmine (*Syn.*, Eserine) is prepared from it.

3. *S.V.R. diluted with Distilled Water is the menstruum in :*

Ext. Calumbæ. *Dose, 2 to 10 grs.*

Ext. Cascaræ Sagradæ.—*Dose, 2 to 8 grs. Syn., Ext. Rhamni Purshiani.*

Ext. Euonymi Siccum. *Syn. Euonymin. Dose, 1 to 4 grs.*

Mixed with 20 per cent. of Sugar of Milk, dried, and reduced to powder.

Ext. Jaborandi. *Dose, 2 to 10 grs.*

Ext. Nucis Vomiceæ. *Dose, $\frac{1}{4}$ to 1 gr.*

The greater part of the menstruum is S.V.R. The extract is standardised (*i.e.*, made of a definite strength as ascertained by chemical testing). It contains 15 per cent. of the alkaloids (mainly Strychnine with some Brucine). Used to prepare *Tr. Nucis Vomiceæ*.

Ext. Rhamni Frangulæ. *Dose, 15 to 60 grs.*

Ext. Rhei. *Dose, 5 to 15 grs.*

Ext. Stramonii. *Dose, $\frac{1}{4}$ to $\frac{1}{2}$ grs.*

The seeds are freed from fixed oil by percolation with Ether before exhaustion.

4. *Exhausted first with S.V.R., then with Distilled Water and the two Extracts mixed :*

Ext. Jalapæ. *Dose, 5 to 15 grs.*

Ext. Lupuli (Hop). *Dose, 5 to 15 grs.*

5. *Boiling Water is the menstruum in :*

Ext. Aloes Barbadensis. *Dose, 2 to 6 grs.*

Ext. Aloes Socotrinæ. *Dose, 2 to 6 grs.*

From it are made *Decoct. Aloes Co.* and *Ext. Colocynth. Co.*

Ext. Hæmatoxyli. *Dose, 10 to 30 grs.*

The above three are evaporated to dryness. In making Extract of Logwood, iron vessels must be avoided ; otherwise the extract will be discoloured.

Ext. Anthemidis. *Dose, 2 to 10 grs.*

The Chamomile Flowers are boiled with water, and as this causes loss of volatile oil, a little Oil of Chamomile is added at the end of the evaporation.

Ext. Gentianæ. *Dose*, 2 to 10 grs.

Ext. Pareiræ. *Dose*, 10 to 30 grs.

6. *Distilled Water is the menstruum in :*

Ext. Opii. *Dose*, $\frac{1}{2}$ to 2 grs.

The Opium is exhausted by repeated maceration in successive quantities of water, and the fluids so produced are mixed and evaporated. It is double the strength of opium, and therefore contains 20 per cent. of Morphine. From it are prepared :

Ext. Opii Liquidum,	1 of Extract in 20.
Vinum Opii,	1 of Extract in 20.
Trochisci Opii,	$\frac{1}{10}$ gr. of Extract in each lozenge.

Ext. Glycyrrhizæ. *Dose*, 5 to 60 grs.

Ext. Kramerizæ. *Dose*, 5 to 20 grs.

Evaporated to dryness.

Ext. Papaveris. *Dose*, 2 to 5 grs.

Ext. Quassizæ. *Dose*, 3 to 5 grs.

There is one Compound Extract, viz. :

Ext. Colocynthis Co. *Dose*, 3 to 10 grs. (see Pil. Colocynth. Co., p. 79).

The Extracts are most suitably administered in the pilular form. Many of them can be ordered in 5 to 10 grain doses. The following doses must be specially noted :

Ext. Belladonnæ Alcoholic.,	} $\frac{1}{10}$ to $\frac{1}{4}$ gr.
Ext. Physostigmatis,	
Ext. Stramonii,	} $\frac{1}{4}$ to $\frac{1}{2}$ gr.
Ext. Aconiti,	} $\frac{1}{4}$ to 1 gr.
Ext. Belladonnæ,	
Ext. Cannabis Indicæ,	
Ext. Nucis Vomizæ,	
Ext. Colchici,	} $\frac{1}{2}$ to 2 grs.
Ext. Colchici Acet.,	
Ext. Gelsemii Alcoholic.,	
Ext. Opii,	} 1 to 5 grs.
Ext. Conii,	
Ext. Euonymi Siccum,	
Ext. Papaveris,	
Ext. Quassizæ,	

N.B.—Ext. Mezerei Æthereum is not given internally.

The Liquid Extracts.

The methods adopted in the preparation of these are similar to those by which the Extracts made from dry vegetable substances are obtained. The drug is exhausted by treatment with a suitable menstruum, and the solution of medicinal principles so produced is concentrated by evaporation. But, instead of continuing the evaporation until a solid residue is left, it is stopped when the fluid is reduced to a stated volume. This volume, in the majority of cases, is such that 1 fluid part of the liquid extract represents 1 part of the drug from which it is made. Thus, if 40 ounces of dry Dandelion Root be exhausted, the liquid so obtained is reduced by evaporation to 40 fluid ounces, which therefore contain the soluble material of 40 ounces of Dandelion Root. Hence, 1 part (*e.g.*, 1 fl. ounce) of the Liquid Extract represents 1 part (*e.g.*, 1 ounce) of the drug. The strength is 1 in 1.

The following *exceptions* to the above general statement may be noted :

Ext. Cinchonæ Liquid. This is evaporated, not until a certain volume is reached, but until the fluid is of such a strength that 100 grains contain 5 grains of the alkaloids of the Red Cinchona Bark as ascertained by definite tests. The preparation is thus a standardised one.

Ext. Filicis Liquid. Is reduced by evaporation to an oily consistence. (See below.)

Ext. Opii Liquid. **Ext. Pareiræ Liquid.** These are not prepared by exhausting the crude drugs, but by dissolving the solid extracts of Opium and Pareira respectively in Distilled Water, then adding a little S.V.R., and filtering.

The **Liquid Extracts** may now be classified according to the nature of the menstruum employed in preparing them.

1. *Ether is the menstruum in :*

Ext. Filicis Liquid. The Male Fern (in coarse powder) is packed in a percolator, and ether passed through it. The ether dissolves out the fixed oil. By distillation the ether is removed, leaving an "oily extract."

It should be prescribed with gum acacia in the form of an emulsion. *Dose*, 15 to 60 min.

2. *S.V.R. is the menstruum in :*

Ext. Cimicifugæ Liquid. 1 in 1. Dose, 5 to 30 min.

3. *S.V.R., diluted with Distilled Water, is the menstruum in :*

Ext. Cocæ Liquid. 1 in 1. Dose, $\frac{1}{2}$ to 2 fl. drachms.

Ext. Hamamelidis Liquid. (Leaves.) 1 in 1. Dose, 2 to 5 min.

Ext. Hydrastis Liquid. 1 in 1. Dose, 5 to 30 min.

Ext. Taraxaci Liquid. 1 in 1. Dose, 2 to 4 fl. drachms.

Ext. Sarsæ Liquid. 1 in 1. Dose, 2 to 4 fl. drachms.

Some sugar is dissolved in this preparation.

4. *Distilled Water is the menstruum in :*

Ext. Belæ Liquid. 1 in 1. Dose, 1 to 2 fl. drachms.

Ext. Cascaræ Sagradæ Liquid. *Syn.*, Ext. Rhamni Purshiani Liquid. 1 in 1. Dose, $\frac{1}{2}$ to 2 fl. drachms.

Ext. Ergotæ Liquid. 1 in 1. Dose, 10 to 60 min.

This, by evaporation, mixture with S.V.R., filtration and subsequent reduction to a soft extract, forms *Ergotinum*, *B.P.* (Bonjean's Ergotine).
Dose, 2 to 5 grs.

Ext. Glycyrrhizæ Liquid. Dose, 1 fl. drachm.

Ext. Rhamni Frangulæ Liquid. 1 in 1. Dose, 1 to 4 fl. drachms.

Ext. Opii Liquid. Dissolve 1 ounce of Ext. of Opium in 16 ounces of Distilled Water; then add 4 ounces S.V.R. and filter. 1 (of Ext. Opium) in 20. Dose, 10 to 40 min.

Ext. Pareiræ Liquid. Made from the solid Extract of Pareira.
(See p. 46.) Dose, $\frac{1}{2}$ to 2 fl. drachms.

Note.—In all cases where water is the menstruum, a little S.V.R. is added to the aqueous fluid after this has been reduced by evaporation. The albuminous and gummy materials are thus precipitated, and are removed by subsequent filtration. (Compare with the Juices and Green Extracts.)

Ext. Cinchonæ Liquid. Red Cinchona Bark is exhausted by percolation with Distilled Water containing a little S.V.R. and Glycerine. The liquid so obtained is reduced by evaporation to a definite alkaloidal strength, and a little S.V.R. added. 100 grains contain 5 grains of the alkaloids of the bark. *Dose*, 5 to 10 min.

The usual dose of the Liquid Extracts is 1 to 2 fl. drachms. The following exceptions may be noted:

Ext. Hamamelidis Liq.	2 to 5 min.	Ext. Opii Liq.	10 to 40 min.
Ext. Cinchonæ Liq.	5 to 10 min.	Ext. Filicis Liq.	10 to 60 min.
Ext. Hydrastis Liq.	5 to 30 min.	Ext. Ergotæ Liq.	10 to 60 min.
Ext. Cimicifugæ Liq.	5 to 30 min.		

VII. — THE OFFICIAL SYRUPS, OXYMELS, CONFECTIONS, LOZENGES, AND TABLETS.

All these preparations contain medicinal substances associated with some sweet basis—*e.g.*, sugar, syrup, honey, etc.

Syrupi. Syrups. (*Syrupus*, i. *second decl., masculine.*)

These are fluid preparations sweetened with sugar. Some are merely flavouring agents; others offer themselves as fairly palatable preparations of active medicines. In the Syrups containing Iron (ferrous) salts, the sugar helps to preserve these from oxidation.

The Official Syrups are:

Syrupus. *Syn.*, Syrupus Simplex. A solution of Refined Sugar in Distilled Water.

Syr. Aurantii. Tinct. of Orange Peel and Syrup.

Syr. Zingiberis. Strong Tinct. of Ginger and Syrup.

Syr. Aurantii Floris. Orange-flower Water and Syrup.

Syr. Scillæ. Vinegar of Squill and Sugar.

This contains free Acetic Acid and is therefore incompatible with alkaline carbonates, etc. (See *Acetum Scillæ*, p. 30.)

Syr. Mori. Mulberry Juice and Sugar.

Syr. Limonis. Lemon Juice, Lemon Peel and Sugar.

Contains free Citric Acid and is therefore incompatible with alkaline carbonates, etc.

Syr. Chloral. A solution of Hydrate of Chloral in water mixed with Syrup.

N.B.—10 grains in 1 fluid drachm. *Dose*, $\frac{1}{2}$ to 2 fl. drachms.

Three contain Salts of Iron, viz.:

Syr. Ferri Iodidi.

A solution of freshly prepared Ferrous Iodide made into Syrup by the addition of Sugar. 4.3 grs. in 1 fl. drachm. *Dose*, $\frac{1}{2}$ to 1 fl. drachm.

Syr. Ferri Phosphatis.

Freshly prepared Ferrous Phosphate dissolved in Phosphoric Acid, then made into Syrup by the addition of sugar and water. 1 gr. in 1 fl. drachm. *Dose*, 1 fl. drachm.

Syr. Ferri Subchloridi. *Syn.*, Syrup of Ferrous Chloride.

A solution of freshly prepared Ferrous Chloride mixed with Syrup, a little Citric Acid being added to prevent oxidation. 4 grs. (about) in 1 fl. drachm. *Dose*, $\frac{1}{2}$ to 1 fl. drachm.

In the remainder of the Syrups, the drugs are exhausted by some suitable menstruum, and the solution so obtained is sweetened. They are, in short, infusions, decoctions, etc., made into Syrup by the addition of sugar.

Syr. Hemidesmi (Hemidesmus Root).

Syr. Papaveris (Poppy Capsules freed from their seeds).

Syr. Rhœados (Fresh Red Poppy Petals).

Syr. Rosæ Gallicæ (Dried Red Rose Petals).

Syr. Tolutanus (Balsam of Tolu).

Syr. Rhei (Rhubarb Root and a little Coriander Fruit).

Syr. Sennæ (Senna and a little Oil of Coriander).

The usual dose of the Official Syrups is 1 fl. drachm.

The following Syrups are well known *official* preparations :

Syr. Ferri, Quininæ, et Strychninæ Phosphatum. *Syn.*,
Easton's Syrup.

One fluid drachm contains Phosphate of Iron 1 grain.
 " " " Quinine $\frac{3}{4}$ grain.
 " " " Strychnine $\frac{1}{2}$ grain.
Dose.—1 fluid drachm.

Syr. Ferri Phosphatis Co. *Syn.*, Parrish's Syrup; Chemical Food.

Contains Phosphates of Iron and Calcium with small quantities of Sodium and Potassium Phosphates. Sometimes called Syrup of the Phosphates. Is a convenient form for the administration of iron to children. *Dose*, 1 to 2 fl. drachms.

Mel. Honey. (*Mel, mellis. third decl., neuter.*)

This is a saccharine secretion deposited in the honeycomb by the Hive Bee (*Apis mellifica*). When freshly collected it is a light brown, translucent, viscid fluid, and consists largely of ordinary cane sugar and inverted sugar. On keeping, it solidifies and forms an opaque granular mass. The cane sugar is changed to grape sugar. Melted, and then strained to free it from mechanical impurities, it forms

Mel Depuratum. Clarified Honey.

Mel Boracis. Borax mixed with Clarified Honey and a little Glycerine.

Oxymel. Clarified Honey mixed with 10 per cent. each of Acetic Acid and Water.

Oxymel Scillæ. Vinegar of Squill and Clarified Honey.

Contains free Acetic Acid and is therefore incompatible with alkaline carbonates, etc. (See *Acet. Scillæ*, p. 30.)

Confectiones. Confections. (*Confectio, onis. third decl., feminine.*)

The Confection is a very ancient medicinal preparation. It is a soft, pulpy or semi-solid mass, containing medicinal substances mixed mechanically with syrup, honey, or sugar. The Confections were formerly known as Electuaries. In the B. P. there are eight, viz. :

Two made with Sugar :

Conf. Rosæ Caninæ. Confection of Hips.

Conf. Ros Gallicæ. Confection of Roses.

The fresh drug (fruit in the first, petals in the second) is beaten into a pulp and mixed with sugar. They are used principally as pill excipients. (See p. 75.)

Two made with Syrup :

Conf. Opii. Comp. Powder of Opium 1, Syrup 3. *1 of Opium in 40.* Dose, 5 to 20 grains.

Conf. Sulphuris. Sublimed Sulphur, Cream of Tartar, Syrup of Orange Peel, and a little Tragacanth.

Two made with Clarified Honey :

Conf. Piperis. Black Pepper, Caraway Fruit, Clarified Honey.

Conf. Terebinthinæ. Oil of Turpentine, Powdered Liquorice Root, Clarified Honey.

One made with a mixture of Syrup and Clarified Honey :

Conf. Scammonii. Resin of Scammony and Ginger mixed with Syrup and Clarified Honey, and small quantities of Oils of Cloves and Caraway added. *1 in 3.* Dose, 10 to 30 grains.

The other B. P. Confection is :

Conf. Sennæ. *Syn.,* Lenitive Electuary.

This is a mixture of Senna and Coriander Fruit (in fine powders), with the pulp of Figs, Prunes, Cassia Fruit and Tamarind. It is sweetened with Sugar and flavoured with Extract of Liquorice. It is a popular laxative or mildly purgative preparation.

All the B. P. Confections may be given in doses of 60 to 120 grains, except,

Conf. Opii. 5 to 20 grains.

Conf. Scammonii. 10 to 30 grains.

Trochisci. Lozenges. (*Trochiscus, i. second decl., masculine.*)

In these preparations the medicinal ingredients are mixed with a basis of Sugar, Gum Acacia, and Water. The mass so formed is dried and divided into lozenges.

In the B. P. the following are official :

- Troch. Acidi Tannici. ($\frac{1}{2}$ grain in each.)
 Troch. Acidi Benzoici. ($\frac{1}{2}$ grain in each.)
 Troch. Bismuthi. (2 grains subnitrate in each.)
 Is made with Rose Water, and contains some Magnesium and Calcium Carbonates.
 Troch. Catechu. (1 grain in each.)
 Troch. Ferri Redacti. (1 grain in each.)
 Troch. Ipecacuanhæ. ($\frac{1}{4}$ grain in each.)
 Troch. Morphinae. ($\frac{1}{36}$ gr. hydrochlorate in each.)
 Troch. Morphinae et Ipecacuanhæ. (Morphine Hydrochlorate $\frac{1}{36}$ gr., Ipecacuanha $\frac{1}{12}$ gr. in each.)
 Troch. Opii. (Extract of Opium $\frac{1}{10}$ gr. in each.)
 Troch. Potassii Chloratis. (5 grains in each.)
 Troch. Santonini. (Santonin, 1 grain in each.)
 Troch. Sulphuris. (Precipitated Sulphur, 5 grains, Cream of Tartar, 1 grain in each.)
 Troch. Sodii Bicarbonatis. (5 grains in each.)

Tabellæ Nitro-glycerini.

These are the only official "Tablets." They are made of chocolate; each weighs about $2\frac{1}{2}$ grains and contains $\frac{1}{100}$ gr. pure nitro-glycerine. (See also Liq. Trinitrinae, p. 33.) *Dose*, 1 to 2 tablets.

VIII.—THE OFFICIAL OILS AND SOAPS.

Olea. Oils. (Oleum, i. *second decl., neuter.*)

In the official list there are both *fixed* and *volatile* oils.

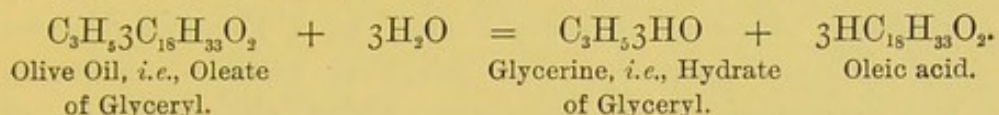
Fixed Oils.

These are distinguished by their non-volatile character. They do not rise in vapour when heated and consequently cannot be distilled. They are contained in various vegetable and animal tissues and are obtained from these by expression. The extraction is sometimes aided by the application of heat. This secures the fluidity of the oil and so makes its expulsion more easy. Most of them are bland, greasy, fluids with little or no odour. They are insoluble

in water and as a rule also in alcohol (Castor and Croton Oils are exceptions). Ether and chloroform dissolve them freely. The specific gravity is less than that of water. Consequently the fixed oils rise to the surface when mixed with that fluid.

In their chemical constitution, the Fixed Oils may be regarded as formed by the union of a fatty acid (oleic, stearic, palmitic), with a compound basylous radical—usually glyceryl (C_3H_5)". Thus, olive oil is mainly *Oleine*, *i.e.*, Oleate of Glyceryl ($C_3H_5_3C_{18}H_{33}O_2$). *Stearine* (Stearate of Glyceryl) and *Palmitine* (Palmitate of Glyceryl) are solid at ordinary temperatures; they are the main constituents of the solid or concrete oils—the *fats*.

By subjecting a fixed oil or melted fat to the action of steam heated to 500° F. or 600° F., a separation of the glyceryl from the fatty acids is effected, and glycerine ($C_3H_5_3HO$) is formed.



In this way the official *Glycerinum*, and the official *Acidum Oleicum*, may be obtained. The superheated steam is driven through olive oil. The oil is thus decomposed, and the acid and glycerine are both carried with the steam into a receiver. The glycerine is dissolved in the water. The insoluble acid floats on the surface. It is collected and purified. From it are made the official *Oleatum Hydrargyri* and *Oleatum Zinci*. (See p. 97.)

Fixed oils and fats can also be decomposed by acting on them with an alkali or other metallic hydrate or oxide. The fatty acids combine with the metal to form soaps. Glycerine is the other product of the reaction (see Soaps, p. 64.) The process is termed *saponification*.

The following are the official fixed oils:

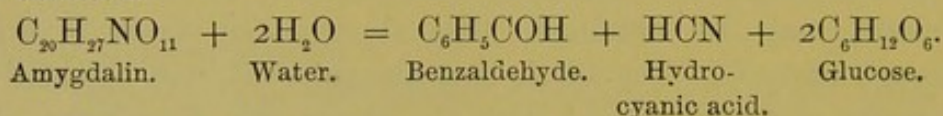
Oleum Amygdalæ. Almond Oil. *Syn.*, Oil of Sweet Almonds.

A bland, pale yellow, nearly inodorous fluid, obtained by expression from bitter or sweet almond. It must be carefully distinguished from

ESSENTIAL OIL OF ALMONDS. *Syn.*, Oil of Bitter Almonds.

This is a *non-official, volatile* oil, obtained by distilling

bitter almonds with water. The oil does not exist preformed in the almonds, but results from chemical action. The bitter almond contains a glucoside*—*amygdalin*—and a nitrogenous ferment, *emulsin* or *synaptase*. When the Almond is bruised in the presence of water, the amygdalin, under the influence of the emulsin, splits up, and the volatile oil of almonds, hydrocyanic acid, and glucose are formed. (See also Aqua Laurocerasi, p. 13.) The *sweet* almond contains emulsin, but no amygdalin. Hence it does not yield any volatile oil. The student will notice that both bitter and sweet almonds contain and yield the bland, innocuous, official, fixed oil. The essential oil of almonds has a powerful and characteristic odour. Freed from hydrocyanic acid, and dissolved in S.V.R., it forms the *Essence of Bitter Almonds* or *Ratafia* used as a flavouring agent for culinary purposes. The following reaction represents the decomposition of *amygdalin* under the influence of *emulsin*.



Oleum Olivæ. Olive Oil.

Expressed from the ripe fruit of the Olive (*Olea Europæa*.)

Oleum Myristicæ Expressum. *Syn.*, Myristicæ Adeps.

Is obtained by expression and heat from nutmeg. It is of firm consistence, orange yellow in colour, and has a fragrant odour. The odour is due to the volatile oil. Nutmeg contains both fixed (concrete) and volatile oils. When subjected to pressure, both are expelled and form the official "expressed oil."

Oleum Theobromatis. Cacao Butter.

A concrete oil obtained by expression and heat from the seeds of *Theobroma Cacao*. It is firm at the ordinary temperature, does not become rancid on exposure, and readily melts at the temperature of the body. Hence its value as a basis for suppositories (see p. 67.) This is its chief use in pharmacy. The seeds of the *Theobroma Cacao* roasted, and coarsely

* See Appendix III.

broken, are known as *Cocoa Nibs*. Reduced to fine powder and the greater part of the oil expelled, they form *cocoa*. Mixed with a large proportion of sugar they form *chocolate*. *Cacao Butter* must not be confounded with *Cocoa-nut Oil* or *Butter*. This is a soft fat, sometimes used medicinally, though not described in the B. P. It is expressed from the edible portion of the common cocoa-nut, the seed of the Cocoa-nut Palm (*Cocos nucifera*).

Oleum Lini. Linseed Oil.

Expressed in Britain from the dried ripe seeds of *Linum usitatissimum*. The residue left after expression of the fixed oil from linseed is known as "Oil-cake" or "Linseed-cake." It is largely used for feeding cattle. It must not be confounded with the official *Farina Lini* (Linseed Meal.) This is simply linseed reduced to powder and therefore contains the fixed oil. The presence of the fixed oil renders the meal more suitable for making poultices. It increases the emollient properties of the poultice. In the B. P. 1867, it was the ground linseed-cake which was official under the name *Farina Lini*, and hence, in making a poultice with this, a little olive oil was added. This is now unnecessary, because the official *Linseed Meal* contains the natural fixed oil.

Linseed oil is one of the group of fixed oils known as "drying oils." This name is applied, because, on exposure, the oils absorb oxygen and harden into varnishes. Hence their value for mixing with pigments to be used as paints. "Boiled oil" is linseed oil which has been boiled with oxide of lead. This increases its tendency to "dry." Cod Liver Oil is a "drying" oil. Castor Oil and Croton Oil are also "drying" to some extent. "Non-drying oils" on exposure tend to become rancid and acquire an acid reaction.

Oleum Ricini. Castor oil.

Expressed from the seeds of *Ricinus communis*. It differs from most fixed oils in being soluble in alcohol. "Cold Drawn Castor Oil" is oil expressed without the aid of heat. *Dose*, 1 to 8 fl. drachms. From it is made *Mistura Olei Ricini*. (See p. 38.)

Oleum Crotonis. Croton Oil. *Syn.*, Oleum Tiglii.

Expressed in Britain from the seeds of *Croton Tiglium*. This also is soluble in alcohol. Applied to the skin it produces pustules. It is used internally as a prompt and powerful purgative. *Dose*, $\frac{1}{3}$ to 1 min. From it is prepared *Linimentum Crotonis*. (See p. 83.)

Oleum Morrhuæ. Cod-liver Oil.

Extracted from the fresh liver of the cod—*Gadus Morrhua*. Heat is employed during the process, but the temperature should not exceed 180° F. A higher temperature might provoke decomposition. Some manufacturers cool down the oil, after it has been extracted, to 50° F. or 60° F. This causes a deposit of the more solid fats. The oil is then drawn off and will remain clear and fluid in cold weather. Cod-liver Oil contains traces of iodides and also a substance apparently allied to the biliary acids. *Test*: A drop of H₂SO₄ added to a few drops of the oil on a porcelain slab gives a violet colour, which soon becomes yellowish or brownish-red (Pettenkofer's test for Bile Acids). *Dose*, 1 to 8 fl. drachms.

Oleum Phosphoratum. Phosphorated Oil.

This is a 1 per cent. solution of Phosphorus in Almond Oil. The oil is first heated to 300° F., to drive off any water present and to coagulate albuminous matter. The coagulated albumen is separated by filtration. The Phosphorus is then dissolved in the purified oil by the aid of a very gentle heat. *Dose*, 5 to 10 min.

There are several other official substances which are fixed oils or fats, though not classified with the oils in the B. P. These will now be enumerated.

EXTRACT. FILICIS LIQUIDUM. Is the fixed oil of the rhizome of Male Fern extracted by means of Ether. (See p. 46.)

ADEPS PRÆPARATUS.* Lard. A mixture of oleine and stearine.

SEVUM PRÆPARATUM.* Suet. Principally stearine.

ADEPS LANÆ.* Wool Fat. This, when saponified, yields, not glycerine, but cholesterine. Mixed with 30 per cent. of water it forms "lanoline" (*Adeps Lanæ Hydrosus*, B. P.).

* See pp. 92-93.

CETACEUM. Spermaceti. This is a solid fat obtained from the head of the Sperm Whale (*Physeter Macrocephalus*). It is separated from the oil (sperm oil) by filtration and pressure. In spermaceti, palmitic acid is combined with the radical Cetyl.

CERA FLAVA.* Yellow Wax.

CERA ALBA.* White Wax.

In yellow and white wax the radical Glyceryl is replaced by Ceryl.

The student is reminded of the fact, that the mineral fats (Hard and Soft Paraffins†) have an entirely different chemical constitution from that possessed by fats of animal and vegetable origin. The mineral fats are members of the Paraffin series of Hydrocarbons. They do not yield soaps when treated with alkalies.

Volatile Oils.

These exist in various plants. The odour and medicinal properties of many plants largely depend on their presence. Hence volatile oils are often called *Essential Oils*. They are obtained from their natural sources, usually by distillation with water. The plant is bruised and heated with water in a still. The volatile oil passes over, together with aqueous vapour, and is condensed. There collects in the receiver a saturated aqueous solution of the volatile oil (see B. P. Aquæ, p. 12), and excess of oil. This excess usually floats on the surface of the water and can be removed by some appropriate mechanical contrivance, *e.g.*, a pipette, siphon, separating funnel, etc. The oils of *Cinnamon*, *Cloves*, and *Pimento* are heavier than water and therefore collect in the lower part of the receiver. The process, it will be observed, is similar to that employed in making the official Distilled Waters. The only difference is that, when the volatile oil is specially required, a comparatively small quantity of water is placed in the still, whilst if an "aqua" is needed, a volume of water sufficient to dissolve nearly the whole of the oil is used. The use of water has two advantages. If heat were applied directly to the vegetable tissue, this would be decomposed, and various volatile products would pass over into the receiver. The water protects

* See p. 93.

† See p. 92.

the organic (vegetable) material from the direct attack of the heat. Again, it is very desirable to separate the volatile oils without exposing them to high temperatures. High temperatures are apt to induce chemical changes. The boiling point of most volatile oils is between 300° F. and 400° F. But, in the presence of water, they distil over at a temperature of 212° F. The diffusion of the vapour of the less volatile oil through the vapour of the more volatile water secures the carrying over of the oil at a temperature far below its boiling point. Hence the risk of chemical change is diminished. As a rule, the oils distilled in Britain are much superior to the imported varieties. The B. P. orders most of the official volatile oils to be "distilled in Britain."

The volatile oils, existing as most of them do preformed in plants, could of course be separated by expression. But it is easier to obtain them free from impurity by the above method. Moreover, the distilled volatile oils have generally a finer aroma than those which are expressed. The volatile Oil of Lemon is an exception to this rule.

The volatile oils are fluids with marked and characteristic odours. Most of them are light in colour when recently prepared, but darken when kept. They are slightly soluble in water (see B. P., *Aquæ*, p. 12.) S.V.R. dissolves them freely (see B. P. *Spiritus* and *Essentiæ*, p. 19.) They are also soluble in ether and in fixed oils.

Most volatile oils as found in commerce are mixtures of liquid hydrocarbons and oxidised hydrocarbons. The liquid hydrocarbons are termed *elæoptenes*. They readily become oxidised and, as a rule, the oxidised hydrocarbons are solid camphor-like bodies known as *stearoptenes*. These are sometimes deposited from the volatile oils, more especially in cold weather. Further oxidation converts the volatile oils into resins. Hence the frequency with which volatile oils and resins are associated in plants as *Oleo-resins*. (See pp. 37-38.) The same tendency explains the necessity for keeping volatile oils well protected from the atmosphere. Otherwise, not only will there be loss of oil by evaporation, but the oil will undergo chemical change. It will also lose, to a greater or less extent, its distinctive odour and acquire the smell of Oil of Turpentine.

The chief differences between fixed and volatile oils may now be conveniently summarised :

Fixed Oils.

1. Obtained by expression.
2. Cannot be distilled (*i.e.*, without decomposition.)
3. Stain on paper permanent.
4. Odour slight.
5. Insoluble in water.
6. Insoluble in alcohol (as a rule).
7. Consist of fatty acids in combination with a compound basylous radical—usually Glyceryl.
8. Yield soaps when decomposed by alkalies.

Volatile Oils.

1. Obtained by distillation (generally).
2. Can be readily distilled.
3. Stain on paper evaporates on drying.
4. Odour marked and distinctive.
5. Slightly soluble in water.
6. Freely soluble in alcohol.
7. Are hydrocarbons, or oxidised hydrocarbons.
8. Cannot be saponified.

The following are the **Official Volatile Oils**, with the names of the plants yielding them :

From fruits :

Ol. Anethi. *Peucedanum graveolens*, (Umbelliferæ).

Ol. Anisi. *Pimpinella Anisum*, (Umbelliferæ); also from *Illicium Anisatum*, Star Anise, (Magnoliaceæ).

The Star Anise is cultivated in China.

Oil of Anise enters into *Tr. Camphoræ Co.*, and *Tr. Opii Ammoniata*.

Ol. Carui. *Carum Carui*, (Umbelliferæ).

Ol. Coriandri. *Coriandrum sativum*, (Umbelliferæ).

Ol. Cubebæ. *Piper Cubeba*, (Piperaceæ).

Ol. Juniperi. *Juniperus communis*, (Coniferæ).

Ol. Pimentæ. *Pimenta officinalis*, (Myrtaceæ).

From leaves :

Ol. Cajuputi. *Melaleuca minor*, (Myrtaceæ). Imported from the East Indies. Has a pale bluish-green colour and a strong camphoraceous odour. It enters into *Lin. Crotonis* (p. 83).

Ol. Eucalypti. *Eucalyptus globulus*, etc., (Myrtaceæ). Imported from Australia.

Ol. Pini Sylvestris. Fir-wool Oil. *Pinus Sylvestris* (Coniferæ). Used with hot water as an inhalation. (See p. 69.)

From flowers :

- Ol. Anthemidis. *Anthemis nobilis*, (Compositæ).
 Ol. Lavandulæ. *Lavandula vera*, (Labiatae).
 Ol. Rosmarini. *Rosmarinus officinalis*, (Labiatae).

From fresh herbs :

- Ol. Menthæ Piperitæ. *Mentha piperita*, (Labiatae).
 On cooling yields a stearoptene, viz., *Menthol*, B. P.
 Ol. Menthæ Viridis. *Mentha Viridis*, (Labiatae).
 Ol. Rutæ. *Ruta gravecolens*, (Rutaceæ.)

The remainder are :

- Ol. Caryophylli. From the flower-bud (clove) of *Eugenia caryophyllata*, (Myrtaceæ).
 Ol. Cinnamomi. From the bark of *Cinnamomum Zeylanicum*, (Lauraceæ).
 Ol. Copaibæ. From the oleo-resin, (Copaiba).
 Ol. Limonis. From the fresh peel of *Citrus Limonum*, (Aurantiaceæ).
 This is not usually obtained by distillation, but is separated from the peel by some mechanical means.
 Ol. Myristicæ. From the seed kernel (Nutmeg) of *Myristica fragrans*, (Myristicaceæ).
 This must be distinguished from the *expressed oil*, which is a mixture of fixed and volatile oils. (See p. 54.)
 Ol. Sabinæ. From the fresh tops of *Juniperus Sabina*, (Coniferæ).
 Ol. Santali. Oil of Sandal Wood. From the wood of *Santalum album*, (Santalaceæ).
 Must not be confounded with Red Sandal-wood which is derived from *Pterocarpus santalinus* (Leguminosæ).

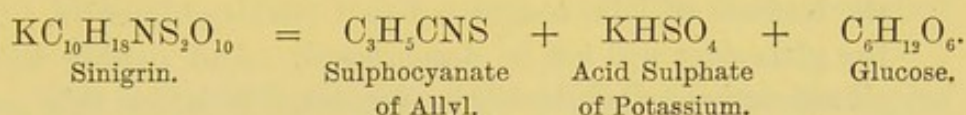
The following three demand more special notice :—

Oleum Sinapis. Oil of Mustard.

This is the volatile oil distilled with water from the seeds of Black Mustard (*Brassica nigra*—*Cruciferae*), after the expression of the fixed oil.

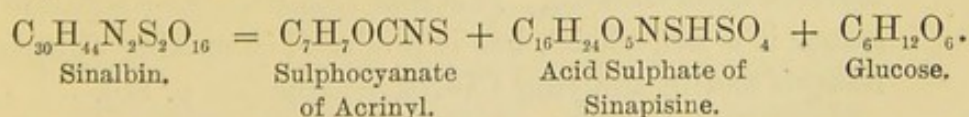
Both black and white mustard seeds contain a considerable percentage of a bland fixed oil. This may be obtained by expression. It is not official.

Neither variety of seeds contains any volatile oil. Hence the dry powdered mustard seeds are free from odour. When, however, black mustard seeds are treated with water, a very pungent and penetrating odour is produced. This is due to the formation of a volatile oil—the volatile oil of mustard—which results from a chemical reaction between two of the constituents of the black mustard seeds. One of these is a glucoside, or rather a compound formed by the union of potassium with an acid glucoside. It is known as *sinigrin*. The other is a ferment *myrosin*. The reaction between these two substances only occurs in the presence of water. One of the products of the reaction is the official *Oleum Sinapis*. It is a colourless or pale yellow, volatile liquid, with a burning taste, and a pungent odour. Applied to the skin it almost instantly produces blisters. It is therefore a *vesicating agent*. The reaction by which it is produced is as follows :



White mustard seeds, when treated with water, yield a paste or fluid with a sharp taste, but without odour. The sharp taste is due to an oily, *non-volatile* fluid, which also possesses vesicating properties, though to a less extent than the volatile oil yielded by black mustard seeds. Further, like the last-mentioned substance, it does not exist preformed in the seed, but is a product of the action of the ferment *myrosin* upon a glucoside *sinalbin*. In the presence of water the *myrosin* causes the *sinalbin* to break up. One of the results of this decomposition is an oily, non-volatile liquid, possessing a sharp taste and known as *sinalbin-mustard-oil*. It is not official.

The decomposition of *sinalbin* under the influence of *myrosin* is as follows :



The amount of the ferment *myrosin* in the black mustard seeds is insufficient to decompose all the contained *sinigrin*.

In the white mustard seeds, on the other hand, there is excess of ferment. Hence the B. P. *Sinapis*, as well as ordinary "mustards," are a mixture of the ground seeds of both black and white mustard. When mixed with water, the excess of ferment in the "white" compensates for the deficiency of ferment in the "black." A more complete decomposition of the *sinigrin* therefore results, and a larger amount of the volatile oil is necessarily produced. In such a mixture too there is both the volatile oil of mustard and also the non-volatile sinalbin-mustard-oil. A mixture of the two seeds, therefore, forms a more active "mustard" than the powdered seed of either variety alone.

It has already been stated that the action of the *myrosin* upon the glucoside—both in black and white mustard seeds—is exerted only in the presence of water. It must further be noted that the action of the ferment is most effective at a temperature not exceeding 100° F. If hot water is employed, the ferment will be coagulated and rendered inactive. Thus the glucosides will not be decomposed. And neither volatile oil nor active principle will be formed. It is for this reason that in making Mustard Poultice (*Cataplasma Sinapis*, B. P.) the mustard is ordered to be mixed with lukewarm, not with boiling water (see p. 89.) The facts with relation to the oily fluids yielded by mustard may now be conveniently summarised. There are three such fluids, viz. :

FIXED OIL. Exists in both black and white mustard seeds and may be obtained on expression. It is not official.

VOLATILE OIL. Obtained from black mustard seeds (after expression of the fixed oil) by treating these with water and then distilling. It results from the action of *myrosin* upon *sinigrin*. It is the official *Oleum Sinapis*.

SINALBIN-MUSTARD-OIL. Is produced, when white mustard seeds are treated with water, as a result of the action of *myrosin* upon *sinalbin*. It is non-volatile. As a separate substance it is not official, but is produced in making *Cataplasma Sinapis* and in applying *Charta Sinapis* (see p. 89).

Oleum Terebinthinæ. Oil of Turpentine.

This official volatile oil is known familiarly as Turpentine,

Spirit of Turpentine, and "Turps." It is obtained by distilling the natural oleo-resin (turpentine) yielded by certain coniferous trees, such as *Pinus australis*, *Pinus Tæda*, etc. The volatile oil passes over. The residue is the well-known common resin or "rosin." It is official under the name *Resina*. The oil is usually purified by rectification. It is redistilled, after being mixed with an alkali to neutralise any resinous acids that may be present. It is imported from America, Russia, and France.

Oil of Turpentine may be regarded as the type of the elæoptenes. It has the formula $C_{10}H_{16}$. It is given internally in doses of 10 to 30 min., or, as an anthelmintic,* from 2 to 4 fl. drachms. The following are the official preparations:

Confectio Terebinthinæ.

Linimentum Terebinthinæ.

Enema Terebinthinæ.

Lin. Terebinthinæ Aceticum.

Unguentum Terebinthinæ.

Oleum Cadinum. Oil of Cade. *Syn.*, Huile de Cade; Juniper Tar Oil.

This is an oily liquid produced by the destructive distillation of the woody portions of *Juniperus oxycedrus* (Coniferæ). It is a dark, reddish-brown, oily liquid, with an odour like tar. It contains creasote, phenol, etc. Applied as an ointment, it has long been valued in the treatment of various chronic skin diseases. It was made official in the Additions to the B. P. (1890).

The student may associate with the volatile oils named as such in the B. P., three official stearoptenes, or concrete volatile oils, viz.:

CAMPHORA. This is obtained by boiling the wood of the *Cinnamomum Camphora* (Lauraceæ) with water. It is imported from China, Japan, and the East Indies, and is purified by sublimation in Britain. *Dose*, 1 to 5 grains.

MENTHOL. Is deposited on cooling the volatile Oil of Peppermint. *Dose*, $\frac{1}{2}$ to 2 grains.

THYMOL. This can be obtained by cooling the volatile oil of *Thymus vulgaris* (Labiatae). *Dose*, $\frac{1}{2}$ to 2 grains.

* *Anthelmintics* are remedies used to remove or destroy intestinal worms. Oil of Turpentine may be given with Castor Oil to patients suffering from tape-worm.

Here may also be placed the official preparation known as

Oleo-Resina Cubebæ.

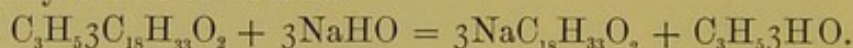
In the B. P. there are several oleo-resins which are natural exudations from plants. These have already been enumerated. (See p. 38.) The *Oleo-Resina Cubebæ* is obtained from Cubebs by exhausting the fruit with ether. The ethereal solution is evaporated, and the residue put aside to allow waxy matter, etc., to deposit. Then the oleo-resin is decanted. *Dose*, 5 to 30 min.

Sapo. Soap. (*Sapo, onis. third decl., masculine.*)

A soap may be defined as a substance formed by the union of a fatty acid with a metal or base (see Fixed Oils, p. 53). There are three official "soaps."

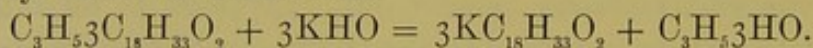
Sapo Durus. Hard Soap. *Syn.*, White Castile Soap.

This is made with Olive Oil and Caustic Soda. It is mainly Oleate of Sodium.



Sapo Mollis. Soft Soap.

This is made with Olive Oil and Caustic Potash. It is mainly Oleate of Potassium.



Sapo Animalis. Curd Soap.

This is made with a purified animal fat and Caustic Soda. It is mainly Stearate of Sodium.

In making these soaps the alkali and fat are boiled together. The soap is separated from the water and glycerine by the addition of common salt. This precipitates the soap in the form of a curd.

Soaps are also formed in making the following official preparations:

* Emplastrum Plumbi (Oleate of Lead).

† Linimentum Ammoniacæ (Oleate of Ammonium).

† Linimentum Calcis (Oleate of Calcium).

† Linimentum Hydrargyri (Oleate of Mercury).

‡ Oleatum Hydrargyri (Oleate of Mercury).

‡ Oleatum Zinci (Oleate of Zinc).

* See p. 86.

† See pp. 82-83.

‡ See p. 97.

Mucilagines. Mucilages. (*Mucilago, inis. third decl., feminine.*)

These are thick, viscid fluids. They contain gum or other colloid material dissolved in, or diffused through water. They are principally used to emulsify oils and resins and to suspend insoluble powders. In the B. P. there are three, viz. :

Mucilago Acaciæ. Gum Acacia dissolved in Distilled Water.

Gum Acacia consists principally of a soluble gum termed *Arabin*. With water it forms a clear but viscid solution. The gum is used in the B. P. to emulsify fixed oil (*Mist. Amygdalæ*) and resin (*Mist. Guaiaci*). In *Mist. Cretæ* it suspends the insoluble prepared chalk. The Mucilage is used to make the B. P. *Trochisci*. It may be employed to administer fixed oils (*e.g., Extract. Filicis Liquidum*), and resinous tinctures, as emulsions; it is also used as a pill-excipient.

Mucilago Tragacanthæ. Tragacanth, in powder, mixed with a little S.V.R., and then agitated with Distilled Water. Tragacanth consists partly of *Arabin*, and partly of a gum named *Bassorin*. The latter is insoluble in water but swells up when mixed with that fluid to form a very viscid mucilage. If water is added directly to powdered Tragacanth, the powder runs into little masses which are not easily diffused through the fluid. The S.V.R. keeps the particles of the gum from thus running together. Hence, their diffusion through the water and the formation of a satisfactory mucilage are promoted. Mucilage of Tragacanth is used to suspend heavy, insoluble powders—*e.g., Carbonate and Subnitrate of Bismuth*.

Mucilago Amyli. Starch boiled for a few minutes with Distilled Water. The heat is necessary to rupture the hard envelope of the starch granules. This allows the more soluble material to escape into, and swell up in the water. The Mucilage of Starch is the vehicle for all the official *Enemata* except *Enema Asafœtidæ*. (See p. 66.)

IX.—THE ENEMAS AND SUPPOSITORIES.

These preparations are administered *per rectum*.

Enemata. Enemas. (*Enema, atis. third decl., neuter.*)

These preparations contain some medicinal agent dissolved or suspended in a mucilaginous fluid. They were formerly termed *Clysters*. Sometimes they are spoken of as *Injections*. They are introduced into the rectum by means of a syringe. The majority of them have a purgative action; they excite contractions of the intestinal muscular fibre. This effect is due, partly to the specific action of the medicinal ingredients, partly to the bulk of the enema. Water alone, if introduced in sufficient quantity (say 2 or 3 pints), will act as a purgative enema. It is a common practice to add a little soap to the water. When it is desired that an enema be retained, the volume should not exceed 2 or 3 ounces. Nutrient materials may be administered in the form of an enema.

The official "Enemata" are five in number. The vehicle is mucilage of starch except in the case of *Enema Asafœtidæ*, in which water is the vehicle. The gum of the asafœtida dissolves in the water and suspends the insoluble resin. An emulsion is thereby formed. The quantities mentioned in the B. P. are intended for a single administration.

The following are official in the B.P. :

Enema Aloes. Aloes, 40 grs., Carbonate of Potassium, 15 grs.,
Starch Mucilage, 10 ounces.

The Potass. Carb. promotes the solution of the resin of the Aloes.

Enema Magnesii Sulphatis. Epsom Salts, 1 oz., Olive oil, 1 oz.,
Starch Mucilage, 15 ounces.

Enema Terebinthinæ. Oil of Turpentine, 1 oz., Starch Mucilage,
15 ounces.

Enema Asafœtidæ. Asafœtida, 30 grs., Distilled Water, 4 ounces.

Enema Opii. Tincture of Opium, $\frac{1}{2}$ fl. drachm, Starch Mucilage,
2 ounces.

Suppositoria. Suppositories. (*Suppositorium, ii. second decl., neuter.*)

In these preparations medicinal agents are mixed with some solid basis which readily melts at the temperature of the body. They are small, conical or bullet-shaped masses, each weighing as a rule about 15 grains. At the ordinary temperature they are sufficiently firm to permit their ready introduction through the *sphincter ani*. Some are employed to produce a local effect on the rectal mucous membrane. In others, it is desired that absorption of the medicinal ingredients shall occur. Suppositories containing nutrient materials may be used when food cannot be administered by the stomach.

The B. P. Suppositories are as follows :

In five the basis is Oil of Theobroma.

Supposit. Acidi Tannici. (3 grs. in each.)

Supposit. Hydrargyri. (5 grs. Mercurial Ointment in each.)

Supposit. Iodoformi. (3 grs. in each.)

Supposit. Morphinae. ($\frac{1}{2}$ gr. Morphine Hydrochlorate in each.)

Supposit. Plumbi Co. (3 grs. Lead Acetate, and 1 gr. Opium in each.)

In three the basis is a mixture of Glycerine of Starch and Curd Soap.

Supposit. Acidi Carbolici cum Sapone. (1 gr. in each.)

Supposit. Acidi Tannici cum Sapone. (3 grs. in each.)

Supposit. Morphinae cum Sapone. ($\frac{1}{2}$ gr. Morphine Hydrochlorate in each.)

In one the basis is Gelatine.

Supposit. Glycerini. (70 per cent. of Glycerine.)

This causes prompt evacuation of the rectum. One or two drachms of glycerine may be used as an enema for the same purpose.

Pessaries are similar in their nature to suppositories. They are of larger size and are for introduction into the vagina. They are used to obtain some local effect. There are no official formulæ.

Bougies are similar preparations. They are slender rods several inches in length. They are introduced into the male urethra. Iodoform is frequently applied in this way. There are none official.

X. THE INHALATIONS, DISCS, AND HYPO- DERMIC INJECTIONS.

These preparations require special methods of application. The *inhālations* are applied in the form of vapour to the respiratory tract. The *discs* are placed on the conjunctival mucous membrane. The *hypodermic injections* are introduced into the subcutaneous tissue by means of a special syringe.

Vapores. Inhalations. (Vapor, oris. *third decl., masculine.*)

These are preparations intended to be applied in the form of vapour to the respiratory passages. They are used by means of an *Inhaler*. The medicinal agent, if highly volatile, is mixed with cold water, and the vapour which arises is inhaled. When less volatile, the temperature of the water is raised. Again, the apparatus may be so arranged that air may be drawn through the solution containing the drug and then inhaled. Or the medicinal agent may be dropped on a sponge placed in the mouth of the inhaler. Then the patient by an act of inspiration draws steam through the sponge. The steam thus becomes charged with the medicine. Non-volatile materials may be driven into the pharynx, larynx, etc., by means of a spray-producing apparatus. In Seigel's inhaler the spray is a jet of steam which carries mechanically mixed with it the non-volatile drug. The active ingredients of the B. P. inhalations are all volatile. Both they, and inhalations generally, are used for the sake of some local action on the pharyngeal and neighbouring mucous membranes. But volatile medicines, unless too irritating, may be inhaled in order to secure the absorption of the medicine and its action upon the body generally. Chloroform, ether, nitrous oxide gas, nitrite of amyl, etc., are constantly administered in this way.

The following are the B. P. Inhalations :

Vapor Acidi Hydrocyanici. 10 to 15 min. of the dilute acid with cold water.

Vapor Chlori. The vapour that arises from moistened chlorinated lime.

Vapor Iodi. Tincture of Iodine, 1 fl. drachm ; Water, 1 fl. ounce. Apply a gentle heat.

Vapor Creasoti. Creasote, 12 min., with Boiling Water, 8 fl. ounces.

Vapor Olei Pini Sylvestris. Fir-wool Oil diffused through water by means of light carbonate of magnesium and added to hot water.

Vapor Coninæ. Mix Hemlock Juice with Solution of Potash and water, and place a few drops on the sponge of an inhaler.

Hemlock contains a volatile, liquid alkaloid—*Conine*—combined with an organic acid. The caustic alkali decomposes the alkaloidal salt and sets free the volatile alkaloid. (See Appendix III.)

Hydrocyanic Acid and *Chlorine* are so highly volatile that no heat is required. *Iodine* needs merely a gentle heat. The inhalations of *Creasote* and *Fir-wool Oil* are inhaled by drawing air through the solutions. The volatile *Conine* is carried by the steam arising from hot water as this passes through the sponge in the mouth of the inhaler.

Lamellæ. Discs. (*Lamella, æ. first decl., feminine.*)

These are minute medicated discs, each weighing about $\frac{1}{30}$ grain. The basis is gelatine, with some glycerine. They are intended to be placed in the conjunctival sac in order to produce a local effect on the eyeball. The method of application is as follows: Direct the patient to look upwards; draw down the lower eyelid; then take up the disc by means of a camel-hair brush and apply it to the lower part of the eyeball. In the B. P. there are three *Lamellæ*, viz.:

Lamellæ Atropinæ. Sulphate of Atropine, $\frac{1}{5000}$ grain in each. Used to dilate the pupil.

Lamellæ Physostigminæ. Physostigmine (*Eserine*), $\frac{1}{1000}$ grain in each. Used to contract the pupil.

Lamellæ Cocainæ. Hydrochlorate of Cocaine, $\frac{1}{200}$ grain in each. Cocaine is a local anæsthetic. It renders it possible for the surgeon to perform operations without causing pain. It also dilates the pupil.

Injectiones Hypodermicæ. Hypodermic Injections.
(*Injectio, onis. third decl., feminine.*)

These are solutions of powerful medicines intended to be introduced into the subcutaneous tissue by means of a *hypodermic syringe*. This is a small graduated syringe, the nozzle of which consists of a hollow needle. It is used in the following manner: The required dose of the injection is drawn into the syringe. The physician then nips up a fold of skin between the thumb and index finger of his left hand. Into the base of this he plunges the needle, and gradually presses home the piston. He then withdraws the needle, and places his finger over the puncture for a minute or two to prevent escape of the fluid. The advantages of this method of medication, as compared with administration by the stomach, are several. A smaller dose is required. The medicine is more rapidly absorbed, and its action consequently more prompt. It may be used when the patient is unconscious, or when the stomach will not retain or permit the absorption of medicines. Risk of decomposition of the medicine by admixture with the contents of the stomach is avoided. And the physician is certain that the medicine has been administered, for he himself gives it. To be set against these advantages are the slight pain which the puncture causes, and the risk of irritation at the site of application. A sharp needle used with a prompt and steady hand will mean but little pain.* Irritation (abscess, etc.) may be avoided by scrupulous cleanliness of the syringe. The solutions too should be freshly prepared and free from solid particles. Small tabloids, each containing a known dose of an alkaloid or other active medicinal agent, are now largely used. They are dissolved when required. The risk of decomposition, which so readily occurs in solutions of the alkaloids

* It is sometimes recommended, if the patient is very sensitive, to deaden sensation by freezing the skin with ice or ether; these methods however cause decidedly more discomfort than the mere prick of the hypodermic needle.

when kept for any time, is thus obviated. Another recognised danger attending the practice of hypodermic injection is the puncture of a vein. The entire dose may thus be suddenly introduced into the blood. To avoid this, the syringe, after its insertion, should be withdrawn for about an eighth of an inch. If by chance the point has entered a vein, it is in this way removed from the interior of the vessel into the surrounding cellular tissue.

The injection may be made at any point on the surface of the body. But convenient situations are the outer side of the arm, the forearm, or the thigh. It is recommended in the case of *Ergotine* to drive the needle into the substance of a muscle—*e.g.*, the *gluteus maximus*. Injected under the skin it sometimes leads to the formation of dark, hard, unsightly lumps. *Strychnine* is sometimes administered in the same way. This method of using the syringe is termed the *parenchymatous* method. The practice of hypodermic medication was introduced by the late Dr. Alexander Wood of Edinburgh.

A large number of medicines are in practice employed in the form of hypodermic injections, but there are only three official formulæ, viz. :

Injectio Apomorphinæ Hypodermica.

Hydrochlorate of Apomorphine in Camphor Water. 1 in 50.
Dose, 2 to 8 min.

Apomorphine is a prompt and powerful emetic.

This preparation becomes of a green colour when kept for a time, but its efficacy remains unimpaired.

Injectio Ergotini Hypodermica.

Ergotin in Camphor Water. 1 in 3. *Dose*, 3 to 10 min.

It is used to check hæmorrhage from the smaller arteries, and to produce contraction of the uterus. It stimulates the unstriated muscle of these organs.

Note.—The Camphor assists in the preservation of these solutions. S.V.R. would be too irritating. (See also *Liq. Atropinæ Sulphatis*. p. 32.)

Injectio Morphinæ Hypodermica.

Freshly prepared Acetate of Morphine in Distilled Water.
1 in 10. *Dose*, 1 to 5 min.

Used to allay pain and produce sleep.

XI.—THE OFFICIAL POWDERS AND PILLS.

The majority of these are *compound* preparations. They contain two or more active ingredients. As a rule, the association of the ingredients has in each case been a long-established custom with prescribers. It is therefore convenient to have official recognition of this custom in the Pharmacopœia. The time and memory of the physician are both economised by it. For, instead of writing in the prescription the name of each ingredient, he has only to express the name of the official compound preparation. Thus, "Pulvis Opii Co." means to every pharmacist a mixture of certain proportions of five drugs as enumerated in the B. P. It will be sufficient for the physician to remember the proportion of the active ingredient, and merely the names of those of secondary importance. Further, as many of these compound preparations are frequently prescribed, it is the custom for pharmacists to keep them ready prepared. They can therefore be promptly supplied when required. If there were no official formula, the physician could not order (say) "Pulv. Opii Co.," because there would be no statement in the B. P. to interpret this phrase to the pharmacist. And of course the pharmacist could not keep any such preparation in stock. He would have to wait for the full and detailed directions of each prescription, and this would necessarily involve some delay in dispensing. These remarks may be extended to *compound* preparations generally. Again, though it is by no means the purpose of the Pharmacopœia to teach Therapeutics, the association of medicines in official compound preparations does usefully suggest to prescribers certain combinations of remedies. The physician may at least depend upon the fact that such combinations have been so generally used as to necessitate their admission to the national Pharmacopœia. He will therefore reasonably conclude that such preparations are useful forms in which to prescribe these medicines. Indeed, all the official preparations teach the same lesson. As a result partly of the clinical observations of physicians, partly of the experiments of pharmacists, it has been determined in what forms the various medicinal agents are best administered. These forms are the official preparations. This is one of the reasons why the physician should make himself familiar with the various simple and compound preparations which the B. P. describes. The mere manufacturing details he may leave to the pharmacist.

Pulveres. Powders. (*Pulvis, eris. third decl., masculine.*)

The official Powders are mixtures of finely powdered medicinal materials. Nearly all of them are of vegetable origin. The method of preparation is extremely simple. The ingredients are first reduced to fine powder. They are then thoroughly mixed. The mixture is now passed through a fine sieve, by which means any "knots" are detected and may be broken down. The sifted product is then rubbed lightly in a mortar. The last step is necessary because the sieve may cause partial separation of the ingredients. This separation may be due to the fact that the various drugs are not all in equally fine powder. And the finer particles will pass through the sieve more readily than the coarser particles. Again, if one or more "knots" of one of the ingredients has been broken down on the sieve, this will mean unequal diffusion of the particular ingredient through the mixture. The light rubbing in a mortar corrects these possibilities and ensures uniform admixture of the several ingredients. The B. P. preparations are as follows :

Four contain Opium, viz. :

Pulv. Opii Compositus.

Opium, Ginger, Pepper (black), Caraway fruit, and Tragacanth. 1 in 10. *Dose*, 2 to 5 grs.

Used to make *Confectio Opii*. (See p. 51.)

Pulv. Ipecacuanhæ Compositus. *Syn.*, Dover's Powder.

Ipecacuanha, Opium, Potassium Sulphate. 1 of each (Ipecacuanha and Opium) in 10. *Dose*, 5 to 15 grs.

The Potass. Sulph. by its hardness and grittiness assists in securing the complete sub-division and uniform mixture of the vegetable powders. The Powder is largely used as a diaphoretic.* A dose of 10 or 15 grains is a popular "sweating powder." It is used in making *Pil. Ipecacuanhæ cum Scilla*. (See p. 79.)

Pulv. Kino Compositus.

Kino, Opium, Cinnamon Bark. 1 in 20. *Dose*, 5 to 20 grs.

Pulv. Cretæ Aromaticus cum Opio.

Aromatic Powder of Chalk and Opium. 1 in 40. *Dose*, 10 to 40 grs.

* *Diaphoretics* are agents which promote the activity of the sweat glands and so cause increase in the amount of perspiration.

Four contain the drug indicated by the name, ginger, and a third substance, viz. :

Pulv. Scammonii Co.

Resin of Scammony, Ginger, Jalap. 1 in 2. *Dose*, 10 to 20 grs.

Pulv. Jalapæ Co.

Jalap, Ginger, Acid Tartrate of Potassium. 1 in 3. *Dose*, 20 to 60 grs.

Pulv. Cinnamomi Co. *Syn.*, Pulvis Aromaticus.

Cinnamon, Ginger, Cardamom Seeds. 1 in 3. *Dose*, 3 to 10 grs.

Pulv. Rhei Co. *Syn.*, Gregory's Powder or Mixture.

Rhubarb, Ginger, Magnesia (light or heavy). 1 in 4½. *Dose*, 20 to 60 grs.

Two contain each, two ingredients, viz. :

Pulv. Antimonialis. 1 in 3. *Dose*, 3 to 5 grs.

Oxide of Antimony and Phosphate of Calcium.

This represents an old-fashioned preparation known as James's Fever Powder and sometimes ordered as *Pulv. Jacobi Verus*.

Pulv. Elaterini Co. 1 in 40. *Dose*, ½ to 5 grs.

Elaterin and Sugar of Milk.

The Sugar of Milk divides and dilutes the active ingredient.

The other official powders are :

Pulv. Amygdalæ Co. A mixture of Sweet Almonds, Sugar, and Gum Acacia.

Used in making *Mistura Amygdalæ*.

Pulv. Catechu Co. 1 in 2½. *Dose*, 20 to 40 grs.

Catechu, Kino, Rhatany Root, Cinnamon Bark and Nutmeg.

Pulv. Cretæ Aromaticus. *Syn.*, Confectio Aromatica.

Cinnamon, Nutmeg, Saffron, Cloves, Cardamom Seeds, Sugar, and Chalk (prepared).

Pulv. Glycyrrhizæ Co. 1 (Senna) in 6. *Dose*, 30 to 60 grs.

Senna, Sugar, Sublimed Sulphur, Liquorice Root and Fennel Fruit.

This is sometimes known as *Prussian Powder*, as the formula is taken from the German Pharmacopœia. It is a popular laxative medicine.

Pulv. Sodæ Tartaratæ Effervescens. *Syn.*, Seidlitz Powder.

The *blue* paper contains 120 grains of Tartarated Soda (Rochelle Salt) and 40 grs. of Bicarbonate of Sodium. In the *white* paper are 38 grs. of Tartaric Acid. When added to water the contents of the two papers dissolve with effervescence, carbonic acid gas escaping. A "double" Seidlitz Powder has 240 grs. of Rochelle salt.

Pulv. Tragacanthæ Co. Tragacanth, Gum Acacia, Starch and Sugar.

It is used principally to suspend heavy powders such as Bismuth Subnitrate.

Hydrargyrum cum Creta. This is not classified as a "powder" in the B. P. It is however universally known as *Grey Powder*. It is made by rubbing metallic Mercury and Prepared Chalk together until metallic globules cease to be visible to the naked eye. 1 in 3. *Dose*, 3 to 8 grs.

Freshly prepared, the Mercury exists as finely divided metal. In time, a greater or less proportion of Oxide is formed.

Pilulæ. Pills. (*Pilula, æ. first decl., feminine.*)

The official "Pilulæ" are not pills, but *pill-masses*. That is, they are plastic masses out of which pills may be formed. Most of them are made by mixing together several drugs which have been previously reduced to a fine powder. To the mixture, some more or less tenacious fluid (*e.g.*, glycerine, syrup, treacle, etc.) or some pulpy or adhesive substance (*e.g.*, confection of roses, hard soap, etc.) is added. In this way a *mass* or *pill-mass* is formed. The mass may then be rolled out and divided into pills in the usual way. The substance which is added to the medicinal ingredients to cause them to cohere into a mass is termed an *excipient* or *pill-excipient*. In the official formulæ the excipient in each case is named in the B. P. But many medicines, besides those included amongst the official pills, are ordered in the pilular form, and the selection of the excipient in these cases must be made by either the prescriber or the dispenser. The pharmacist ought to have more information on this subject than the physician. Consequently the choice of the excipient is often left to him. Certain general considerations bearing upon the selection of an excipient may however

here be mentioned. It must be of such a nature that the resulting mass can be readily formed into pills. The pills so produced must be sufficiently firm to retain their shape, but not so hard as to be insoluble in the alimentary canal. Obviously the excipient must be quite innocuous. It must not exert any chemical action upon the medicinal ingredients of the pill, and it must not interfere with their therapeutic efficacy. An excipient very generally useful is *Glycerine of Tragacanth*. The following substances, more or less frequently administered in the pilular form, and requiring special excipients, may be usefully noted.

Solid extracts are almost invariably prescribed as pills. The softer ones may be rendered sufficiently firm by the addition of a little powdered tragacanth. The dry extracts can be reduced to powder and then made into a pill mass by means of mucilage of acacia, etc. *Croton Oil* may be made into a pill with crumb of bread. *Creasote*, with crumb of bread; *Carbolic Acid*, with liquorice powder; *Essential Oils*, with a mixture of soap and wax; *Calomel*, with manna and tragacanth powder; *Quinine*, with confection of hips; *Chemicals* liable to be decomposed by contact with organic matter may be made into pills by means of *Kaolin** and a little water or soft paraffin (Kaolin ointment); *Silver Nitrate*, *Silver Oxide*, *Permanganate of Potassium*, are examples; these must not be associated with extracts or other organic materials.

Pills are a convenient form for administering medicines. They are portable, permanent, and as a rule are easily swallowed without offending the taste. With the exception of some few heavy powders, no substance should be made into a pill weighing more than 5 grains. To render them less unsightly, and to diminish the risk of their ingredients being tasted, it is a common practice to "coat" pills. The pills are moistened with some adhesive fluid, and then shaken with a circular motion in a vessel containing some fine white powder such as French chalk, sugar, etc. By a similar method it is possible to cover pills with gold

* KAOLIN. *Syn.*, China Clay. This is a native silicate of aluminium. It is found largely in Devonshire and Cornwall. Purified by washing, etc., it exists as a soft, non-gritty, white powder. It may be used as a dusting powder for infants. From it some of the finest kinds of porcelain are manufactured. A variety containing a trace of silicate of iron is known as "Fuller's Earth."

or silver leaf. Or the pills may be coated with a thin layer of gelatine or other varnish. The pills are "impaled" on needle points and dipped into the melted gelatine. They are then allowed to dry. Another substance used to coat pills is *Keratin*. This is made from horn parings. It is insoluble in the acid gastric juice but freely soluble in the alkaline fluids of the small intestine. Pills coated with *Keratin* will therefore pass safely through the stomach into the intestine. Medicines which would be neutralised or decomposed by the gastric juice can be administered in this way, *e.g.*, *Sulphurated Lime* and *Pancreatin*. The same method may be adopted when it is desired to obtain a local action of the medicine upon the intestinal contents or mucous membrane. Pills of *Carbolic Acid* are sometimes protected in this way in order to disinfect the intestine in enteric fever.

If pills are not coated, a little fine, dry powder (*e.g.*, magnesia, starch, lycopodium,*) should be placed in the pot or box containing them. This prevents the pills sticking together and renders their appearance less unsightly.

The official "Pilulæ" are as follows :

Two contain Mercurials, viz. :

Pil. Hydrargyri. *Syn.*, Mercurial Pill ; Blue Pill.

Mercury, Liquorice Root in Powder, Confection of Roses. Rub the Mercury with the Confection until metallic globules disappear ; then add the Liquorice Root. 1 in 3. *Dose*, 3 to 8 grs.

The Mercury exists as finely divided metal. The Pill-mass offers much less opportunity for oxidation than "Grey Powder." Hence but little oxide is formed, even when the mass is kept for some time.

Pil. Hydrargyri Subchloridi Co. *Syn.*, Compound Calomel Pill ; Plummer's Pill.

Subchloride of Mercury, Sulphurated Antimony, Guaiacum Resin and Castor Oil. A 5 gr. pill contains 1 gr. of Calomel. The Antim. Sulph. gives to the mass a bright orange colour.

* *Lycopodium* is a fine, somewhat greasy, yellowish powder. It consists of the spores of the common Club-moss (*Lycopodium clavatum*).

Three contain Opium, viz. :

Pil. Saponis Co. *Syn.*, Pil. Opii.

Opium, Hard Soap, Glycerine. 1 in 6. *Dose*, 3 to 5 grs.

It may be prescribed when it is desirable to conceal from the patient the fact that Opium has been ordered.

Pil. Plumbi cum Opio.

Opium, Lead Acetate, Confection of Roses. 1 in 8. *Dose*, 3 to 5 grs.

It is the same combination of remedies as in *Supposit. Plumbi Co.*

Pil. Ipecacuanhæ cum Scilla.

Made with Dover's powder (see p. 79.) 1 of Opium in 23. *Dose*, 5 to 10 grs.

Four contain Salts of Iron, viz. :

Pil. Ferri. *Syn.*, Bland's Pill.

It contains freshly prepared Ferrous Carbonate, about 1 grain in a 5-grain pill. The Ferrous salt is formed by the action of Potassium Carbonate on Ferrous Sulphate. It is made into a mass by the addition of sugar, tragacanth, glycerine and water. *Dose*, 5 to 20 grs.

Pil. Ferri Carbonatis.

Saccharated Carbonate of Iron and Confection of Roses. *Dose*, 5 to 20 grs.

Pil. Ferri Iodidi.

Prepare Ferrous Iodide by direct union of the two elements in the presence of water. Make it into a mass with sugar and powdered Liquorice Root. *Dose*, 3 to 8 grs.

In the above three preparations the sugar preserves the ferrous salts from oxidation.

Pil. Aloes et Ferri.

Contains Ferrous Sulphate and Barbadoes Aloes (see p. 79.)

Four contain Socotrine Aloes, viz. :

Pil. Aloes Socotrinæ. Socotrine Aloes, Hard Soap, Confection of Roses, Volatile Oil of Nutmeg.

Pil. Aloes et Asafœtidæ. Socotrine Aloes, Asafœtida, Hard Soap, Confection of Roses.

Pil. Aloes et Myrrhæ. Socotrine Aloes, Myrrh, Saffron, Treacle, Glycerine. *Syn.*, Pil. Rufi.

Pil. Rhei Co. Socotrine Aloes, Rhubarb, Myrrh, Hard Soap, Treacle, Glycerine, Oil of Peppermint.

Five contain Barbadoes Aloes, viz. :

Pil. Aloes Barbadosis. Barbadoes Aloes, Hard Soap, Confection of Roses, Oil of Caraway.

Pil. Aloes et Ferri. Barbadoes Aloes, Ferrous Sulphate, Comp. Cinnamon Powder, Confection of Roses.

Pil. Cambogiæ Co. Barbadoes Aloes, Gamboge, Hard Soap, Comp. Cinnamon Powder, Syrup.

Pil. Colocynthis Co. **Extract. Colocynthis Co.**
Syn., Gregory's Pill.

Colocynth Pulp,
Resin of Scammony,
Barbadoes Aloes,
Potassium Sulphate,
Oil of Cloves,
Distilled Water,

Colocynth Pulp,
Resin of Scammony,
Extract Socotrine Aloes,
Curd Soap,
Cardamom Seeds,
Proof Spirit,

These two preparations of Colocynth may be usefully compared.

Pil. Colocynthis et Hyocyami. *Syn.*, Christison's Pill.
2 parts of Pil. Coloc. Co., with 1 of Ext. of Hyoscyamus.

Hamilton's Pill is a mixture of Comp. Extract of Colocynth with Extract of Hyoscyamus.

Another active purgative Pill is :

Pil. Scammonii Co. Resins of Scammony and Jalap, Curd Soap, Strong Tinct. of Ginger and S.V.R.

Two contain Squill, viz. :

Pil. Ipecacuanhæ cum Scilla.
Comp. Ipecacuanha Powder,
Squill,
Ammoniacum,
Treacle,
(1 of Opium in 23.)

Pil. Scillæ Co.
Squill,
Ammoniacum,
Treacle,
Hard Soap and Ginger.

The other official formulæ are:—

Pil. Asafœtidæ Co. Asafœtida, Galbanum, Myrrh, Treacle.

Pil. Conii Co. Extract of Hemlock, Ipecacuanha, Treacle.

Pil. Phosphori. 3 grs. contain $\frac{1}{30}$ gr. Phosphorus, mixed with Wax, Soap, and Balsam of Tolu.

As a rule the official pills may be given in doses of 5 to 10 grains. In the following the dose is less :

Pil. Phosphori. 2 to 4 grs.

Pil. Hydrargyri. 3 to 8 grs.

Pil. Saponis Co. 3 to 5 grs.

Pil. Ferri Iodidi. 3 to 8 grs.

Pil. Plumbi cum Opio. 3 to 5 grs.

The student will observe that four of the official purgative pills contain each a small quantity of a volatile oil. The oil acts as a *carminative*. That is, it prevents griping and helps to dispel flatulence. It also gives to each pill (when freshly prepared) a characteristic odour by which it can be distinguished. *Pil. Aloes Barb.* contains oil of caraway; *Pil. Aloes Socot.*, volatile oil of nutmeg; *Pil. Colocynth. Co.*, oil of cloves; *Pil. Rhei Co.*, oil of peppermint. *Pil. Aloes et Myrrhæ* has the odour of myrrh and saffron. A combination of *Aloes* and *Myrrh* in the pilular form has been known as Rufus's pill for more than three centuries. *Plummer's Pill* is distinguished by its orange colour; *Blue Pill*, by its grey colour and faint odour of roses.

XII.—THE GLYCERINES, LINIMENTS, AND LOTIONS.

These are fluid preparations. They are for the most part applied to the skin in order to exercise a local action. Many of the Glycerines are painted on the mucous membrane of the fauces, pharynx, etc., or are diluted and used as gargles. The Lotions are useful applications for syphilitic and other ulcers.

Glycerina. Glycerines. (*Glycerinum*, i. *second decl.*, *neuter*.)

Glycerine has extensive powers as a solvent. It itself is freely soluble in Water and in Alcohol, but is insoluble in Chloroform, Ether and Fixed Oils (Squire). The official Glycerines are as follows :

Four are solutions in Glycerine, viz.

Glycerin. Acidi Carbolic. 1 to 4.

Glycerin. Acidi Tannici. 1 to 4.

Glycerin. Acidi Gallici. 1 to 4.

Glycerin. Aluminis. 1 to 5.

Three are solutions in a mixture of Glycerine and Distilled Water, viz.:

Glycerin. Amyli. 1 of Starch to 8. It forms a firm jelly used to make some of the suppositories.

Glycerin. Boracis. 1 to 6.

Glycerin. Tragacanthæ. It is a useful pill-excipient.

The other official formula is:

Glycerin. Plumbi Subacetatis. Oxide and Acetate of Lead are boiled with Glycerine and water. The Subacetate is formed. The solution is filtered and the water removed by evaporation. There is an official *Unguentum Glycerini Plumbi Subacetatis*.

In several of the official Glycerines solution is effected by rubbing the medicinal ingredient and the glycerine in a mortar. In other cases the heat of a water-bath is required. Heat must always be applied with care to glycerine. It is liable when heated to undergo decomposition and to give off irritating vapours of *acrolein*. *Glycerinum Amyli* needs a temperature of about 240° F. This is necessary to break up the starch granules. The heat of a water-bath is not sufficient to secure this result.

Linimenta. Liniments. (*Linimentum, i. second decl., neuter.*)

Liniments are fluid preparations intended for external application. They are used almost entirely for their local effects. Some have a stimulating action upon the skin and superficial tissues. The purpose of others is to allay pain—they are *anodyne* liniments. Liniments of a stimulating nature are generally applied with more or less friction. They usually contain a fixed oil or a soap which gives a lubricating quality to the liniment. Anodyne liniments may be painted on the skin or applied sprinkled on a piece of flannel, lint, etc. The menstruum is usually spirituous. Ether, however, is a more satisfactory vehicle. It dissolves the fatty sebaceous secretion of the integument. Alcohol does not do this, and therefore alcoholic fluids do not come into intimate contact with the epidermis or freely penetrate the superficial horny layers.

The term *Embrocation* is used as synonymous with liniment. Liniments and other fluid preparations intended for external application should always be dispensed in "poison bottles."

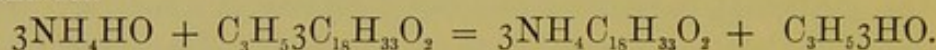
The official liniments are 16 in number. They all contain Camphor, except five, viz., *Lin. Ammoniacæ*, *Lin. Calcis*, *Lin. Crotonis*, *Lin. Iodi*, *Lin. Potass. Iodidi cum Sapone*. The Camphor is added, partly for its local stimulating action, and partly to prevent, by its odour, a liniment being mistaken for a tincture or other preparation intended for internal administration.

The official list is as follows :

Three contain, each, the substance indicated by the name and olive oil, viz. :

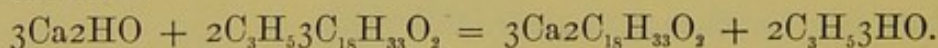
Lin. Ammoniacæ. *Syn.*, Hartshorn and Oil.

Solution of Ammonia, 1 part, Olive oil, 3 parts. A soap,* *Oleate of Ammonium*, is formed, and this emulsifies the rest of the oil.



Lin. Calcis. *Syn.*, Oil and Lime Water.

Solution of Lime and Olive Oil, equal parts. A soap,* *Oleate of Calcium*, is formed, and this emulsifies the rest of the oil.



It is a useful application to scalds and burns. A well-known application for the same purpose is Carron Oil. It is a mixture of equal parts of Solution of Lime and Linseed Oil.

Lin. Camphoræ. *Syn.*, Camphorated Oil.

Camphor, 1 part, dissolved in Olive Oil, 4 parts.

This is a solution of a volatile in a fixed oil.

It must be distinguished from *Lin. Camphoræ Co.* (See p. 83.)

Three contain, each, the substance indicated by the name and an official liniment, viz. :

Lin. Chloroformi.

Chloroform and Liniment of Camphor, equal parts.

Lin. Opii.

Tincture of Opium and Liniment of Soap, equal parts.

* See p. 64.

Lin. Hydrargyri.

Ointment of Mercury, Liniment of Camphor and Solution Ammonia.

It contains some Oleate of Mercury.

Two are made by exhausting roots (in No. 40 powder) by percolation with S.V.R., and then dissolving a little Camphor in the spirituous fluid, viz. :

Lin. Aconiti. (Aconite root.)**Lin. Belladonnæ.** (Belladonna root.)

The odour of Camphor distinguishes these from the corresponding tinctures. The Liniments are of course much stronger than the Tinctures. They are applied to relieve neuralgic and muscular pains. The addition of Chloroform increases their efficiency, probably by its solvent action upon the fatty secretion of the skin. A mixture of the two Liniments with Chloroform forms the "A B C Liniment."

Six are solutions in S.V.R., viz. :

Lin. Camphoræ Co.

Camphor, Oil of Lavender, Strong Solution of Ammonia, S.V.R.

Lin. Saponis. *Syn.*, Opodeldoc.

Hard Soap, Camphor, Oil of Rosemary, Distilled Water, S.V.R.

Lin. Iodi.

Iodine dissolved in S.V.R. by the aid of Iodide of Potassium, and a little Glycerine added.

It is used as a counter-irritant. (See p. 85.) It is four times the strength of the tincture. Equal parts of the two form a useful paint over chronic glandular enlargements, etc.

Lin. Crotonis.

Croton Oil, Oil of Cajuput, S.V.R.

Has the green colour and camphoraceous odour of the Cajuput Oil.

Lin. Sinapis Co.

Oil of Mustard, and Ethereal Extract of Mezereon, with Camphor, Castor Oil, and S.V.R.

The Liniments of Croton Oil and Mustard are both energetic stimulating applications. Croton Oil itself applied to the Skin produces pustules. Oil of Mustard and Mezereon Extract are *vesicants*. They cause the formation of blisters on the skin. Both Liniments may be used as applications to painful, chronic rheumatic joints.

Two contain Oil of Turpentine, viz. :

Lin. Terebinthinæ.

Oil of Turpentine with Camphor in solution, added to a solution of Soft Soap in Distilled Water.

The solution of soap emulsifies the two volatile oils.

Lin. Terebinthinæ Aceticum.

Oil of Turpentine, Glacial Acetic Acid, Lin. of Camphor.

It represents a once much vaunted application known as St. John Long's Liniment.

The other official Liniment is :

Lin. Potassii Iodidi cum Sapone.

Iodide of Potassium, Curd Soap, Oil of Lemon, Glycerine and Distilled Water.

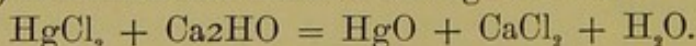
It forms a translucent jelly. It may be applied with friction over chronic glandular enlargements, etc., and does not stain or irritate the skin like Iodine.

Lotiones. Lotions. (*Lotio, onis. third decl., feminine.*)

The term *Lotion* signifies a watery preparation or *wash* that may be applied to any portion of the external surface of the body. In the B. P. there are two. Both are mercurial preparations. They are employed as stimulating applications to ulcers, more especially those of syphilitic origin.

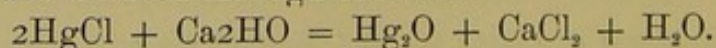
Lotio Hydrargyri Flava. *Syn.*, Yellow Wash.

Mix 18 grs. of Perchloride of Mercury (Corrosive Sublimate) with 10 ounces of Solution of Lime. Mercuric oxide (yellow) is formed and diffused through the fluid.



Lotio Hydrargyri Nigra. *Syn.*, Black Wash.

Mix 30 grs. of Subchloride of Mercury (Calomel) with 10 ounces of Solution of Lime. Mercurous oxide (black) is formed and diffused through the fluid.



XIII.—THE PLASTERS, POULTICES, PAPERS, AND COLLODIONS.

All the members of this group are intended for external use. Most of them are applied to the unbroken skin. Some of the *poultices* are used to promote the healing of ulcers. The simple forms of *collodion* are useful as protective films to cover contusions, abrasions, etc.

Emplastra. Plasters. (*Emplastrum*, i. *second decl., neuter.*)

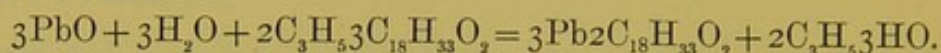
The official *Emplastra* are firm masses usually found in "sticks," or "rolls." They consist of various medicinal agents mixed with a resinous, waxy, or soapy basis. At the temperature of the body they become sufficiently tenacious to adhere to the skin. When required for use, they are spread in a thin layer on a sheet of leather (sheep-skin) or other suitable material. To effect this, the "emplastrum" is melted, and then spread by means of a heated *plaster iron* or *spatula*. A clear margin is left between the spread plaster and the edge of the leather. This is to secure cleanliness. It prevents the plaster, as it extends under the influence of the heat of the skin, oozing out beyond the margin of the leather. *Emplastrum Cantharidis* does not require heat. It is a firm paste, which can be readily spread by the pressure of the thumb. As it is not very adhesive, it is a common practice to spread it upon ordinary "sticking" plaster, thus providing an adhesive margin. It forms the familiar "fly-blister" and is largely used as a vesicating agent. Its therapeutic position is that of a *counter-irritant*. That is to say, it is applied to the surface mainly in order that the irritation it there produces may relieve pain or congestion of the deeper parts. Of the other official Plasters, some have a *stimulating* action upon the superficial tissues and are used to promote the removal, by absorption, of chronic inflammatory exudations. Several are *anodyne* applications. The principal use of others is to afford mechanical support to sprained muscles, etc.

The B. P. *Emplastra* require in their manufacture attention to several practical details. These are of interest and importance to the pharmacist, but not to the physician. Speaking generally, it may be said, that the medicinal ingredient is added to the

melted basis, and the mixture stirred until it solidifies. Similarly, the exact materials used as the basis in each formula are mainly of manufacturing, not of therapeutic moment. The substance which forms the basis, directly or indirectly, of ten of the fifteen official plasters is

Emp. Plumbi. Lead Plaster. *Syn.*, Diachylon Plaster.

Heat Oxide of Lead with Olive Oil and Water for several hours by means of a steam-bath. Oleate of Lead and Glycerine are formed.*



The five official Plasters which do not contain Lead Plaster are:—

Emp. Ammoniaci cum Hydrargyro, Emp. Cantharidis, Emp. Menthol, Emp. Picis, and Emp. Saponis Fuscum.

The two following also form the basis of several of the official plasters:

Emp. Resinæ. Resin, Curd Soap, Lead Plaster. *Syn.*, Adhesive Plaster.

Emp. Saponis. Curd Soap, Resin, Lead Plaster.

The other official formulæ are as follows:

Three are anodyne applications, viz.:

Emp. Belladonnæ. Alcoholic Extract of Belladonna, Resin and Soap Plasters.

It was formerly made with the *green* extract and had therefore a distinctly green colour.

Emp. Opii. Opium in fine powder added to melted Resin Plaster. 1 in 10.

Emp. Menthol. Menthol added to a mixture of melted Resin and Yellow Wax.

As Menthol is a volatile substance, it must be added to the melted basis as this is cooling.

Two contain Cantharides, viz.:

Emp. Cantharidis. *Syn.*, Fly-Blister. Cantharides, in powder, added to a mixture of melted Resin, Lard, Suet and Wax. The soft consistence, and the presence of shining green particles (wing cases of the beetles) readily distinguish it.

A "Fly-blister," should be applied from 6 to 10 hours. If upon its removal vesication has not been produced, a linseed poultice may be placed on the reddened surface for 15 minutes. The vesicle is

* See. p. 64.

then covered up with cotton wool, or punctured and dressed with vaseline or other soothing application. Occasionally it is desired to sustain the irritation for some time. The sore is then "kept open" by some stimulating dressing, *e.g.*, Savin Ointment. (See p. 97.)

Emp. Calefaciens. *Syn.*, Warm or Warming Plaster. A strained infusion of Cantharides is added to a mixture of Resin and Soap Plasters, with expressed Oil of Nutmeg, Resin and Wax.

It does not contain any particles of the beetles. It has a uniform pale yellow colour.

Two contain Mercury, viz. :

Emp. Hydrargyri. Finely divided Mercury is added to melted Lead Plaster.

The division of the metal is secured by rubbing it in a mortar with a small quantity of Olive Oil and Sulphur previously heated together. This "kills" the Mercury. A little Sulphide of Mercury is formed which prevents the metallic globules reuniting. A few grains of oil and sulphur are sufficient to "kill" several ounces of Mercury.

Emp. Ammoniaci cum Hydrargyro. Mercury is "killed" and added to melted Ammoniacum.

The other official plasters are :

Emp. Ferri. *Syn.*, Chalybeate Plaster; Strengthening Plaster; **Emp. Roborans.** Peroxide of Iron, Burgundy Pitch, and Lead Plaster.

Emp. Galbani. Galbanum, Ammoniacum, Wax, and Lead Plaster.

Emp. Picis. Burgundy Pitch, Common Frankincense, expressed Oil of Nutmeg, Resin, Wax, Olive Oil and Water.

Emp. Plumbi Iodidi. Lead Iodide, Resin, and Lead Plaster.

Emp. Saponis Fuscum. *Syn.*, **Emp. Cerati Saponis.** Oxide of Lead is boiled with Vinegar, then Curd Soap, and afterwards Olive Oil and Wax are added, and the mixture evaporated to a suitable consistence.

Cataplasmata. Poultices. (*Cataplasma, atis. third decl., neuter.*)

Poultices are familiar medicinal applications. Those made by the addition of hot water to linseed-meal, bread, oatmeal, bran,

etc., are convenient methods for securing the continuous application of moist heat to the surface of the body. The value of these materials is due to their power of absorbing a considerable quantity of hot water and to their heat-retaining properties. Such poultices are mainly emollient and soothing in their action. Hot *fomentations* or *stupes* may be used to secure the same results. These are simply pieces of flannel "wrung out" of hot water. They may be applied when the poultice by its weight would cause pain. Their soothing properties may be increased by infusing chamomile flowers, poppy capsules, etc., in the hot water, or by adding tincture of opium to the fomentation. *Turpentine Stupes* are made by sprinkling oil of turpentine over the hot moist flannel. They are used as *counter-irritants*. The heat-retaining properties of the poultice, and the less oppressive weight of the fomentation are to some extent combined in *Spongio-piline*. This is a kind of thick cloth, made of a mixture of sponge and wool and covered on one surface with a waterproof varnish. It is dipped in hot water and applied to the skin. A bandage retains it in position. The varnish prevents cooling by evaporation.

In the B. P. there are six official poultices. In these the basis is Linseed Meal and Boiling Water, with the single exception of

Cataplasma Fermenti. Yeast Poultice.

This is made by adding Wheaten Flour to a mixture of Beer Yeast and Water at 100° F. The mass is then placed near the fire till it rises.

Wheaten Flour (*Farina Tritici*, B.P.) consists mainly of starch, with some gluten, sugar, etc. Yeast (*Cerevisia Fermentum*, B.P.), is defined officially as "the ferment obtained in brewing beer, and produced by the *Saccharomyces cerevisia*." (See *Spiritus Rectificatus*, p. 14.) Under its influence fermentation occurs and carbonic acid gas is set free. The moderate heat favours the process. Boiling water would destroy the yeast plant and so prevent fermentation. As carbonic acid gas is formed through the whole mass of the poultice, this acquires a spongy character. The poultice "rises." It becomes indeed a kind of dough such as is produced in the manufacture of bread. Yeast poultice has been recommended as a sedative and disinfectant application to boils, sloughing ulcers, etc.

The other official poultices are made with Linseed Meal and Boiling Water, and a third ingredient which gives its name to the poultice. The list is as follows :

C. Carbonis. (Wood Charcoal.)

The basis is partly crumb of bread. Some of the charcoal is mixed with the poultice and the rest sprinkled on the surface. It is used as a disinfectant application to foul ulcers.

C. Conii. (Hemlock Juice.)

The juice is heated to get rid of the spirit. The poultice is recommended to relieve the pain of malignant ulcers, etc.

C. Lini. (Linseed Meal.)**C. Sinapis.** (Mustard.)

Mustard mixed with lukewarm water, and then added to the basis of Linseed Meal and Boiling Water. If the mustard were mixed with the boiling water, the formation of the volatile oil would be interfered with (see *Oleum Sinapis*, p. 62).

The B. P. Poultice contains equal parts of Linseed Meal and Mustard. An ordinary mustard "plaster" or "blister," is made without the Linseed Meal. It should be applied from 15 to 20 minutes.

C. Sodæ Chlorinatæ. (Solution of Chlorinated Soda.) *Syn.*, Chlorine Poultice.

It is applied as a disinfectant agent to foul ulcers.

Note.—In all cases the linseed meal should be added gradually to the water with constant stirring. If the reverse process is adopted, it is difficult to avoid the formation of "lumps," and to secure a perfectly smooth poultice.

Chartæ. Papers. (*Charta, æ. first decl., feminine.*)

These are pieces of paper coated on the surface with a thin layer of varnish impregnated with a medicinal agent. There are two official. Both are comparatively mild counter-irritants.

Charta Epispastica. Blistering Paper.

Digest *Cantharides* in a mixture of Wax, Resin, etc., and pass strips of paper over the surface so that they receive a thin coating. The paper is gently warmed before being applied to the skin. It is often ruled in square inches for convenience in measurement.

Charta Sinapis. *Syn.*, Mustard Leaf.

Mix *Mustard* with Solution of Gutta Percha and pass strips of cartridge paper over the surface. Before application the paper is dipped in *tepid*, not hot water. (See p. 62.)

Collodia. Collodions. (*Collodium*, ii. *second decl., neuter.*)

In these preparations a variety of gun-cotton (*Pyroxylin*, B. P.), is held in solution in an ethereal fluid. When painted on the skin, the volatile fluid evaporates, leaving a film on the surface.

In the B. P. there are three official Collodions. Two of these are used almost entirely for protective purposes. Painted over abrasions, contusions, and superficial wounds, they cover the surface with a film which protects the injured parts from the air. The official *Collodium Vesicans* is, as the name implies, a vesicating agent. It contains the active principle of *Cantharides*.

The following are the official Collodions :

Collodium. Collodion.

Pyroxylin dissolved in a mixture of S.V.R. and Ether.

Collodium Flexile. Flexible Collodion.

Collodion to which small quantities of Canada Balsam and Castor Oil have been added.

The film it leaves is more flexible and less liable to crack and shrivel than that of the simple variety of Collodion.

Collodium Vesicans. Blistering Collodion.

Pyroxylin dissolved in Blistering Liquid (*Liquor Epispasticus*).

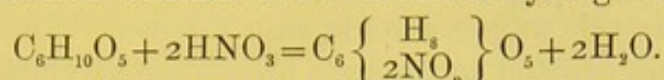
Various non-official Collodions are prepared. Thus, *Styptic collodion* contains tannic acid, and is used to check superficial hæmorrhage. *Anodyne collodion* is collodion impregnated with aconitine, etc., and may be painted over the site of neuralgic pain. Collodion containing salicylic acid and extract of Indian hemp is a favourite application to corns. Similarly, collodion may be used as a vehicle for many other remedies which it may be desirable to apply to the external surface of the body.

Pyroxylin. Pyroxylin.

This is prepared by immersing Cotton Wool for a few minutes in a mixture of nitric and sulphuric acids. It is then washed to remove free acid and dried by the heat of a water-bath. A higher temperature might cause it to explode.

Cotton Wool (*Gossypium*, B. P.) is the hairs of the seeds of various species of *Gossypium* (*Malvaceæ*). It is almost pure *cellulin* or *cellulose* ($C_6H_{10}O_5$). Treated as described above, one

or more of the hydrogen atoms is replaced by peroxide of nitrogen (NO_2). If the official strength of nitric acid is used, this replacement extends to two atoms of hydrogen thus:—



The official Pyroxylin is therefore *Dinitrocellulin*. If a weaker acid is used, *Mononitrocellulin* is formed. A stronger acid produces *Trinitrocellulin*. This is the ordinary highly explosive gun-cotton. Dinitrocellulin is only moderately explosive. Mononitrocellulin is practically non-explosive. Dinitrocellulin (*Pyroxylin, B. P.*) is readily soluble in a mixture of alcohol and ether (see Collodion). The other two compounds are not soluble in this mixture.

XIV.—THE OFFICIAL OINTMENTS AND OLEATES.

These are soft but solid preparations of a more or less greasy character. They are intended for application to the external surface of the body, and are employed mainly for their local effects.

Unguenta. Ointments. (*Unguentum, i. second decl., neuter.*)

In these preparations the medicinal agent is mixed with some greasy basis. The diffusion of the active ingredient through the basis must of course be uniform, and the ointment ought to be perfectly smooth and free from all gritty particles. To secure these results, the medicinal substance must be in a fine state of division. It may be finely powdered or dissolved in a small quantity of fluid, and then mixed with the basis by means of a pestle and mortar. Sometimes the basis must be melted before the medicinal agent is added. Two or more ointments may be satisfactorily mixed together on a porcelain slab—an *ointment tile*—by the use of a spatula. The same method may be employed when glycerine or other thick fluid is to be incorporated with some soft greasy substance.

Medicated ointments are used to promote a variety of local effects. Some, spread thickly on lint, form protective and soothing applications over inflamed or ulcerated surfaces. By others, a stimulating

action is produced. The fatty basis allows the medicinal agent to be applied with a considerable amount of friction, and so to be carried through the horny layers of the epidermis. Many ointments are employed in this way in chronic skin diseases. The same method is sometimes adopted to promote absorption of chronic inflammatory thickenings, etc. Powerful anodyne medicines may be applied in the same way to relieve superficial neuralgic pain. The use of the skin, as an avenue through which the whole body may be reached, is confined almost exclusively to one remedy. This is Mercury. In the form of an ointment it may be rubbed in through the skin and so gain entrance to the blood. By this it is distributed to all the tissues, and thus the whole body is brought under its influence. Mercurial inunction is practised in the treatment of syphilis.

The following substances are used as bases in the preparation of the Pharmacopœial ointments :

Paraffinum Durum. *Syn.*, Paraffin; Paraffin Wax; Solid Paraffin.

Paraffinum Molle. *Syn.*, Vaseline; Unguentum Paraffinum; Petrolatum.

The Paraffins are members of the paraffin series of hydrocarbons. Their natural source is crude petroleum or "earth oil," the fluid portions of which are largely used as illuminating agents under such names as petroleum, paraffin oil, benzoline, etc. From this crude oil Hard Paraffin is separated by exposure to cold. It is a mixture of several of the harder hydrocarbons. Soft Paraffin contains some of the softer or more fluid members of the series and is obtained by purifying the residue left after distilling off the more volatile portions of the crude petroleum. The Paraffins, as bases for ointments, have the advantage of never becoming rancid. But as they have only slight power of penetrating the integument, they are not suitable for use with medicinal agents intended for absorption.

Adeps Lanæ. Wool Fat.

Adeps Lanæ Hydrosus. Hydrous Wool Fat. *Syn.*, Lanoline.

These were made official in the "Additions," 1890. *Adeps Lanæ* is the purified natural fat of sheep's wool. It

consists principally of stearic and other fatty acids in combination with cholesterine. It is of a yellowish colour and very tenacious. Water can be freely incorporated with it and renders it more pliable. *Adeps Lanæ Hydrosus* is wool fat with 30 per cent. of water. Wool fat, as might be expected from its origin, is easily absorbed by the skin. It is not prone to turn rancid. Only one official ointment is prepared with it—viz., *Ung. Conii*. This is made by mixing evaporated Hemlock Juice with Hydrous Wool Fat, and adding a small quantity of Boric Acid. It may be used to relieve the pain of malignant ulcers, hæmorrhoids, etc.

Adeps Præparatus. Prepared Lard.

Adeps Benzoatus. Benzoated Lard.

Prepared Lard is the internal fat of the abdomen of the hog (*Sus Scrofa—Pachydermata*), purified by melting and straining. It is a mixture of oleate and stearate of glyceryl. Its disadvantage, as an ointment basis, is the readiness with which it becomes rancid and acquires an acid reaction. This tendency is increased by various substances (*e.g.*, salts of mercury and lead) frequently applied in the form of ointments. It is lessened if a small quantity of benzoin is digested in the melted lard. Some of the benzoin is dissolved in the lard, giving it an agreeable odour and retarding decomposition. The undissolved portion of the benzoin is separated by straining. The strained product is *Adeps Benzoatus, B. P.* The presence of the benzoin, however, makes the lard somewhat irritating. Benzoated lard, therefore, should not be used as a basis for ointments which are to be applied to the eye.

Sevum Præparatum. Prepared Suet.

This is the internal fat of the abdomen of the sheep (*Ovis Aries—Ruminantia*) purified by melting and straining. It consists almost entirely of stearate of glyceryl (Stearine). Only one official ointment contains it—viz., *Unguentum Hydrargyri*.

Cera Flava. Yellow Wax. *Syn.*, Bees' Wax.

Cera Alba. White Wax.

Wax, melted and mixed with Almond or Olive Oil, forms the basis of several of the official ointments. *Cera Flava* is

obtained from the honeycomb of the Hive Bee (*Apis mellifica*—*Hymenoptera*). *Cera Alba* is yellow wax which has been bleached by exposure to moisture, air, and light. In these fats the radical *Ceryl* taken the place of glyceryl. Ointments made with wax were formerly called *Cerates*.

Unguentum Simplex. Simple Ointment.

This is a mixture of White Wax, Benzoated Lard, and Almond Oil. The ingredients are heated in a water bath and the mixture then stirred until it cools.

B. P. Ointments. The following is the official List :

In three the active ingredient is an alkaloid, viz. :

Ung. Aconitinæ. Aconitine, 8 grs., dissolved in a little S.V.R. and mixed with 1 ounce of Benzoated Lard.

Ung. Atropinæ. Atropine, 8 grs., dissolved in a little S.V.R. and mixed with 1 ounce of Benzoated Lard.

Ung. Veratrinæ. Veratrine, 8 grains, rubbed smooth with a little Olive Oil, and added to 1 ounce of a mixture of Hard and Soft Paraffin.

In the first two, the S.V.R. by dissolving the alkaloid promotes the uniform diffusion of this through the basis. In the third, the oil is used principally to prevent the veratrine rising in the form of dust. Veratrine is intensely irritating to the nasal and conjunctival mucous membranes. The use of the oil protects the compounder from this irritation.

Eight contain Mercurial Compounds, viz. :

Ung. Hydrargyri. *Syn.*, Blue Ointment.

Equal weights of Mercury and Lard with a small quantity of Suet are rubbed together until the metallic globules disappear.

The Suet renders the basis more firm and so prevents the subsidence of the metal in hot weather. From the ointment are prepared the official *Liniment, Suppository, and Compound Ointment*.

Ung. Hydrargyri Compositum. *Syn.*, Scott's Dressing.

Ointment of Mercury, Yellow Wax, Olive Oil and a little Camphor. It is less than half the strength of *Ung. Hydrargyri*.

Ung. Hydrargyri Ammoniati. *Syn.*, White Precipitate Ointment.

Ammoniated Mercury and Simple Ointment.

Ung. Hydrargyri Oxidi Rubri. *Syn.*, Red Precipitate Ointment.

Red Oxide of Mercury with Hard and Soft Paraffin.

Ung. Hydrargyri Nitratis. *Syn.*, Citrine Ointment.

Mercury dissolved in Nitric Acid and added to a mixture of melted Lard and Olive Oil.

Ung. Hydrargyri Nitratis Dilutum.

Nitrate of Mercury Ointment 1, Soft Paraffin 2.

Ung. Hydrargyri Iodidi Rubri.

Red Iodide of Mercury and Simple Ointment.

Ung. Hydrargyri Subchloridi. Calomel and Benzoated Lard.

Horn or Vulcanite Spatulas should be used in dispensing the Mercurial Ointments. Metallic instruments cause decomposition and reduction of the mercurial salts. Similar changes are apt to occur in the ointments on keeping, especially if they are exposed to light.

Four contain Lead Salts, viz :

Ung. Plumbi Acetatis. Acetate of Lead and Benzoated Lard.

Ung. Glycerini Plumbi Subacetatis. Glycerine of Subacetate of Lead, Hard and Soft Paraffin.

Ung. Plumbi Carbonatis. Carbonate of Lead and Simple Ointment.

Ung. Plumbi Iodidi. Iodide of Lead and Simple Ointment.

Three contain Zinc Salts, viz. :

Ung. Calaminæ. *Syn.*, Turner's Cerate, Prepared Calamine, Benzoated Lard.

Ung. Zinci. Oxide of Zinc, Benzoated Lard.

Ung. Zinci Oleati. Oleate of Zinc, Soft Paraffin.

The remainder of the official ointments are :

Ung. Acidi Borici. (Boric Acid.)

Ung. Acidi Carbolici. (Carbolic Acid.)

- Ung. Acidi Salicylici.** (Salicylic Acid.)
- Ung. Antimonii Tartarati.** (Tartar Emetic.)
Occasionally used as a counter-irritant. Rubbed on the skin it produces pustules.
- Ung. Belladonnæ.** (Alcoholic Extract of Belladonna.)
This was formerly prepared from the *green* extract.
- Ung. Cantharidis.** (Cantharides.)
Infuse the Cantharides in Olive Oil; strain, and add the infusion to melted wax.
- Ung. Cetacei.** (Spermaceti.)
It contains also Almond Oil, White Wax, and a little Benzoin. (See *Adeps Benzoatus*, p. 93.)
- Ung. Chrysarobini.** (Chrysarobin, 20 grs. to the Ounce.)
The active agent is Chrysophanic Acid.
- Ung. Creasoti.** (Creasote.)
- Ung. Elemi.** (Elemi.)
- Ung. Eucalypti.** (Oil of Eucalyptus.)
- Ung. Gallæ.** (Galls, in fine powder.)
- Ung. Gallæ cum Opio.** (Opium, 32 grs. with Oint. of Galls, 1 ounce.)
The Ointments containing galls are frequently used in the treatment of hæmorrhoids.
- Ung. Hamamelidis.** (Liquid Extract of Hamamelis.)
- Ung. Iodi.** (Iodine.)
The Iodine is dissolved in a little Glycerine by the aid of Iodide of Potassium, and the solution mixed with lard.
- Ung. Iodoformi.** (Iodoform.)
- Ung. Picis Liquidæ.** (Tar mixed with melted Wax.)
- Ung. Potassæ Sulphuratæ.** (Sulphurated Potash.)
- Ung. Potassii Iodidi.** (Iodide of Potassium.)
The Iodide and a little Carbonate of Potassium are dissolved in a small quantity of water and mixed with Benzoated Lard. As the Lard on keeping becomes rancid and acid, the Iodide is decomposed and Iodine set free. The carbonate prevents this and so saves the ointment from discoloration.
- Ung. Resinæ.** *Syn.*, Basilicon Ointment. Resin with Yellow Wax, Simple Ointment and Almond Oil.

Ung. Sabinæ. (Fresh Savin Tops digested in a mixture of Lard and Wax and strained.)

It is sometimes used to "keep open" blisters. (See Emp. Cantharidis, p. 87.)

Ung. Staphisagriæ. (Stavesacre Seeds bruised and digested in melted Benzoated Lard and strained.)

It is used to destroy pediculi.

Ung. Sulphuris. (Sublimed Sulphur 1, Benzoated Lard 4.)

Sulphur Ointment is largely used in the treatment of Scabies or Itch. The B.P. formula, however, is rather strong for this purpose. It is apt to cause irritation of the skin. An Ointment of one-half the strength is more suitable. A little Potass. Carb. may be added with advantage.

Ung. Sulphuris Iodidi. (Iodide of Sulphur.)

Ung. Terebinthinæ. (Oil of Turpentine, Resin, Wax, and Lard.)

Oleata. Oleates. (*Oleatum, i. second decl., neuter.*)

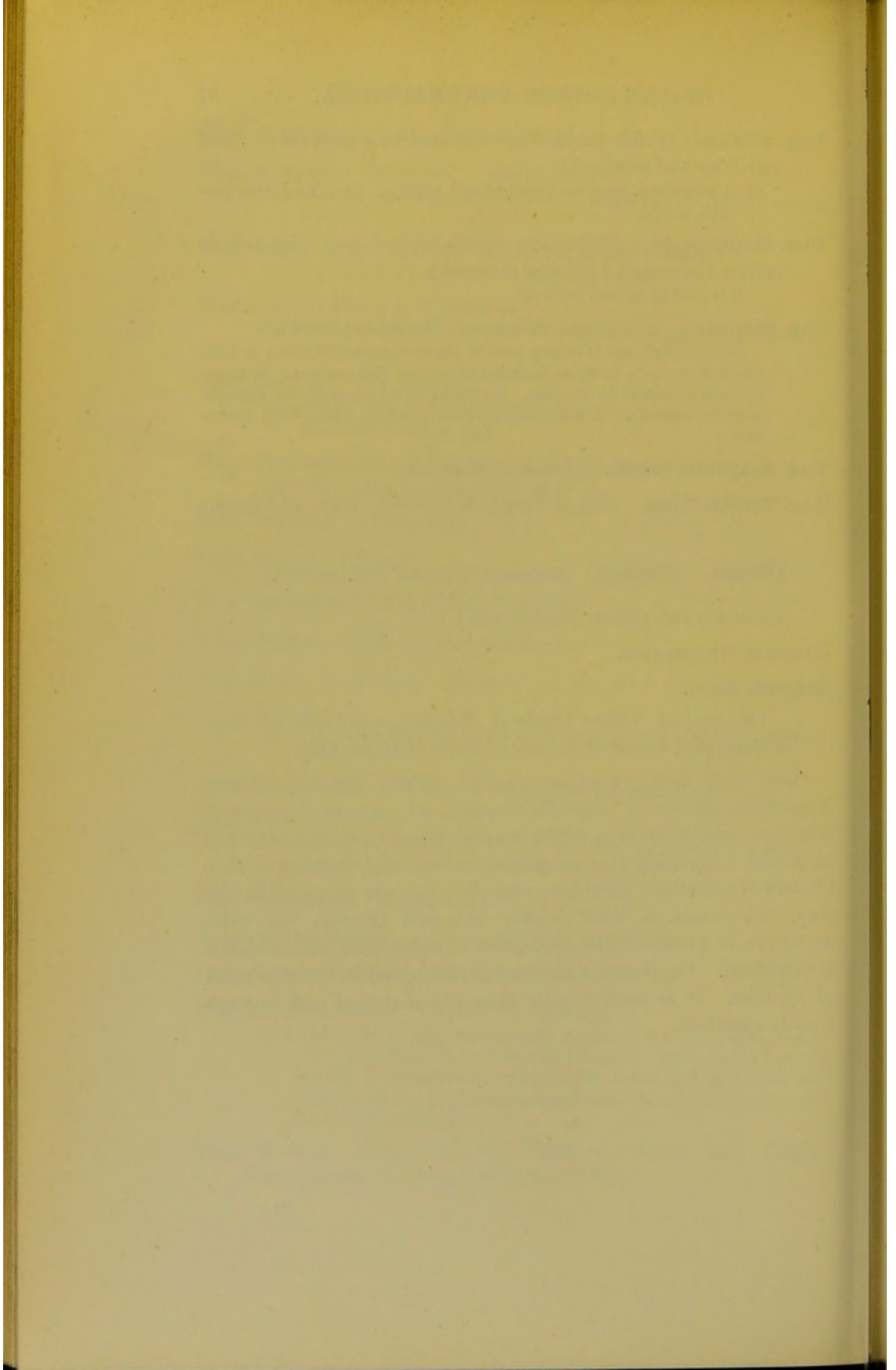
There are two official Oleates, viz. :

Oleatum Hydrargyri.

Oleatum Zinci.

One part of Yellow Oxide of Mercury, and Oxide of Zinc, respectively, dissolved in nine of parts of Oleic Acid.

Oleic acid dissolves many metallic oxides, forming oleates. Non-official oleates of bismuth, copper, etc., are thus prepared. They are usually solutions of the corresponding oleates in excess of oleic acid. Alkaloids also are soluble in oleic acid, forming oleates. Oleates of morphine, aconitine, veratrine, etc., are prepared in this way. Oleic acid is itself readily absorbed through the skin. Moreover, it promotes the absorption of substances with which it is combined. The oleate of mercury is often used in the treatment of syphilis. It is more cleanly than the ointment and is more readily absorbed.



APPENDIX I.

REGULATIONS REQUIRED BY THE PHARMACY ACT, 1868, TO BE OBSERVED IN SELLING BY RETAIL, AND IN DISPENSING, POISONS.

ALL the articles named or referred to in the appended List are Poisons within the meaning of the Pharmacy Act, 1868.

List of Poisons within the meaning of the Act.

PART I.

Not to be sold unless the purchaser is known to, or is introduced by some person known to the seller; also entry to be made in Poison Book of

1. Date of Sale;
 2. Name and Address of Purchaser;
 3. Name and quantity of article;
 4. Purpose for which it is wanted;
- attested by signature; and must be labelled with
1. Name of Article;
 2. The word "Poison";
 3. Name and address of seller.

Arsenic and its preparations;
 Aconite, and its preparations;
 Alkaloids:—All poisonous vegetable alkaloids and their salts;
 Atropine, and its preparations;
 Cantharides;
 Corrosive Sublimate;
 Cyanide of Potassium, and all metallic cyanides and their preparations;
 Emetic tartar;
 Ergot of rye and its preparations;
 Prussic acid and its preparations;
 Savin and its oil;
 Strychnine and its preparations;
 Vermin-killers, if preparations of poisons the preparations of which are in Part I. of this Schedule.

PART II.

- Must be labelled with
1. Name of Article;
 2. The word "Poison";
 3. Name and address of seller.

Almonds, essential oil of (*unless deprived of prussic acid*);
 Belladonna, and its preparations;
 Cantharides, tincture, and all vesicating liquid preparations of;
 Chloroform;
 Chloral hydrate, and its preparations;
 Corrosive sublimate, preparations of;
 Morphine, preparations of;
 Nux vomica, and its preparations;
 Opium, and its preparations, and preparations of poppies;
 Oxalic acid;
 Precipitate, red (red oxide of mercury);
 Precipitate, white (ammoniated mercury);
 Vermin-killers (see Part I.). Compounds containing "poisons" prepared for the destruction of Vermin, if not subject to the provisions of Part I., are in Part II.

Relating only to Arsenic and its Preparations.

It is unlawful to sell arsenic or any of its preparations, unless, in addition to all the foregoing Regulations, the following provisions of the Arsenic Act be also observed :

1. That the poison, if colourless, be mixed with soot or indigo, so as to colour it.
2. That the person to whom the poison is sold or delivered be of mature age.
3. That the occupation, as well as the name and address, of the purchaser be entered in the poison book.
4. That when the purchaser is not known to the seller, and is introduced by some person known to both, this person shall be present as a witness to the transaction, and shall enter his name and address in the poison-book.

Specimen Page of Poison Book.

DATE _____	
NAME OF PURCHASER _____	
NAME AND QUANTITY OF POISON SOLD _____	
PURPOSE FOR WHICH IT IS REQUIRED _____	
SIGNATURE OF PURCHASER _____	
ADDRESS OF PURCHASER _____	
SIGNATURE OF PERSON IN- TRODUCING PURCHASER _____	

Dispensing.

None of the foregoing Regulations apply to any article when forming part of the ingredients of any medicine dispensed by a

Registered Chemist and Druggist; but it is necessary, if a medicine contain a poison included in Part I. or Part II. of the List, that the ingredients of the medicine, together with the name of the person to whom it is sold or delivered, be entered in a book kept for that purpose (Prescription Book) and that the name and address of the seller be attached to the medicine.

APPENDIX II.

WEIGHTS AND MEASURES.

Weights and Measures of the B.P.

THE Weights are those of the Avoirdupois System :

1 Grain. gr.

1 Ounce. oz. = 437.5 grains (the weight of one fluid ounce of distilled water at standard temperature and pressure).

1 Pound. lb. = 16 ounces = 7000 grains.

The Measures of Capacity are of the Imperial Standard :

1 Minim. ℥ or min. (minimum, i, second decl., neuter) = .9114 gr. of water.

1 Fluid Drachm. fl. drm., or f̄j or j̄ (drachma, æ, first decl., feminine) = 60 minims.

1 Fluid Ounce. fl. oz., or f̄j̄, or j̄j̄ (uncia, æ, first decl., feminine) = 8 fl. drachms.

1 Pint. Oj (octarius, ii, second decl., masculine) = 20 fl. ounces.

1 Gallon. Cj (congius, ii, second decl., masculine) = 8 pints.

Note that one fluid ounce of water contains 480 minims and weighs 437.5 grains.

Weights and Measures used in Prescriptions.

The Weights are those of the Apothecaries' System :

1 Grain. gr. (granum, i, second decl., neuter).

1 Scruple. ℥j (scrupulus, i, second decl., masculine) = 20 grs.

1 Drachm. j̄ (drachma, æ, first decl., feminine) = 60 grs.

1 Ounce. j̄j̄ (uncia, æ, first decl., feminine) = 8 drachms.

Note the difference between the avoirdupois ounce (oz. = 437.5 grains) and the apothecaries' ounce (j̄j̄ = 480 grains). The avoirdupois ounce only is employed in the B. P.

The Measures of Capacity are of the Imperial Standard. (See above.)

These have already been enumerated. Sometimes the term gtt. (*gutta*, æ, first decl., feminine, a drop) is used in prescriptions as identical with minim. "Drops," however, are vague quantities. They vary with the specific gravity and viscosity of the fluid, and with the

size and shape of the surface from which the fluid is dropped. Hence, quantities ordered in drops should always be measured in minims.

The letters *ss*, placed in a prescription after any sign signify half the quantity indicated by the sign. They are contracted from *semis*, *issis* (third decl., masculine)—a half. Thus *gr. ss* = semigranum, half a grain; ζss = semidrachma, half a drachm; and so on. The same contraction may be combined with units, as *e.g.*, $\zeta j ss$, *i.e.*, drachma cum semisse, a drachm and a half; *gr. ij ss*, *i.e.*, grana duo cum semisse, two and a half grains; and so on.

Smaller quantities are written as follows: *gr.* $\frac{1}{4}$ (*i.e.*, *pars quarta grani*—the fourth part of a grain), *gr.* $\frac{1}{3}$ (*i.e.*, *pars tertia grani*—the third part of a grain); and so on.

Domestic Measures.

When used as measures for medicines, these are regarded as of the following capacity:

A teaspoonful = 1 fluid drachm (ζj).

A dessertspoonful = 2 fluid drachms (ζij).

A tablespoonful = 4 fluid drachms (ζiv) or half a fluid ounce (ζss).

A wineglassful = 2 fluid ounces (ζij).

A teacup contains about 6 fluid ounces, and a breakfast cup about 8 fluid ounces. An ordinary tumbler is equal to about 10 fluid ounces or half an imperial pint.

Teaspoons, etc., however, vary widely in their capacity, and in measuring medicines for administration it is far better to use accurately graduated glass or other measures.

The Metric System of Weights and Measures is the one exclusively employed in Continental countries in writing prescriptions, and in compounding and dispensing medicines. Both liquids and solids are prescribed and dispensed by weight—in grammes. It may be useful therefore to note some of the values of the metric weights and measures in British equivalents.

1 Gramme = 15.432 grains.

1 Litre = 1.76 pints.

1 Metre = 39.37 inches.

1 Cubic centimetre = 17 minims.

1 Grain = 0.06 grammes, *i.e.*, 6 centigrammes.

1 Ounce (avoirdupois) = 28.349 grammes.

1 Fluid drachm = 3.5 cubic centimetres.

APPENDIX III.

ALKALOIDS are complex chemical bodies resembling in certain respects ammonia (the volatile alkali). They all contain nitrogen, give an alkaline reaction with litmus, and combine with acids to form salts. The salts, as a rule, are soluble both in water and in alcohol. On the addition of an alkali to the aqueous solution the salts are decomposed and the alkaloid precipitated. The alkaloids themselves are insoluble or very sparingly soluble in water, but they are soluble in alcohol, chloroform, and in some cases also in ether. Quinine, Morphine, Strychnine, Physostigmine, are examples. With regard to the salts of the alkaloids, the names are given on the assumption that the acid unites with the alkaloid without decomposition. Thus, hydrochlorate of morphine is regarded as morphine with added hydrochloric acid; as we might assume sal ammoniac to be ammonia (NH_3) with hydrochloric acid (HCl), and name it hydrochlorate of ammonia (NH_3HCl), instead of chloride of ammonium (NH_4Cl)—(Attfield.)

GLUCOSIDES are active principles obtained from various plants, and are distinguished by the fact that, when decomposed by ebullition with a dilute acid or by the action of a ferment, each yields *glucose* and a second substance, which differs according to the glucoside operated on. They are compounds of carbon, hydrogen and oxygen and in some few cases nitrogen also is present. Amygdalin, Tannin, Salicin are examples.

NEUTRAL PRINCIPLES are proximate principles obtained from certain plants and more or less closely allied to the glucosides. Their exact chemical position, however, cannot at present be defined. Elaterin, Picrotoxin, Santonin are examples.

Note.—In the B. P. the English names of all the alkaloids terminate in *ine* (Latin, *ina*), whilst the termination of the names of the glucosides and neutral principles is *in* (Latin, *inum*).

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