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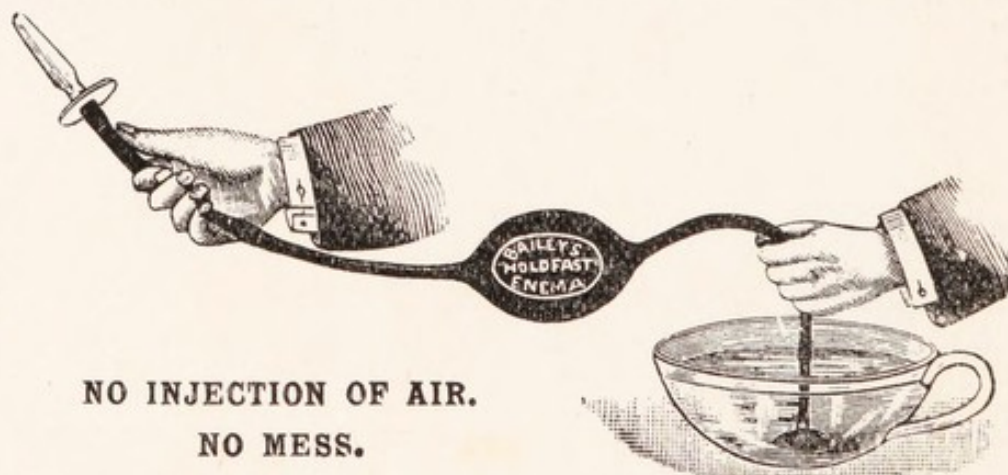
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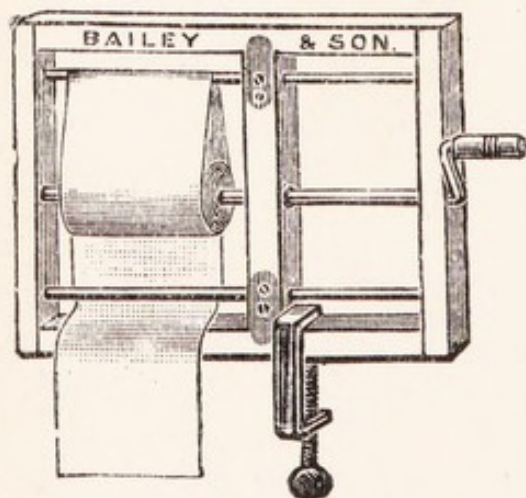
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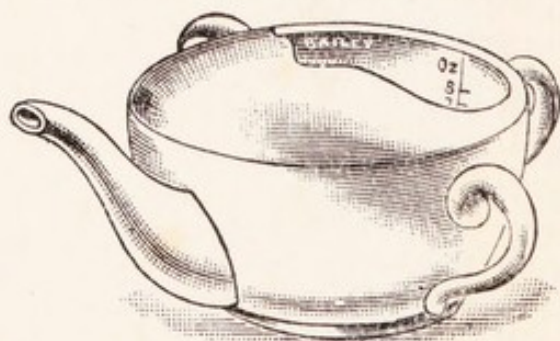
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## FOR NURSES

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C. J. S. THOMPSON, F.R.S.M.

AUTHOR OF "PRACTICAL DISPENSING FOR PHARMACEUTICAL AND MEDICAL STUDENTS," "A MANUAL OF PERSONAL HYGIENE," "THE CHEMIST'S COMPENDIUM," ETC., ETC.

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## PREFACE.


THE chief object of the following notes is to present to the nurse, in simple language, a description of the various methods employed in dispensing the medicinal agents she so frequently handles in the exercise of her calling. Some knowledge of the therapeutic action and the manner of preparing the many remedies in everyday use should be of value to those who are called upon to administer them.

In the space at our command we can only give a brief outline of the various operations the dispenser is called upon to perform.

The art of dispensing is not an easy one to learn, and, it must be understood, can only be acquired by thorough practical instruction and experience.

C. J. S. T.





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## NOTES ON PHARMACY AND DISPENSING FOR NURSES.

### I.

#### FORMS OF PREPARATIONS USED IN PHARMACY.

AS it comes within the province of the nurse in the daily exercise of her calling, not only to handle, but to administer drugs in one form or another, some knowledge of their properties, nomenclature, and methods of preparation cannot fail to be of interest and assistance to her. No complete knowledge of pharmacy, which is essentially a practical art, can be acquired from books alone. We can, therefore, only hope to convey a general idea of this branch of the art of medicine, but one which we trust may lead to a further and practical study of the subject.

In order to understand the peculiarities in nomenclature of the various medicinal agents, it will first be necessary to define the forms and methods of preparation in general use.

In prescriptions, the names of the ingredients



are expressed in Latin, and are mainly those included in the British Pharmacopœia, the official list of drugs and chemicals, their compounds and proportions, issued by the General Medical Council, under the authority of the Medical Act. This work fixes the standard for the preparation of the various forms of medicinal agents, and is supposed to include all the reliable remedies required in the treatment of disease. A further object of the pharmacopœia is to cause the various preparations to be made of uniform strength, and to lay down a standard of purity as to the drugs used.

There are, of course, a large number of remedial agents in common use that are not included in the pharmacopœia, and these are classed as unofficial remedies.

A careful study of this work, therefore, is of the utmost importance to the dispenser, who should be familiar with its processes, and know the proportions of the active ingredients in all its preparations.

The contents of the pharmacopœia may be roughly divided into three parts, *viz.*: (1) The chemical, or inorganic bodies; (2) the vegetable, or organic bodies; (3) the preparations of the above. The nurse should first make herself thoroughly acquainted with the English and Latin names of the chemicals, drugs, and preparations of the pharmacopœia, which are



arranged alphabetically in that work, and, further, take note of their chief characters and doses.

Taking the British Pharmacopœia as a guide, the first group of galenical preparations we come to are the vinegars.

The *Vinegars* are preparations in which diluted acetic acid is employed to exhaust certain drugs, such as ipecacuanha and squill.

The *Medicated Waters* of the Pharmacopœia chiefly consist of aqueous solutions of the volatile principles of vegetable substances. Dill, anise, orange-flower, carraway, cinnamon, fennel, cherry laurel, peppermint, spearmint, pimento, rose and elderflower are prepared by distillation; and chloroform water by simply shaking a certain proportion of chloroform and water together.

*Confections* are preparations of solid medicaments made into the form of a paste by the addition of sugar or honey.

*Decoctions* are watery solutions of vegetable and medicinal substances prepared by boiling with water. With one exception, the simple drug, after being prepared, is boiled for ten minutes or longer with a certain proportion of water and then strained.

*Plasters* are solid tenacious compounds employed for local application. They are usually composed of some active drug with wax, resin,



soap and oil as a basis. They are melted and spread on leather or other media for application to some part of the body.

The *Extracts* of the Pharmacopœia are solid and liquid preparations. Some consist of the fresh juice of the drug reduced to semi-solidity by evaporation. These are commonly termed fresh or green extracts. Others are prepared from the drug in a dry state by the action of cold or boiling distilled water, by means of which all the soluble matters are dissolved, and the fluid is then evaporated to a proper consistence. The active principles of another class are extracted by means of rectified or diluted spirit, and finally evaporated. The liquid extracts are prepared by a similar process, but the resulting products are not evaporated to dryness.

The *Glycerins* are preparations in which glycerin forms the solvent for some active medicinal substance.

*Infusions* are simply prepared by allowing a certain proportion of a vegetable drug to infuse in hot or cold water for a period varying from fifteen minutes to one hour, according to the solubility of the active ingredients.

The *Hypodermic Injections* consist of solutions of various alkaloids in distilled water, with sometimes the addition of a preservative.

*Discs* of gelatine, medicated with various alka-



loids for use in ophthalmic cases, are also included in the Pharmacopœia.

*Liniments* are fluids of an oily or soapy nature which are employed as external remedies, and are either rubbed on or otherwise applied to the body.

The *Solutions* or *Liquors* form an important class among the preparations of the Pharmacopœia. Some consist of concentrated vegetable liquors, while others are watery solutions either of inorganic substances or of certain definite organic principles, such as morphine, strychnine, etc. The solutions of arsenic, atropine, and morphine hydrochlorate, acetate, and bimeconate, are prepared of the uniform strength of 1 per cent. in water and spirit.

The *Mixtures* of the Pharmacopœia mainly consist of insoluble principles suspended in water by means of gummy or other matters, together with other ingredients.

*Pills*.—The Pharmacopœia includes many formulæ for the preparation of pill masses, both simple and compound. These for the most part consist of insoluble principles in powder, combined with some soft substance such as soap, treacle, confection of roses, or glycerin, in order to form them to a suitable consistence for making into pills.

The *Compound Powders* of the Pharmacopœia



are made by simply mixing various drugs together in the form of fine powder.

*Spirits* are solutions of volatile oils or other bodies in rectified spirit. The aromatic spirit of ammonia (sal volatile), compound spirit of ether, and the spirit of nitrous ether, are prepared by distillation.

The *Juices* consist of the expressed juice of plants to which one-third of the volume of rectified spirit is added as a preservative from decomposition.

*Suppositories* are a form of local application of conical shape, to be administered *per rectum*.

*Syrups* are preparations in which sugar forms the chief ingredient. They are generally used as flavouring agents, or to preserve some active body from undergoing chemical change.

*Tinctures* are fluid preparations in which the active principles of the drug are extracted and dissolved in rectified or diluted spirit, or other suitable solvent. Rectified spirit is employed whenever the active portion of the drug is only sparingly soluble in diluted spirit. Proof or diluted spirit is used for making a large number of tinctures in the pharmacopœia, the amount of alcohol present acting as a preservative as well as a solvent, to keep the preparation for a considerable period.

*Ointments* are semi-solid applications usually employed for smearing over the surface of the

body, the base consisting of some fatty matter, such as lard, soft paraffin, or mixtures of wax and oil, etc.

*Wines* are preparations in which sherry is used as a solvent instead of rectified or diluted spirit. They contain much less alcohol than the tinctures, but sufficient to prevent decomposition of their active ingredients.

The *Lozenges* of the Pharmacopœia contain certain medicinal substances mixed with gum, sugar, or black-currant paste. The ingredients are first formed into a mass which is divided or cut into lozenges, round or oval in shape, and then dried.



## II.

ALTERATIVES — ANÆSTHETICS — ANODYNES — ANT-  
ACIDS — ANTEMETICS — ANTHELMINTICS — ANTHI-  
DROTICS — ANTIPARASITICS — ANTIPERIODICS AND  
ANTIPYRETICS.

HAVING considered the chief forms used for administering medicine, we will proceed to enumerate the principal remedial agents of definite operation, classed according to their therapeutic action.

*Alteratives* are medicines which gradually change and correct a morbid condition of the bodily organs. They include oxide, sulphurated, and tartarated antimony, arsenic and its preparations, iron salts, dilute nitro-hydrochloric acid, ammonium chloride, potassium chlorate, sodium chloride, iodine and the iodides, phosphorus and the hypophosphites, and the salts of potassium. Of mercury, we have the mixture of mercury with chalk (grey powder), blue pill, calomel, and the perchloride. Of sulphur, the sublimed, precipitated, and the sulphides. Among vegetable bodies, dulcamara, guaiacum, hemidesmus (renal), iridin, mezereum, and dandelion, leptandrin sarsaparilla, phytolaccin, and podophyllin.



*Anæsthetics* are substances which suspend consciousness, or cause insensibility to pain. They may be divided into two classes, *viz.* : (1) General, administered by inhalation; (2) local, administered by spray or other application to the part. In the first class we have ether, pure and methylated (it was first used as an anæsthetic for capital operations in 1846, and pure ether is still preferred by some to chloroform, as it has a much less depressing effect upon the heart, and may be used for prolonged operation); ethyl bromide, which is very rapid in its action; ethyl iodide; the A. C. E. mixture, which is composed of chloroform, ether and rectified spirit; pental; and carbon tetrachloride. Chloroform, more frequently used than any other anæsthetic, is obtained by distillation from a mixture of chlorinated lime, slaked lime, and weak spirit. Other anæsthetics of this class are methylene, introduced in 1867, nitrous oxide gas, chiefly used in dental operations, and Regnauld's anæsthetic mixture, which is composed of chloroform, and methylic alcohol.

Among local anæsthetics we have acid carbolic, ether (spray), ethyl bromide, ethyl chloride, cocaine hydrochloride (now largely used for producing anæsthesia in the eye and portions of the mucous membrane), eucaine hydrochloride, iodoform, menthol, holocaine hydrochloride, ice, orthoform, stovaine, novocaine, and methyl chlor-



ide (which produces intense cold, caused by its rapid evaporation).

*Anodynes* or *Analgesics* are medicines which alleviate pain by lessening the excitability of nerves or nerve centres. Among those of chemical origin are the bromides of potassium, ammonium, and sodium, all valuable anodynes, the two latter salts having a less depressing effect than the former; butyl chloral hydrate, chloral hydrate, chloroform, amyl nitrite (by inhalation, in angina pectoris, and asthma, and restorative in defective breathing). Among the more modern remedies we have antipyrine (its anodyne properties being especially useful in neuralgia and gout), aspirin, salophen, apolysin, antifebrin (in neuralgia and nerve affections), exalgin, and phenacetin. Anodynes of vegetable origin include aconite and aconitine (used in acute rheumatism and facial neuralgia), belladonna and atropine (the former given in nervous and inflammatory affections and the latter used locally to relieve pain) caffeine, cajepute oil, camphor, and Indian hemp. Opium, morphine, and codeine, conine, conium, quinine, and veratrine are all powerful anodynes. Of milder action we have henbane, hops, piscidia, scopola, stramonium, and spirit of ether.

*Antacids* are medicinal agents which correct acidity of the secretions, and naturally consist of alkaline bodies. Of these we may mention ammonia carbonate, aromatic spirit of ammonia,



bismuth lozenges, lime water (useful in diarrhoea connected with acidity), carbonate of lime, prepared chalk, compound decoction of aloes, carbonate and citrate of lithia, magnesia and its carbonate (valuable in dyspepsia, heart-burn, sick headache, gout, and other complaints attended with acidity), solution of potass, potassium carbonate and bicarbonate, sodium carbonate and bicarbonate, solution of soda, effervescing soda water, and hard soap.

*Antemetics* are medicines which arrest vomiting from disease, sea-sickness, etc. Among these may be included carbolic acid (which is given in small doses from one to two grains to check sickness and flatulence), hydrocyanic acid (in combination with other drugs to allay vomiting), diluted phosphoric acid (useful in cases of vomiting arising from bilious attack), nitrate of silver, bismuth salts (which are extremely valuable in some forms of irritative dyspepsia accompanied by vomiting), solution of lime, oxalate of cerium (of great use in chronic vomiting), chloral hydrate, chloroform, hydrochlorate of cocaine (said to be successful as a preventive to sea-sickness in doses of a quarter of a grain), creosote (given to arrest nausea in hysteria, and for obstinate sea-sickness), mercury with chalk (chiefly given to children in diarrhoea and vomiting), bicarbonate of potash (usually prescribed for sickness, in effervescence with citric acid), effervescing potass



and soda water, bicarbonate, citrate and bromide of sodium, and oxide of zinc (which is given in spasmodic affections).

*Anthelmintics* (vermicides) are medicines given to destroy worms or expel them from the alimentary canal, and are thus termed vermifuges. The vermicides used for destroying ascarides or thread worms are: carbolic acid, aloes, areca, perchloride of iron, sulphate of iron, quassia, senna, chloride of sodium, castor oil, turpentine, and santonin. For round worms: santonin. For tape worms: kousso, liquid extract of male fern, pomegranate root and bark, pelletierine sulphate and tannate, kamala, and turpentine. Vermifuges include areca nut (for round and tape worm), calomel, gamboge, jalap, castor oil, and scammonium.

*Anthidrotics* are medicines which check perspiration. The following are frequently prescribed: Acetic acid diluted, salicylic acid, sulphuric acid diluted, tannic acid, agaricus (employed in the night sweating of phthisis), atropine (for excessive secretion from the sweat glands), belladonna, sulphate of iron, compound iron mixture, decoction of logwood, henbane, picROTOXINE (as a remedy against profuse sweating), quinine, scopolamine, strychnine, and oxide of zinc.

*Antiparasitics* are agents used for destroying vegetable and animal parasites. They include sulphurous acid, a powerful deoxidising agent



destructive to vegetable life; oleate of copper (employed in ringworm, when diluted with lard), ammoniated mercury (used for pediculi), iodine (employed externally for ringworm), naphthalene (a valuable insecticide, and used with success in scabies), pyrethrum flowers, quassia, hyposulphite of sodium (used as a lotion for parasitic skin diseases), sozoiodol (used as a local application for the same purpose), staphisagria (employed in the form of ointment as a non-irritating remedy in scabies and as a parasiticide), and sulphur and tobacco as insecticides.

*Antiperiodics* are medicines which have the property of interrupting periodical attacks of disease. Of these the salts of quinine are most frequently used, and of great value in intermittent fevers, when given in large doses. They also include arsenious acid (prescribed in agues and neuralgic affections), sulphate of berberine, liquid extract of cinchona, bebeeru bark, salicin, and chloride of sodium.

*Antipyretics* are medicines which reduce the temperature in fever. Among the older remedies are aconite, tartarated antimony, citrate of potash, quinine, and salicin. Within the last few years this class of medicinal agents has been largely increased by a series of synthetic bodies, mostly derived from coal tar, which have become very popular with prescribers. These bodies are said to produce changes in the blood, diminishing its



respiratory capacity and destroying red corpuscles. They include antifebrin, antipyrine, antiseptin, analgene, chinoline (given in doses of from 3 to 10 drops), exalgin (dose, 2 to 6 grains), formanilide (dose, 1 to 4 grains), kairine (dose, 5 to 8 grains), neurodin (dose, 5 to 15 grains), phenacetin (dose, 5 to 10 grains), iodo-pyrin (dose, 5 to 20 grains), salipyrin (dose, 15 to 30 grains), tolusal (dose, 5 to 20 grains), phenocoll hydrochlorate (dose, 7 to 15 grains), salol, salocoll (dose, 10 to 30 grains), thalline sulphate (dose, 3 to 8 grains), and thermodin (dose, 5 to 15 grains).

## III.

ANTISEPTICS — ANTISPASMODICS — ASTRINGENTS —  
CARMINATIVES — CATHARTICS — CAUSTICS — DE-  
MULCENTS — DIAPHORETICS — DISINFECTANTS —  
DESICCANTS.

ANTISEPTICS are agents which prevent the decomposition of organic structures, and therefore of great value in surgery. This class includes a large and increasing number of chemical bodies, the majority of which it will be only necessary to enumerate. The following are those chiefly employed: Acids — benzoic, boric (used as a dressing for granulating and suppurating surfaces in general, also in lotions and eye-washes, etc.), carbolic (as a dressing, with water or oil 1 in 20 or 1 in 40), chromic, cresylic, hydrochloric, nitric, pyrogallic, salicylic (in solution as a preservative), sulphurous, trichloracetic, acetate of alum, aristol, airol, alum solution, alumnol, alum chloride solution, alum oleate, ammonia carbonate, antifebrin, antipyrine, borax, boroglyceride, chlorinated lime, charcoal, bisulphide of carbon, chinolin, cream of tartar, chlorine solution, chloroform, creosote, copper oleate, eucalyptol, euro-



phen, glycerin, helenin, mercuric cyanide, mercuric zinco-cyanide, mercuric perchloride (in solution with water 1 in 1000, a powerful antiseptic and bactericide), mercury and potassium iodide, iodoform, iodol, iodine, loretin, lysol, menthol, naphthalene, naphthol, nosophen, sulphurated potass, phenosallyl, permanganate of potass, resorcin, sal alembroth (used in the antiseptic treatment of wounds, in the form of solution, gauze, 1 per cent., or wool, 2 per cent.), salol, chlorinated soda solution, benzoate of soda, chloride of sodium, sodium of sulphite, sodium sulphocarbolate, sozoiodol, turpentine oil, thalline, sulphate, thymol, tribromophenol, trichlorophenol, zinc chloride, and zinc sulphocarbolate.

*Antispasmodics* are medicines which allay or prevent the recurrence of spasms. They include acid hydrocyanic dilute, ammonia, ammon. carbonate, aromatic spirit of ammonia, ammoniacum, amyl nitrite, nitrate of silver, asafoetida, belladonna, bromides, calendula, camphor, Indian hemp, cerium oxalate, chloral hydrate, chloroform, cimicifuga, conium, ether, galbanum, grindelia, henbane, lobelia (chiefly used in spasmodic asthma), musk (used in hysteria), oil of peppermint, nitro-glycerin (used in solution and in tablets, chiefly for angina pectoris), quebrache, rue, stramonium, sumbul, fetid spirit of ammonia, turpentine, valerian and the valerianates (used in hysteria), zinc sulphate and oxide.



*Astringents* are medicinal agents that produce contraction of the tissues and coagulation of the albuminous fluids. They are given to improve digestion and check increased secretions, mucous discharges, and hæmorrhages, or applied locally to prevent relaxation and to stop bleeding. The principal mineral bodies used as astringents include all the diluted mineral acids, alum, nitrate of silver, oxide of silver, borax, cadmium sulphate, calamine, calcium carbonate, carbolic acid, creosote, prepared chalk, copper sulphate, iron perchloride, iron pernitrated solution, iron sulphate, iron and quinine citrate, lead acetate, carbonate and oxide; solution of subacetate of lead, zinc acetate, carbonate, chloride, oxide, sulphate and sulphocarbolate. The vegetable substances include acetic acid diluted, gallic acid (given in all cases where the bleeding vessels must be reached through the circulation), tannic acid (useful when the mucous membrane is relaxed, bleeding at nose and uterine hæmorrhage), bael fruit (employed in dysentery and diarrhœa), catechu (chiefly used in diarrhœa), cinchona, cinnamon, cornutine, ergot (valuable in uterine hæmorrhage), male fern, pomegranate root, guarana, red gum, logwood (used in diarrhœa), hamamelis, hydrastis, rhatany, kino, larch, matico, oak, roses, rumicin, tannalbin, tannigen, turpentine, elm, bearberry, vinca major, and vinegar.

*Carminatives* are medicinal agents which



stimulate or aid the removal of flatus from the stomach and intestines, and relieve griping. Nearly all the aromatic essential oils are used for this purpose, including dill, anise, carraway, cinnamon, coriander, fennel, juniper, lavender, lemon, mint, peppermint, and nutmeg. Acetic ether, camphor, charcoal, laudanum, pepper and ginger are also largely employed as carminatives.

*Cathartics* are medicines which promote intestinal evacuations or induce action of the bowels. They may be divided into three classes, *viz.*: 1. Mild or laxative, include belladonna, cassia, euonymin, ox gall, figs, liquorice powder (compound), ipecacuanha, magnesia and its carbonate, manna, mulberry juice, nux vomica, olive oil, potassium sulphate and tartrate, prunes, rhamnus frangula, cascara sagrada, castor oil, soap, effervescing citro-tartrate of soda, phosphate of soda, sulphate of soda, tartarated soda, sulphur, precipitated sulphur, tamarinds, dandelion, and treacle. 2. Active aperients: Aloes Barbadoes and Socotrine, baptisin, colchicum, black hellebore, iridin, kamala, leptandrin, sulphate of magnesia (Epsom salts), podophyllin rhubarb, and senna. 3. Strong purgatives: Bryonia, gamboge, colocynth, croton oil, elaterium, black hellebore, calomel, jalap, acid tartrate of potassium and scammonium.

*Caustics* are substances which destroy the vitality of the parts to which they are applied.



They include: Glacial acetic acid (largely employed for destroying corns and warts), arsenious acid (used in the form of a paste to destroy the sensibility of carious teeth), acid carbolic, acid chromic (a powerful agent which will readily dissolve all animal tissues), acid nitric, acid sulphuric, chloride of antimony, nitrate of silver (for cauterising poisoned wounds), lime, creosote, acetate and subacetate of copper, nitrate and sulphate of copper, red iodide of mercury, red oxide of mercury, perchloride of mercury, acid nitrate of mercury, iodine liniment, caustic potash, permanganate of potash, caustic soda, solution of ethylate of sodium (used in the treatment of nasal polypus and lupus), chloride and nitrate of zinc.

*Demulcents* are substances which soften and allay irritation of mucous membranes. The following are chiefly employed: Gum acacia, marsh-mallow, sweet almond, starch, spermaceti, Irish and Iceland moss, quince seed, figs, glycerin, liquorice, barley, isinglass, linseed oil, arrowroot, honey, cod-liver oil, olive oil, albumen of egg, treacle, tragacanth, creeping couch grass, elm bark, and raisins.

*Diaphoretics* are medicines which increase the action of the skin and promote sweating. They are given in a case of chill, also in fevers, dropsy, and some skin diseases. They include ether, alcohol, solution of acetate of ammonia, ammon.



carbonate, chloride, and phosphate; antimonial powder, tartarated antimony, wine of antimony and sulphurated antimony, horse-radish, buchu, spirit of cajaput, calendula, camphor, chloroform, wine of colchicum, Dover's powder, dulcamara, grindelia, ammoniated tincture of guaiacum, ipecacuanha powder and wine, jaborandi, lettuce, lobelia, morphine, opium, pilocarpine potassium citrate and nitrate, savin, sassafras, senega, simarubra, serpentaria, spirit of nitrous ether, sulphur, and oil of turpentine.

*Disinfectants* are substances which act on the specific poisons of communicable diseases so as to prevent their spreading. Amongst those in general use are acid carbolic, acid nitrous, acid sulphurous, acid chromic, acid cresylic, iodol, salol, solution of chloride of alum, chlorinated lime, chlorine iodoform, iodine, eucalyptus oil and preparations of the leaves, naphthol, permanganate of potash, Condyl's fluid, potassium bichromate, sulphate of iron, hydrogen peroxide, sulphur dioxide, chlorinated soda solution, terebene, thymol, trichlorphenol, zinc chloride in solution (known as Burnett's solution); also the numerous carbolic and coal-tar derivatives sold under various names. The majority of disinfectants also act as deodorisers and destroy offensive smells.

*Dessicants* are agents which check secretion and dry up mucous discharges from ulcers and wounds. They include bismuth subnitrate, cal-

cium carbonate, calcium hydrate, prepared chalk (used externally for burns and ulcers), magnesium carbonate, lead acetate and carbonate (employed in diminishing profuse discharges from ulcers), talc, and zinc oxide.

*Deodorants* are substances which destroy offensive odours and absorb foul gases. They include chromic acid, sulphurous acid, charcoal, eucalyptus oil, eucrophen, hydrogen peroxide, iodoform, iodol, loretin, potassium permanganate, thymol, trichlorphenol, and zinc chloride, etc.



## IV.

DIURETICS — EMETICS — EMMENAGOGUES — EMOLLI-  
ENTS — EXPECTORANTS — HYPNOTICS — IRRI-  
TANTS — MYDRIATICS — NUTRITIVES — REFRIGER-  
ANTS — SEDATIVES.

DIURETICS are medicines which promote the secretion of the urine. They include acid benzoic (useful in inflammation of the bladder), alcohol, solution of acetate of ammonium, ammonium benzoate and chloride, apocynium (given in dropsy as a diuretic), horse-radish, borax, buchu (employed in complaints of the urinary organs, such as irritation of the bladder and urethra, etc.), caffeine, cantharides, caulophyllin, colchicum, convallaria, copaiba, cubebs, damiana, digitalis infusion, dulcamara, euonymin, hemidesmus root, iridin, juniper oil, lettuce, lithia water (effervescing), paraldehyde, tar, potass water (effervescing), pareira decoction, potassium acetate (used in dropsy), potassium nitrate, acid tartrate, tartrate, bicarbonate (useful in urinary affections where there is a deposit of uric acid), carbonate, chlorate, citrate and nitrate, solution of potash, senega infusion, broom, squill, sima-



rubra, sodium bicarbonate, phosphate, sparteina, spirit of nitrous ether, turpentine, ulexine (used in cases of dropsy due to heart disease), elm decoction, and bearberry leaves.

*Emetics* are medicines which excite vomiting. The following are chiefly used: Alum in repeated doses of a teaspoonful in honey or treacle, chamomile (infusion in large doses produces vomiting), tartarated antimony as an emetic from 1 to 2 grains, apomorphine hydrochlorate (a powerful and prompt emetic, usual dose  $\frac{1}{10}$  grain injected hypodermically), baptisin, copper sulphate (5 to ten grains will induce vomiting), emetine hydrobromide, ipecacuanha powder (as an emetic, 15 to 30 grains), mustard (in powder—a tablespoonful in half a pint of water), sodium chloride (common salt)—in large doses in water (in case of a leech being swallowed, a strong solution of common salt should be given), tobacco, zinc acetate, zinc sulphate (as an emetic from 10 to 30 grains).

*Emmenagogues* are medicines which maintain or restore a healthy condition of the menstrual discharge and increase the quantity. They include compound decoction of aloes, pill of aloes and myrrh, ammonium chloride, apiol, borax, calendula, cimicifuga, ergot, reduced iron, black hellebore, manganese oxide, potassium permanganate (useful in amenorrhœa), quinine rue, savin, and senega.

*Emollients* are substances which soften and



relax the tissues, and are useful in protecting sensitive surfaces and allaying irritation. They are best used in combination. They include lead, lanoline, almond oil, white wax, spermaceti, collodion, glycerin, glycerin of starch, olive oil, prepared suet, vaseline, etc.

*Expectorants* are medicines which promote the secretion of bronchial mucus. The following are chiefly used: Acid benzoic, ammonia, ammonia carbonate (useful in pneumonia and bronchitis), ammonium benzoate and chloride (in chronic bronchitis internally, and by inhalation), ammoniacum (employed in chronic catarrh and asthma), oil of aniseed, tartarated antimony (given in continued small doses to relax the mucous membranes and skin), apomorphine hydrochlorate (used in croup, bronchitis, and bronchial catarrh), asafoetida, balsam of Peru, and balsam of tolu (largely given in chronic catarrh, asthma, and pectoral complaints), benzoin (employed in the form of compound tincture for chronic cough, internally and by inhalation), copaiba, cubeba, codeine, ether, galbanum (useful in chronic affections of the mucous membrane), ipecacuanha (valuable in bronchial complaints), larch, lobelia, myrrh, tar (in chronic bronchitis, internally or by inhalation), quillaia, squills (a popular remedy in the form of syrup; increases the secretion of the bronchial mucous membrane, and aids expectoration of mucus in chest complaints), sene-



ga (chiefly used in chronic bronchitis), styrax, carbolic acid, chlorine, creosote, and iodine (by inhalation in bronchitis and chronic congestion of the larynx).

*Hypnotics* or soporifics are medicines which induce sleep. They include amyl nitrate, boldo, butyl chloral hydrate, monobromated camphor (given in hysteria and delirium tremens), Indian hemp, chloral hydrate, chloralamid, chlorobrom, chloroform, codeine, conium, creosote, henbane, hyoscyamine sulphate, hyoscine, (used hypodermically), hypnone, hops, methylal, morphine and its salts, narceine, opium, paraldehyde, piscidia, potassium bromide, sodium bromide, sulphonal, somnal, urethane, stramonium, chloralose, papaverine, bromal, acetophenone, amylene hydras, bromida, hypnal, metaldehyde, tetronal, trional uralium, and scopolamine hydrobromate.

*Irritants* are substances which stimulate and cause irritation or inflammation of the parts to which they are applied; they differ in their intensity of action, and may be divided as follows:—Rubefacients when applied to the skin produce local warmth and redness. They include alcohol, ether, liquid ammonia, warming plaster, pitch plaster, compound camphor liniment, capsicum liniment, chloroform liniment, iodine liniment, compound mustard liniment, mezereum, cajeput oil, lemon oil, rosemary oil, and also the oils of rue, amber, and turpentine.



Vesicants are agents which raise a vesicle or blister, as glacial acetic acid, strong liquid ammonia, and cantharides. Pustulants are those which produce a pustule, such as tartarated antimony, nitrate of silver, and croton oil.

*Mydriatics* are agents which produce dilatation of the pupil of the eye. They include atropine sulphate, belladonna, daturine, duboisine sulphate, ephedrine hydrochloride, homatropine and its hydrobromide (more rapid in action than atropine), hyoscyamine, hyoscyine hydrobromide, and scopolamine.

*Nutritives* are substances which quicken assimilation and improve the condition of the living tissues. They include gum acacia, sweet almonds, malt extracts, meat extracts, Irish moss (used as an article of food on the west coast of Ireland, where it is found), Iceland moss decoction, figs, glycerin, milk, manna, arrowroot, cod-liver oil, olive oil, yolk of egg, prunes, sugar of milk, suet, mixture of brandy, treacle, and raisins.

*Refrigerants* are medicines which diminish the body heat and quench thirst. The following are chiefly employed: Acetic acid diluted, citric acid, hydrochloric acid diluted, nitric acid diluted, phosphoric acid diluted, tartaric acid, sulphuric acid diluted, solution of ammonium acetate, orange juice, lemon juice, solution of citrate of magnesia, mulberry syrup, lemon syrup, oxymel, citrate of potassium, chlorate of potassium,



nitrate of potassium, acid tartrate of potassium, prunes, spirit of nitrous ether, tamarinds, and pure water. A weak infusion of cascarilla bark is recommended to quench thirst during fevers.

*Sedatives* are agents which exert a soothing influence on the system by diminishing pain, lessening functional activity, or tranquillising disordered muscular movement. They may be classed as follows:—*Local Sedatives*: such as acid carbolic (given as a sedative to check sickness and flatulence), acid hydrocyanic (used to allay vomiting), atropine, belladonna, borax, chloral hydrate, creosote, morphine, opium, acetate of lead and solution of subacetate of lead (externally for inflammation arising from sprains and bruises). *Respiratory Sedatives*: Acid hydrocyanic, bromide of ammonium, belladonna, oxalate of cerium, gelsemium, cherry laurel water, ethyl iodide, codeine, lobelia, morphine, opium, wild cherry bark (useful in the form of syrup for spasmodic cough), and stramonium (employed also in convulsive coughs). *Nervine Sedatives*: Ammonium bromide, monobromated camphor, gelsemium, bromide of nickel, Calabar bean, phenacetine, phenazone, trional, potassium nitrate and bromide, sodium bromide, green hellebore, (in spinal spasms), viburnum (as a sedative to the uterine nervous system), and bromide of zinc. *Stomachic Sedatives*: Arsenious acid, carbolic acid, hydrocyanic acid, phosphoric acid diluted, nitrate of



silver, belladonna, bismuth salts, solution of zinc, oxalate of cerium, chlorobrom, chloroform, cocaine hydrochlorate, creosote, mercury with chalk, henbane, opium, potassium bicarbonate, effervescing potass water, sodium bicarbonate, effervescing soda water, sodium bromide, and zinc oxide. *Cardiac Sedatives*: Aconite, nitrite of amyl, tartarated antimony, apocynum, cherry laurel water, colchicum, chloral hydrate, digitalis, ergot, ipecacuanha, nitro-glycerin, acetate of lead, potassium nitrate, sodium nitrite, spirit of nitrous ether, stramonium, and green hellebore.

## V.

SIALAGOGUES—STIMULANTS—STYPTICS—TONICS  
—GUIDE FOR STUDY AND QUALIFICATIONS.

SIALAGOGUES are medicines that increase the secretion of the saliva. They include ether, horseradish, mercury and its salts, the iodides, jaborandi, mezereum, Calabar bean, pilocarpine, pepper, pellitory, rhubarb, mustard, tobacco, and ginger.

*Stimulants* increase the natural function of a part, or of an organ. They are classed as follows :

*General Stimulants* : Alcohol in small doses, ether, ammonia, arnica, cajepute oil, and phosphorus.

*Spinal Stimulants* : Benzoic acid, ether, arnica, ammonia carbonate, belladonna, Indian hemp, cantharides, coffee, ergot, guarana, morphine, musk, nux vomica, cajepute oil, opium, phosphorus, strychnine. *Vascular Stimulants* : Alcohol, ether, ammonia, castoreum, convallaria, cubebs, galbanum, guaiacum, mezereum, sassafras, strychnine, sumbul, oil of turpentine, and valerian.

*Styptics* are medicinal agents which arrest bleeding. They include vinegar, silver nitrate, catechu, cinchona (in powder), collodium, creosote, copper sulphate, ergot, erigerontis oil, iron perchloride, galls, pomegranate bark, red gum, logwood (liquid extract), hamamelin, kino, krameria, oak bark, lead acetate, rectified alcohol, turpentine, zinc acetate and sulphate, gallic acid (valuable



remedy for internal hæmorrhage), tannic acid, alum, and matico.

*Tonics* are medicines which impart tone or strength to the body or its parts. They may be classed under the following heads. *Tonics that act through the blood and improve its quality*: preparations of iron, cod-liver oil, arsenic, phosphoric acid, Easton's syrup, and potass permanganate. *Nervine Tonics*: Arsenic, nitrate of silver, oxide of silver, oxalate of cerium, cinchona bark, and its preparations, coca, copper sulphate, damiana, iron salts, nux vomica, phosphorus, sodium and calcium hypophosphites, strychnine, zinc acetate, oxide and sulphate. *Stomachic and Intestinal Tonics*: Acids hydrochloric diluted, nitric diluted, nitro-hydrochloric diluted, phosphoric diluted, sulphuric diluted, chamomile, orange peel, balsam of Peru, beberine sulphate, buchu, calumba, canella, cascarilla, chiretta, cinchona bark, cinchonidine, cinchonine, cusparia, compound decoction of aloes, dandelion, gentian, guarana, hydrastin, lemon peel, hop, menyanthes, winter's bark, nux vomica, pepsine, peptonised foods, pareira, quassia, quinine sulphate, rhubarb, salicin, scopentaria, and strychnine. *Vascular Tonics*: Adonis, apocynum, caffeine, convallaria, digitalis, iron salts, nux vomica, squill, sparteina, strophanthus, strychnine, and green hellebore.

Having enumerated many of the drugs and preparations employed in the practice of medicine, with which it is necessary for the student



to become familiar, it will be well, before proceeding to deal with the practical art of dispensing to indicate a guide to the study of the several subjects bearing on pharmacy, of which a knowledge is necessary.

To commence with, an intimate knowledge of the British Pharmacopœia and its preparations, with their doses, is most essential. A good method of impressing these on the memory is to write down the English and Latin names of the drugs and chemicals, followed by the preparations they enter into, and their doses. To gain an insight into pharmaceutical and practical chemistry, Attfield's, Newth's, or Muter's works on this subject will be found most useful. The processes for manufacturing all the chemicals included in the pharmacopœia, together with the general laws relating to chemistry and pharmacy, are given in these books.

Materia medica must also receive attention, especially that of the organic or vegetable kingdom, and a knowledge of the active principles of drugs and the methods of judging their quality and freedom from adulteration acquired. For this purpose Maisch's, Greenish's, or Southall's *Materia Medica* are recommended. For the study of botany the student cannot do better than use Scott's *Structural Botany* and Green's *Manual*, aided by practical examinations of plants and specimens. Pareira's *Selecta à Pre-*



*scriptis* is a useful little work, which contains the usual terms employed in prescriptions, and from which instruction in reading and translating Latin prescriptions may be gained. Lucas' *Practical Pharmacy* or Cripp's *Galenical Pharmacy* are valuable works on this subject, and Thompson's *Chemists' Compendium* and Thompson's *Practical Dispensing* should also be carefully studied.

Besides the systematic study of the subjects mentioned, a course of instruction under a qualified pharmacist is necessary, in order to learn the many technicalities connected with the art, which can only be gained by practical experience.

Should the nurse wish to qualify as a chemist and druggist or pharmaceutical chemist in this country, it is necessary to enter for the following examinations, which are held under the direction of the Pharmaceutical Society of Great Britain, which is empowered by the Legislature to hold examinations for those who desire to become registered pharmaceutical chemists, and chemists and druggists or compounders of medical prescriptions.

The first step necessary is to become registered as a "student" or "apprentice" of the Pharmaceutical Society. To do this, it is necessary to produce a certificate of having passed an educational examination, which must include English Grammar and Composition, Latin, a



modern foreign language, Arithmetic, Algebra and Euclid.

A list of the examinations (which includes the Junior or Senior, Oxford or Cambridge Locals) the certificates of which are accepted by the Pharmaceutical Society, may be obtained on application to the Registrar, 17 Bloomsbury Square, London, W.C.

The second, called the "Minor" or qualifying examination is held four times during the year, in London and Edinburgh.

This examination is divided into two parts *viz.*, practical and oral, and is taken on two separate days.

The fee for the examination is ten guineas.

The candidate must have attained the age of twenty-one years, and must produce a certified declaration of having been practically engaged in the translation and dispensing of prescriptions for a period of three years. The subjects comprised are: (1) Chemistry and physics. (2) Practical chemistry, including the determination of the specific gravity of liquids and solids, the detection of the chief impurities in the drugs and chemicals included in the British Pharmacopœia, and the candidate must also be able to perform qualitative and volumetric analysis, etc. (3) Botany, including the recognition of plants and a general knowledge of structural botany and the physiology of plants. This subject includes



practical work with the microscope. (4) *Materia medica* includes the recognition of crude drugs and the detection of their adulterations. Their geographical sources and botanical and zoological names must be given, etc. (5) Prescription reading and translating, and the detection of errors and unusual doses is necessary. (6) Pharmacy includes a knowledge of the various operations and processes necessary in manufacturing pharmaceutical preparations and the principles involved in the dispensing of medicines, such as the best excipients and methods for forming pill masses, the preparation and nature of emulsions and the most suitable agents for that purpose, and the best means of suspending insoluble substances in liquids. (7) Practical pharmacy and dispensing. The candidate is required to conduct such operations of the British Pharmacopœia as involved in the processes of making tinctures, extracts, infusions, mixtures, and other preparations, and is also examined in practical dispensing. Those who pass this examination are registered and qualified as chemists and druggists, and may practise as such or dispensers of medicine.

The third or major examination for registration as a pharmaceutical chemist, demands a more advanced knowledge in chemistry, physics, practical chemistry, botany and *materia medica*, and is optional.



## VI.

THE ART OF DISPENSING—THE PRESCRIPTION—  
WEIGHING AND MEASURING.

THE art of dispensing consists in the compounding of medical prescriptions in a proper and scientific manner. In order to become a competent and proficient dispenser, practical instruction and considerable experience are absolutely necessary; therefore, from the outset, it must not be expected that an art which is by no means easy to acquire, can be mastered from a simple description of its various operations.

Dispensing presents no special difficulties which a woman, by study, practice, and careful attention, should not be able to overcome. Delicate manipulation and care are two very essential points in dealing with minute quantities such as grains and minims, and this carefulness in every detail should be cultivated from the beginning. Besides the accomplishment of technical and manipulative difficulties which can only be surmounted by experience, a knowledge of the structure and chemical composition of drugs and other medicinal agents, and the sciences of



chemistry and botany which bear on the art, is necessary. A familiarity with the physical appearance of the drugs and chemicals used in medicine, with their preparations and their doses, is also of importance.

The position of the dispenser, on whose accuracy human life often depends, is one of great responsibility, and the compounding of medicine demands both scrupulous care and undivided attention. These important principles should ever be borne in mind.

When dispensing, the whole attention must be concentrated on the operation in hand, and not relaxed until it is completed. Once allow it to be distracted by conversation or otherwise, it is very easy to make an error which may have fatal results. The greatest care should be exercised over the smallest details, as, for instance, in draining the last drop of liquid from a measure, or in removing every particle of a pill mass from the mortar in which it has been made, and in noting that the measure or implement is perfectly clean before being used.

The strictest accuracy is also necessary in weighing and measuring, where exactitude is of the utmost importance. Equal caution must also be observed in checking the doses ordered in prescriptions, and in the quantities used, also in writing the directions on the label.

Neatness is essential in every operation of



dispensing, from the wrapping of a bottle or powder, to the rounding of a pill. The directions on the label should not only be written neatly, but distinctly, to prevent any possibility of error.

The practice of the rules we have mentioned should be made habitual from the beginning, as when once a slovenly and careless method of work is acquired, it is rarely got rid of afterwards. It should be firmly resolved to use every precaution that will help to render a mistake a practical impossibility. One such error is sufficient to destroy confidence, and the unreliable dispenser can never be trusted.

*The Prescription.*—The prescription is the medium of communication between the prescriber and the dispenser, wherein the former gives the ingredients and instructions for preparing and administering the medicinal agents to be dispensed. The word is derived from *præ*, "before," and *scribo*, "I write".

In most countries Latin is used in writing medical prescriptions, for which purpose it has many advantages. In the first place, it is a universal language among medical practitioners and pharmacists, therefore a prescription written in Latin can be dispensed in almost any civilised country. Secondly, it is considered by prescribers not always advisable for the patient to be aware



of the exact nature of the medicine he is taking. Therefore, to translate and read a prescription some knowledge of Latin is absolutely necessary.

The Latin names of the various drugs, chemicals, and their preparations must be committed to memory.

The names and words are largely abbreviated in practice, often to an extent that becomes confusing to the student, but with experience and practice this difficulty will soon be overcome. Thus tinctura is usually written as T. or Tr., extractum as E. or Ext., and liquidum as L. or Liq.

In the directions for administration also, the words used are largely abbreviated, but the terms generally employed are not very numerous, and may be learnt in a short time with a little careful study.

The prescription may be divided into four parts. (1) The heading. This usually begins with the name of the patient. Beneath it in the left-hand corner, we have the symbol *R.*, which represents the word "Recipe," signifying "Take thou". This symbol is said to have originated in the ancient invocation to Jupiter, with which the early physicians commenced their prescriptions. (2) The names of ingredients prescribed, each occupying one line, followed by the symbol denoting the weight or measure to be used. (3) The instructions to dispenser as to the form in which the medicine is to be made, as, for ex-



ample, the mixture, the application, the pills, the powders, etc. (4) The directions for administration, the whole of which is to be translated and written in English on the label. Below, in the right-hand corner, the initials or signature of the prescriber are usually placed, followed by the date on which the prescription was written.

The abbreviated manner in which some prescribers write the names of the ingredients in their prescriptions is often a source of difficulty to the student, especially when there is a similitude between the names of drugs. In such cases the dose ordered serves as a guide to the dispenser, but where there is room for doubt the prescriber should be communicated with if possible. The following may be taken as examples of doubtful curtailment of words: Ext. col. might mean extract of colocynth or extract of colchicum, two very different preparations. Hydr. chlor. might be taken to mean calomel or corrosive sublimate, a mistake which would lead to very serious results, the latter being a very powerful poison. Potass. sulph. might be read as sulphate of potass or sulphurated potass, and many other instances of a similar nature might be enumerated, against which the dispenser must be on guard.

As science has advanced, many changes in chemical nomenclature have been made, with the result that certain chemical and other bodies



are known by various names. For instance, perchloride of mercury is also known as bichloride of mercury, corrosive sublimate, and mercuric chloride. Persulphate of mercury is also called sulphate of mercury, and mercuric sulphate, and sulphurated antimony is also known as oxy-sulphuret of antimony, golden sulphuret of antimony, and precipitated sulphuret of antimony. The dispenser should make a note of such synonyms until thoroughly acquainted with them.

In dispensing, as in the pharmacopœia, the rule that all liquids are to be measured and solids weighed, is strictly adhered to. In Great Britain, apothecaries' weights and measures are employed in dispensing, but in continental countries and in the United States the metrical system is universally used. In Germany and France it is customary to weigh both solids and liquids in dispensing.

The weight or measured quantity of each ingredient in a prescription is expressed by the symbol which follows it; thus *m.* represents the minim, followed by the number in Roman numerals; *gtt.* signifies drops, *gr.* for grain,  $\vartheta$  the scruple,  $\mathfrak{z}$  the drachm fluid or solid,  $\mathfrak{z}$  the ounce, fluid or solid, *ss.* following any of these symbols signifies half, for instance,  $\mathfrak{zss.}$  represents  $\frac{1}{2}$  drachm, and  $\mathfrak{ziss.}$   $1\frac{1}{2}$  ounces. The symbol *O* represents 1 pint or 20 fluid ounces, and *C* 1 gallon.

In weighing a powdered substance, a small quantity should first be placed in the scale pan and added to gradually by means of a palette knife, until the exact amount is reached to balance the scale. The same care should be exercised in measuring liquids. The measure should be raised to the level of the eye, and the fluid gently poured into it until the desired graduated mark is reached. Then it should be compared with the mark on the other side, taking care that the measure is held perfectly level.



## VII.

IMPLEMENTS AND APPARATUS EMPLOYED IN  
DISPENSING.

THE dispensing counter or bench for compounding medicines should be furnished with a water tap and basin, gas arrangement for Bunsen burner, shelves above for bottles, jars, and measures, and drawers below the counter to hold other necessary requisites.

It will be well, perhaps, at this point to give a short description of the implements used in dispensing. To commence with, a good pair of apothecaries' scales, for weighing solids are of the greatest importance to the dispenser. They must be perfectly accurate and should turn to half a grain, care being taken to keep them scrupulously clean. The pans should be rubbed with a dry cloth each time after they have been used. Grain weights from  $\frac{1}{2}$  to 6, and apothecaries' weights from  $\frac{1}{2}$  scruple to 4 drachms, should be kept in a box close to the scales. In using the scales they should be held with the left hand, the pans being allowed just to touch the counter, in order to steady them. The weight



must be placed in the left, and the article to be weighed in the right pan, a small quantity being put in at first, and then added to gradually. Between such addition raise the scales about an inch, in order to see if the correct balance has been reached, and add more, or reduce the quantity accordingly.

The pestle and mortar are the appliances used for powdering, pounding, and triturating medicinal agents. They are composed of metal, wedgwood or composition, and glass. The metal mortar is used for breaking up roots, barks, and other hard bodies, the wedgwood and glass being chiefly used for mixing or triturating purposes.

The measures employed in dispensing are of glass, and vary in capacity from 1 drachm to 20 ounces. The drachm measure is graduated in minims, the 1 and 2 ounce graduated in drachms, and the 10 and 20 ounce usually in ounces. When measuring a liquid the bottle containing it should be held in the right hand, the measure being in the left. The stopper of the bottle may be removed with the disengaged fingers of the left hand, and, on the measure being raised to the level of the eyes, gently pour the liquid into it until the desired graduated mark is reached. Carefulness in measuring is most important, and it should never be hurriedly performed.



On removing a bottle from a shelf do not get into the habit of giving it a vigorous shake, or, when measuring, of pouring out 2 ounces instead of 2 drachms, and then having to pour the overplus back into the bottle.

Where drops are ordered, the liquid should be dropped from the neck of the bottle. If it be a stoppered one, slightly loosen the stopper, and, supporting it against the inside of the neck with the forefinger, allow the liquid to escape drop by drop. The rim around the neck of the bottle should first be moistened. The drop is often confused with the minim. The former is by no means an accurate method of measuring a liquid, and is now happily falling out of use. The drop may vary in size according to the consistency of the liquid, the shape of the bottle from which it is dropped, and the amount of liquid in it at the time. Therefore it must be remembered that drops and minims are not synonymous terms. Funnels of varied size, constructed of earthenware or glass, etc., are used in pharmacy for filtering or straining. In dispensing, the smaller sizes of from 2 to 4 ounces in capacity are generally used. The filtering medium usually employed is unsized paper known as "filtering paper," and may be bought in packets, ready cut into circular form, or in sheets. The paper may be simply folded into the form of a cone or plaited concertina fashion, then placed in the



funnel and the liquid carefully poured down the side of the filter to prevent the paper breaking. For straining a liquid, to remove any foreign substance or dirt that may have got into it, the medium used must depend upon the consistency of the liquid. For instance, for thick syrupy fluids, flannel or fine muslin may be used; for thin watery solutions, absorbent wool or tow is best, it being simply necessary to place the medium in the neck of the funnel and run the liquid through it. When it is necessary to filter a large quantity of liquid containing heavy solid matter, it is a good plan to use two thicknesses of paper, or place a second small filter paper arranged as a cap to strengthen the cone and prevent breakage. The folded filter paper should be somewhat smaller than the funnel in which it is placed, as a projecting, badly cut, or torn filter, wastes the liquid both by absorption and evaporation. The paper itself should never be quite filled with liquid, but a margin of about an inch left at the top. When filtering liquids that rapidly evaporate on exposure to the air, such as alcohol, the top of the funnel should be covered.

The pill machine is the appliance used for rolling and cutting a mass into pills. It consists of two parts, one of which rests on the counter, while the other is used with the hands. The latter consists of a flat piece of wood about



three or four inches wide with a handle at each end. One side is used as a roller, while the other, to which a brass plate with hemispherical grooves running across in parallel lines is attached, is employed as the cutter. The larger and stationary part of the machine also consists of two portions, one being flat for rolling, and the other fitted with a corresponding grooved brass plate which exactly coincides with those in the other part.

The operation of rolling and cutting a mass into pills is carried out in the following manner. The mass having been worked to a proper and plastic consistence, it is rolled out on the flat part of the machine by pressure with the upper part, into a pipe or long cylinder of the required length. It is then placed across the metal grooves, the cutter placed over it, and then by slight pressure and a sharp rolling movement, the pipe is cut and formed into pills. The pills are rounded or finished by being placed under a perfectly smooth disc of hard wood, having a rim to prevent them escaping, and being rapidly revolved on the flat part of the pill board. The ordinary pill machines are made to cut from twelve to twenty-four pills of from 1 to 5 grains in weight.

The plaster spatula used for spreading plasters consists of an oblong iron blade about four inches in length, which is attached to a curved shank



having a wooden handle. The under edges of the blade are bevelled and the whole sometimes slightly curved. Another form of spatula is heated with gas. It is made hollow throughout and connected with the gas pipe by means of a rubber tube. The upper part of the blade is perforated with small holes, through which the gas passes, and on being ignited soon warms the metal and keeps it at a suitable heat.

Suppository and pessary moulds are usually made of gun metal and nickel-plated. They vary in size, and are constructed to make six, twelve, or twenty-four cones. They divide down the centre into two sections, which are held together by means of a screw.

Palette knives and spatulas for mixing ointments, etc., are made of metal, bone, and vulcanite, and may be had stiff or pliable.

A few small porcelain dishes, an iron tripod stand, glass stirring rods, glass flasks and beakers, all go to make up the practical furniture of the dispensing counter.



## VIII.

METHODS OF ADMINISTERING MEDICINES—  
MIXTURES.

THE various methods employed for the administration of medicine may be divided into two classes, *viz.*: (1) Medicines for internal use, (2) medicines for external application. The former includes mixtures, draughts, drops, emulsions, pills, powders, cachets, and tablets. Suppositories and pessaries are administered per rectum. The latter consists of liniments, lotions, ointments, pastes, plasters, and blisters.

On receiving a prescription to compound, the dispenser's first duty is to carefully read it through in order to consider the best method of preparing it. If intended for internal use, the dose of each ingredient should be noted and the frequency of its administration. If any of the ingredients ordered are likely to be incompatible when brought together, precautions must be taken to prevent such reaction as far as possible. The course of preparation adopted should be that which will best preserve the properties of the drugs used, and at the same time carry out the intentions of the prescriber.

*Mixtures.*—The mixture is the name given to a liquid medicine for administration by the mouth, generally in doses ranging from 1 drachm to 2 ounces, according to the directions of the prescriber. The quantities prescribed vary from 1 to 20 ounces. The mixtures usually ordered are of 2, 3, 4, 6, 8, 10, or 12 ounces. They may consist of solid substances suspended or dissolved in water or in a watery medium, consisting of an infusion or decoction combined with other preparations, or they may take the form of a simple mixture of tinctures, spirits, and syrups, diluted with water.

When dispensing a prescription it is not necessary to mix the ingredients in the order in which they are written. Where solid bodies are ordered they should be dealt with first, and, if soluble, they should be at once dissolved in a portion of the water or other liquid with which the mixture is to be made up. This may usually be done by placing them together in a bottle and shaking well till dissolved. When a mixture is simply composed of liquids the tinctures or other preparations should first be mixed together, and water then added to make up the quantity ordered. If, as we have previously stated, any of the ingredients are likely to produce a chemical reaction when mixed together, and such is evidently not the intention of the



prescriber, endeavour must be made to prevent it as far as possible. Thus, if an acid be brought into contact with an alkaline body, we shall have a reaction that will probably burst the bottle. Such antagonistic bodies should be well diluted before being mixed together. Hydrocyanic acid and other volatile liquids, when ordered, should always be added to the mixture last of all, and the bottle corked immediately afterwards.

When making a mixture some dispensers prefer to mix the various ingredients in a glass measure of suitable capacity, and when completed, transfer the whole to the bottle, but in most cases the best plan is to mix the various articles in the bottle, then after adding the water, transfer the whole to a measure to confirm that the quantity is correct.

When insoluble bodies such as the carbonates of bismuth or magnesia are included in a mixture, they should be placed in a mortar and well triturated with a portion of the water till thoroughly diffused throughout the liquid. Mucilage is usually added to mixtures containing salts of this kind in order to suspend them. To all bottles containing mixtures in which there is any insoluble matter, a "shake the bottle" label should be affixed. Some medicinal agents, such as butyl-chloral-hydrate, codeine, etc., are much more soluble in spirit than water. When drugs of this kind are met with in a mixture, advantage



should be taken of any tincture or spirit included in the prescription to act as a solvent before adding the water.

In some cases, as, for instance, when bulky crystals such as sulphate or phosphate of soda or sulphate of magnesia in quantity are prescribed, which take a long time to dissolve in the cold, hot water may be used.

To illustrate the compounding of a prescription for a mixture, we will describe exactly how the following should be dispensed: *R.* Potass. Bicarb.,  $\mathfrak{z}\text{ii.}$ ; Potass. Bromid.,  $\mathfrak{z}\text{i.}$ ; Tinct. Calumb.,  $\mathfrak{z}\text{ss.}$ ; Spts. Chlorof.,  $\mathfrak{z}\text{i.}$ ; Syr. Aurant.,  $\mathfrak{z}\text{i.}$ ; Aquæ ad  $\mathfrak{z}\text{viii.}$ ; Misce. Fiat mist.

In this prescription we have two solid and three liquid ingredients to be made into a mixture with water. It will be well to note here, that when the word "aquæ" is followed by "ad" or "adde," sufficient water is to be added to the other ingredients to make up the mixture to the given quantity. When no directions are given "to add," the exact quantity of water ordered is to be used. To proceed with the mixture, an eight-ounce bottle should be half-filled with water, and the bromide of potassium and bicarbonate of sodium having been carefully weighed and placed on a piece of paper, may then be introduced into the bottle. As both these salts are readily soluble in water, if the bottle be shaken briskly for a minute or two,



solution will soon be effected. When this is done, measure the requisite quantities of tincture of calumba, spirit of chloroform, and syrup of orange, and add to the solution in the bottle. Shake again to mix well, and add sufficient water to fill the bottle. Before corking see that the mixture measures exactly eight ounces by transferring it to a glass measure; also examine it carefully for the presence of any foreign matter or dirt that may have found its way in. If such be present, strain the liquid back into the bottle through a little fine tow or absorbent wool, then cork, shake well for a few minutes, and the mixture is ready for labelling.

But it must not be supposed that every mixture is as easy to prepare as the one we have just described, and we will now consider some of the difficulties the dispenser is likely to meet with, and the best methods of dealing with them. First as to solubility. The student will find it a good plan to commit to memory the solubility of the ordinary solid substances used in medicine. If the quantity of a solid ordered in a mixture is more than the water will dissolve, the undissolved portion should not be strained out, but directions to shake the bottle should be affixed. Hot water will be found to aid solution in many cases. Thus gallic acid is soluble only 1 in 100 of cold water, and in boiling water 1 in 3, but it rapidly re-crystallises

out on cooling. This acid should be rubbed down in a mortar as fine as possible, cold water being added gradually. When ordered together with citrate of potassium it dissolves readily. The frothing caused on shaking up citrate of iron and quinine will speedily subside on the addition of a few drops of rectified spirit. It is necessary when dispensing the potassio-tartrate and the pyrophosphate of iron to rub them down in a mortar with hot water to effect solution. Tincture of perchloride of iron and mucilage of acacia when mixed together form an unmanageable jelly, but if the tincture be well diluted with water before the mucilage is added, this can be prevented. Tinctures containing resinous matter, such as guaiacum and Indian hemp, on dilution with water, will precipitate their resin. This may be avoided if the tincture be first triturated with a small quantity of mucilage of tragacanth or acacia and the water added gradually.



## IX.

**DISPENSING DIFFICULTIES—INCOMPATIBLE MIXTURES.**

OF the many difficulties that may present themselves from time to time to the dispenser we can only mention a few, but they will serve to illustrate the fact that, with a little forethought and skill, an unsightly appearance in many compounds may be avoided.

The preparations of iron are a fruitful source of trouble. They are incompatible with alkalis and their carbonates, and also turn black or darken all vegetable astringents that contain tannic acid. In preparing a mixture of solutions of dialysed iron and arsenic, with glycerin and water, care must be taken not to add the Fowler's solution of arsenic until the iron has been well diluted with water, otherwise a precipitate will be formed. When powdered gum tragacanth is met with in a mixture, advantage should be taken of any alcoholic liquids ordered in the prescription to mix them with the gum before adding the water, when by vigorous shaking a mucilage can easily be formed. Quinine is in-

compatible with all alkalies, their carbonates, and iodides. When mixed with vegetable infusions containing tannic acid, a precipitate of tannate of quinine is thrown down. Quinine is readily soluble in acids, tincture of perchloride of iron, and aromatic spirit of ammonia, but is precipitated from the latter on the addition of water.

In the following prescription the whole of the menthol (if the tincture of iodine be added to it and the glycerin) will collect and form a cake on the top of the liquid: *R.* Tr. Iodi.,  $\bar{3}v.$ ; Menthol,  $\bar{3}iss.$ ; Glycerin,  $\bar{3}i.$ ; Aquam ad.  $\bar{3}iv.$  This may be prevented if prepared in the following manner: Dissolve the iodine and potassium iodide (composing the tincture) in the water, then powder the menthol and rub it up with the glycerin, adding the rectified spirit of the tincture last of all.

In the following mixture decomposition takes place owing to the action of the spirit of nitrous ether on iodide of potassium: *R.* Potass. Iodid.,  $\bar{3}iss.$ ; Tr. Digitalis, m. xxx.; Spt. Ether Nitros,  $\bar{3}vi.$ ; Syr. Simplx.,  $\bar{3}i.$ ; Aq. ad.  $\bar{3}viii.$  Misce. This may be prevented by neutralising the spirit of nitrous ether with a little bicarbonate of potass before adding it to the mixture.

Quinine and salicylate of soda when ordered together in a mixture are a frequent source of difficulty, as instanced in the following:



*R.* Quinæ. Sulph., grs. xii.; Acid. Hydrobrom., Dil., ℥iss.; Sodæ Salicylas, ℥ii.; Syr. Simpl., ℥vi.; Aquæ ad. ℥vi. Misce. In preparing this mixture the quinine sulphate should first be dissolved in the hydrobromic acid and diluted with three ounces of water and the syrup. Then dissolve the salicylate of soda in the remainder of the water, and add slowly to the previous solution, shaking gently between each addition.

The following prescription cannot be properly dispensed as written, owing to the bicarbonate of sodium causing the precipitation of the cocaine: *R.* Sol. Cocainæ Hydrochlor., 2 per cent., Sodii Bicarb., ℥ss.; Glycer. Boracis, ℥i.; Ac. Carbol., m. v.; Aquæ, ℥i. Misce. If ten grains of sodium chloride be used in place of the sodium bicarbonate the reaction is prevented.

In the next example a double reaction takes place, resulting in the formation of insoluble calcium sulphate and iron hypophosphite. This cannot be avoided. *R.* Potass. Chlorat., ℥ss.; Calci. Hypophosph., ℥ss.; Magnes. Sulph., ℥i.; Ferri. Sulph., grs. xii.; Liq. Strych., m. xii.; Aquæ, ℥vi. Misce. In incompatible mixtures of this class the dispenser must endeavour to prepare them in as presentable a condition as possible.

Perchloride of mercury is incompatible with mucilage of acacia, albumen, and gelatine, forming insoluble masses. With iodide of potassium,



a precipitate of iodide of mercury is thrown down, which must always be carefully avoided in dispensing. It should never be brought into contact with metals, especially in the presence of moisture, and the student must beware of using a damp palette knife with this salt. When dispensing the perchloride with mucilage, the former must always be well diluted with water before adding the latter, or an unmanageable mass will be produced. The subjoined prescription illustrates a mixture of this kind : *R.* Hydrarg. perchlor., grs. iv. ; Mucil. Acacia,  $\mathfrak{z}$ iv. ; Spt. Chlorof.,  $\mathfrak{z}$ ii. ; Liq. Potass.,  $\mathfrak{z}$ i. ; Aquæ ad.  $\mathfrak{z}$ iii. *Misce.* In dispensing this, the perchloride of mercury should first be dissolved in an ounce of the water, and the mucilage then be added. Dilute the solution of potash with the remainder of the water, mix the solutions and finally add the spirit of chloroform.

It will be well to bear in mind the following list of incompatible substances. The vegetable alkaloids are nearly all precipitated by tannic acid. Acacia mucilage is incompatible with alcohol, sulphuric acid, borax, perchloride of mercury, persalts of iron, and subacetate of lead renders it gelatinous ; acid gallic with spirit of nitrous ether, and metallic salts ; acid hydrochloric with salts of silver and lead, tartarated antimony, and alkalies ; acid nitric with alcohol, alkalies, oxides, sulphate of iron, acetate of lead,



and carbonates; acid tannic with mineral acids, alkalies, salts of antimony, lead, and silver, persalts of iron, vegetable alkaloids, and gelatine; ammonia carbonate with acids and acidulous salts; tartarated antimony with gallic and tannic acids, the alkalies, lead salts, and astringent infusions; antipyrine with hydrocyanic acid, tannic acid, butyl chloral hydrate, chloral hydrate in strong solutions, astringent infusions, nitrites in solution, and astringent tinctures, salicylate of soda, when mixed together in powder, and when combined with spirit of nitrous ether, turns it a green colour; bismuth subnitrate with potash, soda, and ammonia, and their carbonates; cinchona preparations with ammonia, antipyrine, metallic salts, and gelatine; digitalis preparations with sulphate of iron, tincture of perchloride of iron, preparations of cinchona and acetate of lead; iron and ammonia citrate with mineral acids, vegetable astringents, and fixed alkalies; iron and quinine citrate with alkalies and their carbonates, tannic acid, and vegetable astringents; iron perchloride with alkalies and their carbonates, magnesia and its carbonate, vegetable astringents blacken it, and all vegetable infusions are darkened in colour with the exception of quassia and calumba; mercury perchloride with alkalies and their carbonates, tartarated antimony, nitrate of silver, acetate of lead, albumen, iodide of potassium,



soap, and decoction of cinchona; mercury subchloride (calomel) with alkalies and their carbonates, sulphides, hydrocyanic acid, bitter almonds, lime water, iodide of potassium, iodine, nitric acid, salts of iron, lead, copper, nitrate of silver, and soap. Soap should never be used as an excipient for pills containing calomel. Magnesium sulphate with alkaline carbonates, and acetate of lead; morphine hydrochlorate with alkalies, astringent infusions and decoctions; opium preparations with alkaline carbonates, salts of lead, iron, copper, and zinc, solution of arsenic, and vegetable astringents; subacetate of lead solution with hard water, mineral acids and their salts, vegetable acids, iodide of potass, all astringents, preparations of opium, and albuminous liquids; potassium iodide with bismuth subnitrate, spirit of nitrous ether, decoction of liquorice, preparations containing starch or acid, and vegetable alkaloids; potassium permanganate decomposes when mixed with organic bodies; quinine with all alkalies and their carbonates, astringent infusions, salicylic acid and its salts; infusion of roses with alkalies and borax turns green in colour; spirit of nitrous ether with antipyrine, iodide of potassium, tincture of guaiacum, sulphate of iron, gallic and tannic acids.



## X.

## DRAUGHTS—DROPS—EMULSIONS.

THE draught is the name applied to a liquid medicine, the whole of which is to be taken for a dose. During the early part of this century the draught was the most popular method of administering medicine in liquid form, it being customary with medical practitioners to prescribe each dose in a separate bottle. When two doses are dispensed in one bottle a strip of paper should be affixed, showing an accurate division of the liquid. Draughts may vary in quantity from  $\frac{1}{2}$  to 2 ounces. They are prepared in a similar manner to mixtures, *viz.*, first dissolving the solids in the liquid menstruum, then adding the fluids; or, if the solid substances are insoluble in water, they should be stirred in a mortar with a little mucilage in order to suspend them, then placed in the bottle and labelled with directions to shake.

The term "drops" is usually applied to a medicine in concentrated form, the dose of which is ordered to be taken in drops, to be diluted with water by the patient. They are

usually composed of a tincture, or a simple mixture of tinctures, and rarely give the dispenser trouble.

Drops are also frequently ordered for application to the eyes or ears. The former require considerable care in preparation, especially when minute quantities of alkaloids are ordered. When the quantity is too small to be weighed in the ordinary dispensing scales, a solution of definite strength should be made, from which an exact equivalent of the weight may be measured off. Solutions containing nitrate of silver and eserine should be sent out in coloured glass bottles to prevent the action of the light, and distilled water must always be used. Drops should be dispensed in glass-stoppered bottles, and the stopper capped with skin or parchment paper.

An emulsion is the name given to a mixture of an oil, fat, or resin, with water, it being rendered more or less permanent by the aid of another body such as a gum or an alkali, which medium is called the emulsifying agent. Milk may be taken as an example of an almost perfect natural emulsion.

If we half-fill a bottle with olive oil, then add an equal quantity of water, and shake them together vigorously for a few minutes, the oil for a time will appear to have mixed with the water, forming an opaque mixture; allow it to



stand for a short period and it will soon separate into two distinct liquids again. But if a small quantity of liquid ammonia be mixed with the oil before the water, and then the latter added gradually, and the bottle well shaken, a milky liquid will result, which will not readily separate on standing. In this case the ammonia acts as the emulsifying agent or medium, in breaking up the oil globules and so rendering them miscible with water. A perfect emulsion should be of a creamy consistence, exhibit no oil globules, and not separate on standing. Some oils emulsify with one agent better than another. One will form a better emulsion with mucilage than with an alkali; for another, yolk of egg will be found the best medium; therefore the dispenser must note from practical experience the right agent to employ in order to get the best result.

In making an emulsion a great deal depends on manipulative skill, and the manner in which the operation is conducted. While some oils simply require to be shaken up in a bottle with the emulsifying agent, others need careful trituration or stirring in a mortar.

The former method is usually adopted when alkalies, such as solutions of potash or lime, or tinctures of quillaia or senaga, are employed as emulsifying agents. As an example of this class we may take the following process, which should be adopted for emulsifying balsam of copaiba.



The bottle should first be half-filled with water, then 2 or 3 drachms of solution of potash added. The copaiba should then be poured in, without being allowed to touch the neck or sides of the bottle; shake the liquids together vigorously until they assume a creamy consistence. The remainder of the water may then be added in small quantities at a time, the bottle being well shaken after each addition.

Cod-liver oil may be emulsified with tincture of quillaia and lime-water in a similar manner. One drachm of the tincture is sufficient to emulsify 2 ounces of oil. Fill the bottle half full of water, to which add the tincture, and mix. Then pour in an ounce of the oil and shake well until the oil globules are broken up; add another portion and repeat the agitation, and so on until all the oil is emulsified.

When mucilage, powdered gum acacia, tragacanth, Irish moss mucilage, or yolk of egg are used as emulsifying media, trituration in a mortar is necessary. With this method the pestle requires skilful handling. The motion should be quick, light, and regular, care being exercised to stir in one direction only, and not to reverse it during the process. It is well to remember that in most cases the body to be emulsified must be added to the agent in small quantities at a time, each portion being thoroughly mixed before the next is added.



Castor oil may be emulsified with gum acacia in the following way: To one part of the powdered gum in a mortar, add gradually two parts of castor oil, and triturate well with the pestle until thoroughly mixed, then add all at once 2 ounces of water, and again triturate till the oil is completely emulsified. Flavouring may now be added, and more water if required.

Cod-liver oil forms an excellent emulsion with powdered gum acacia if carried out in the following manner: Place 6 drachms of finely powdered gum acacia in a mortar, and add to it, while stirring constantly, 3 ounces of cod-liver oil, which has been previously flavoured with a suitable essential oil, such as almonds or cinnamon. Ten drachms of water may next be added, the mixture being stirred quickly but lightly until it has a creamy appearance. The remainder of the water may now be added gradually, and any other liquid it is required to mix with it, the whole to form a product measuring 6 ounces.

A good emulsion of cod-liver oil may also be made with mucilage of Irish moss. Resinous bodies are usually emulsified with powdered gum acacia.

Balsam of copaiba may be emulsified with powdered gum acacia, solution of potash or yolk of egg. Sweet oil of almonds with solution of potass or ammonia. Spermaceti,

or other solid fats, with yolk of egg. Balsam of Peru and tincture of benzoin with yolk of egg. Oil of male fern with mucilage, powdered acacia, or tincture of quillaia. The admixture of glycerin or spirit is usually fatal to the formation of a good emulsion. Turpentine may be emulsified with yolk of egg or soap. To prepare the yolk, the egg-shell should be fractured about the centre by means of a sharp blow with a knife. Allow all the albumen to escape, then place the yolk in a mortar, break, and stir it well, and add the turpentine to it in small quantities, stirring constantly until they are thoroughly incorporated. When soap is used as the emulsifying agent, it should be placed in a mortar, and the turpentine added to it gradually, in small quantities, with rapid trituration. Each of the methods we have mentioned should be tried and practised by the student repeatedly, until the art of making a good emulsion is acquired.



## XI.

## PILLS AND THEIR EXCIPIENTS.

PILLS are the usual method of administering drugs in solid form, and are very largely prescribed by medical practitioners, especially when they wish to give medicinal agents which cannot readily be given in solution. They are made of various sizes, weighing from 1 to 5 grains. The ingredients prescribed in pills vary greatly, and beside the pill masses of the pharmacopœia, combinations of extracts, gum-resins, alkaloids, and other active principles are met with frequently.

The first step necessary in compounding pills is to work the ingredients ordered into a plastic mass of suitable consistence, an operation which is sometimes attended with difficulty. This having been accomplished satisfactorily, the second stage is purely a mechanical one, and simply consists in rolling and cutting the mass and forming it into pills with the aid of the pill machine. To make a pill mass it is first necessary to combine the ingredients, and the medium



which is usually added for this purpose is called the excipient.

In the choice of this excipient, in the majority of cases, lies the solution of the difficulties met with in the art of pill-making. Occasionally pills are ordered to be made simply of soft extracts, as in the following instance: *R. Ext. Colocynth Comp., gr. ii. ; Ext. Hyoscyam., gr. i. ; Ext. Taraxaci, gr. i. ; misce fiat pil. i.* In this case it is necessary to add some inert powder, such as powdered marshmallow root, in order to form the extracts into a suitable mass. So dry as well as liquid excipients are necessary in pill-making, their use depending entirely on the nature of the ingredients ordered.

The procedure usually adopted in preparing a pill mass is to place the dry ingredients in the mortar first, and powder them as finely as possible. This is especially essential when a crystalline substance such as sulphate of iron is being dealt with. Then carefully add sufficient of the excipient to make a mass, which should be adhesive enough to form a firm pill and just sufficiently soft to roll. In massing the ingredients the pestle should be used with a lever-like motion, in order to induce thorough incorporation. It is necessary that the dispenser should have a knowledge of the composition of the ingredients used, in order to know the best excipient to employ. Thus, if none of the sub-



stances ordered contain a gum or other adhesive body, it is well the excipient should do so. On the other hand, should the ingredients be of a gummy or resinous nature, a liquid excipient may be used to bind the particles of powder into a solid mass. Care must be exercised not to use too much excipient, and so make the mass soft. The right amount can soon be judged with practice. When a very small quantity of an alkaloid such as strychnine or other powerful poison is ordered, it should be placed in the mortar and triturated with a little sugar of milk, in order to ensure perfect distribution throughout the mass. When essential oils are prescribed, they should be placed in the mortar last, and thoroughly well triturated with the other ingredients before massing. When the prescriber orders a certain excipient to be used, the dispenser should always employ it, except when he finds it is absolutely necessary to use another. If the prescriber leaves the size of the pill to the discretion of the dispenser, as shown in the following prescription: *R. Hydrarg. Subchlor. gr.  $\frac{1}{6}$ , fiat pil. i.*, it should be made as small as possible with the aid of sugar of milk, liquorice, or althæa powder, and each pill when finished should not weigh more than 1 grain. To make the process as clear as possible to the student, we will describe how the following prescription, which is a very common



one, should be made: *R.* Ext. Aloes, Aquos., gr. ii. ; Podophyllin Resin, gr.  $\frac{1}{8}$  ; Euonymin, gr. i. ; Pulv. Zingib., gr. ss. ; misce fiat pil. i. ; mitte xii. In this case all the ingredients in the prescription are of a dry nature. The extract of aloes should first be reduced to fine powder, then the other ingredients added, and the whole thoroughly mixed. Compound decoction of aloes forms an excellent excipient when any preparation containing aloes is included among the ingredients ; so in this instance, four or five drops of decoction of aloes placed in the mortar and well worked with the pestle will form an excellent mass. The mass, when finished, should present a perfectly homogeneous appearance throughout. Every particle should be scraped from the mortar and pestle. If crumbly or gritty it will not roll, and should be replaced in the mortar and worked up again with a little more of the excipient. It should be worked for a few moments between the fingers after being taken from the mortar to see it is sufficiently plastic, then placed on the board of the pill machine, which has been previously dusted over with a small quantity of powdered French chalk or magnesia to prevent sticking. With the flat side of the cutter, roll it out into a pipe of the required length, then place on the grooves and quickly cut into the number of pills ordered. A smooth surface and finish may be imparted by



giving them a few rapid turns on the board under the pill finisher. They should be allowed to stand a short time to dry, after which they may be finished off by shaking them up with a small quantity of French chalk, lycopodium or magnesia; or they may be silvered, varnished, coated with gelatine, French chalk or sugar, as desired.

*Excipients.*—The nature of the excipient used in pill-making necessarily depends on the composition of the drugs it is desired to mass. For bulky powders, such as ipecacuanha, jalap, and rhubarb, etc., simple syrup or treacle are good media. For resinous drugs, equal parts of spirit and acacia mucilage may be used, or when aloes is included, the compound decoction forms an excellent mass. Where moisture is necessary the mucilage of tragacanth or acacia will be found useful. For dry powders that require the addition of an adhesive body to bind them, the confection of roses, or glycerin of tragacanth answers best. The latter is a most useful all-round excipient, and very generally employed. It should be the consistence of a stiff jelly, and is made as follows: Take of powdered gum tragacanth, 1 drachm; glycerin, 4 ounces; water, 1  $\frac{1}{2}$  drachms; rub them together in a mortar, then heat over a water bath for ten minutes, and allow to cool and set.

Among other useful excipients are powdered

soap, which is employed for massing powdered opium, and with liquorice powder for making creosote pills. Bread-crumbs (which should be a day old), for massing calomel, and balsam of Peru, etc. Honey, for dry powders, and manna, for nitrate of silver, calomel, etc. Confection of roses, for woody powders, but it must not be used with sulphate of iron or tannic acid. Kaolin ointment, for permanganate of potassium and nitrate of silver. Powdered gum acacia, tragacanth, liquorice powder, or althæa may be added to soft extracts to render the mass a suitable consistence.

There are certain drugs which present special difficulties to the dispenser and which need special excipients, as, for instance, carbolic acid, creosote, and phosphorus. Such drugs require experience and careful manipulation to form into a good pill mass, and a great deal also depends on the method employed.



## XII.

SPECIAL EXCIPIENTS AND DIFFICULTIES IN PILL-  
MAKING—SILVERING AND COATING.

CHLORIDE of ammonia is a difficult salt to work into a pill mass, but with the aid of a small quantity of soluble cream of tartar a good result can be obtained. Benzoic acid can be massed with Canada balsam, 1 to every 4 grains of the acid, or with glycerin, using 1 drop to 5 grains. Antipyrine with glycerin of tragacanth, or powdered gum and water. Nitrate of bismuth forms a good pill with soluble cream of tartar, or powdered gum tragacanth, and a few drops of water. Balsam of Peru with bread-crumbs or bees-wax. Calomel may be made into a firm pill with the aid of confection of roses or manna and compound tragacanth powder. Calcined magnesia should not be used for rolling a mass containing calomel. In massing camphor, it should first be reduced to very fine powder with the aid of a few drops of spirit, then worked up with glycerin of tragacanth and powdered soap. Chloral hydrate must also be reduced to a very fine powder, when it may

be massed with syrup and powdered tragacanth, or Canada balsam,  $\frac{1}{2}$  gr. to 5 grs. of chloral, and made into pills. Ergotine, which is usually semi-liquid, should be very carefully evaporated over a water bath, and brought to a proper consistence by the addition of powdered gum acacia. Other thin extracts may require the addition of compound tragacanth powder or gum acacia to form a firm mass. Grey powder may be made into a satisfactory pill with confection of roses, care being exercised not to work it too hard, or the mercury will separate, and be found at the bottom of the mortar. Bromide and iodide of potassium, after being reduced to a fine powder, form a good mass with liquorice powder, tragacanth and a few drops of water, or with confection of roses. Permanganate of potassium decomposes when mixed with organic substances; therefore, after reducing to powder, it must be massed with kaolin or resin ointment. An excellent quinine pill can be made by adding 1 grain of tartaric acid to every 10 grains of quinine and a drop of water.

Of the liquids that are likely to give the dispenser trouble, we will first consider creosote. Most dispensers have their favourite method of forming this body into a pill mass, but the success of the result depends largely on the manipulation. An excellent method of making a firm mass is to well mix 1 part of creosote



with 5 parts of liquorice powder and 1 part of powdered soap; another, with powdered liquorice and glycerin of tragacanth. A good pill may also be formed with calcium phosphate and hard soap as excipients. The student should practise all these methods until a good result is obtained.

Carbolic acid may be massed by incorporating 2 parts, with powdered althæa 3 parts, and glycerin  $\frac{1}{4}$ . A firm pill may also be formed with liquorice and soap in the following proportions: Carbolic acid, 1 part; powdered soap, 1 part; liquorice powder, 5 parts. Balsam of copaiba should be mixed with calcined magnesia or slaked lime and allowed to stand for some hours, when it may be massed with the aid of a small quantity of bees-wax.

Essential oils require the addition of calcined magnesia and powdered soap, or calcium phosphate and soap, to form a workable mass.

Croton oil can be made into a firm pill with bread-crumbs, magnesia and soap, or powdered liquorice and glycerin of tragacanth.

Tar should be massed with lycopodium, and oil of turpentine with calcined magnesia and white wax.

Phosphorus is a somewhat difficult substance to form into a satisfactory pill, and the student must be wary in handling it. In the first place a solvent is necessary, and in the second the



solution must be incorporated with a suitable base. Bisulphide of carbon is one of the best solvents for phosphorus, but chloroform and theobroma oil answer the purpose well.

Phosphorus pills should be coated or varnished soon after being made, and kept in a dark place in well-closed amber-coloured bottles.

Of the various methods of finishing and coating pills used in pharmacy, silvering is the process most frequently employed by the dispenser.

The pills to be silvered should be kept free from powder and have a smooth surface. They should first be shaken up in a willow box or covered pot, with a drop or two of mucilage, until they have received a thin coating of the gum; then turn them into a clean pot in which a sheet or two of silver leaf has been placed and rotate them rapidly for a few minutes. The superfluous silver may then be blown off and the pills placed into another clean pot, in which they should again be rapidly rotated for a few minutes. The process for varnishing pills is very simple; all that is necessary is to place them in a covered pot, with a small quantity of the varnish, and shake them for a few moments until they are evenly coated, then turn them out on a flat plate to dry. A good varnish can be made by dissolving one part of gum sandarach in one part of absolute alcohol.



To give pills a pearl coating is an operation that requires some dexterity, and is not by any means an easy one; but with practice good results may soon be obtained.

The following is a simple method: Moisten the pills by shaking them up in a pot with just sufficient of a mixture of mucilage of acacia, 1 drachm; syrup, 1 drachm; water, 5 drachms; spirit, 1 drachm; then turn them into a round-bottomed covered pot about half filled with the following powder: Powdered French chalk, 6 drachms; and rice starch, 2 drachms. Rotate the covered pot rapidly and evenly until the pills have received a white coating, then transfer them to a clean pot without any powder, and rotate again until they are polished. Pills to be coated must be well rounded, hard, and free from powder.

Keratin coating is used for pills that are intended to pass through the stomach and into the small intestine before being dissolved. Keratin is prepared in alkaline and also in acid solution, the alkaline being employed for alkaline medicines, and the acid for those that are acid. Keratin is prepared by digesting the parings of horn with a liquid consisting of pepsin, 1 part; hydrochloric acid, 1 part; and water, 11 parts, so long as anything is removed. The residue is then dissolved in ammonia by prolonged maceration for several weeks, and the solution evaporated.

The alkaline solution is made by dissolving 7 parts of this dried keratin in 100 parts of a mixture of equal volume of ammonia and alcohol, the acid solution of the same strength in acetic acid. A fatty excipient should be used for the pill mass, and no dusting powder, the pills being dipped in melted cocoa butter before coating. Coating is carried out by shaking the pills up in a covered pot with the solution, the process being repeated several times.

Pills may be coated with gelatine by placing each on the point of a fine needle, dipping them separately into a warm solution of gelatine, then placing the other end of the needle in a pin-cushion, and allowing them to dry and become hard. The gelatine solution for coating should be made as follows: Dissolve 2 parts of gelatine in 8 parts of water over a water bath, and strain through muslin.



## XIII.

POWDERS — GARGLES — CACHETS — CAPSULES—  
TABLETS—ENEMAS—HYPODERMIC INJECTIONS.

POWDERS are another method of dispensing medicine in a dry form. They are usually directed to be taken dry, by being placed on the tongue, or dissolved or stirred in a little water. They may consist of a single drug or a mixture of several, each dose being divided and wrapped separately in paper. In the latter case, the ingredients after being weighed, must be placed in a mortar, reduced to fine powder, and well mixed together. The requisite number of pieces of paper having been spread out on the counter, the total amount for each powder must be weighed separately, and then neatly folded in the usual manner. The quantities should never be guessed. Glazed white paper of good quality should always be used for wrapping powders, and the utmost neatness observed in folding, so that each may be exactly similar in shape and size. Drugs of a volatile nature should be folded in tinfoil or waxed paper, and enclosed in white paper afterwards.



*Gargles.*—The gargle is the term applied to a liquid medicine used as an application for affections of the mouth, palate, and fauces. Gargles are usually composed of salts in solution, combined with certain astringent preparations, or glycerin. They rarely present any difficulty to the dispenser, and are prepared in a similar manner to mixtures. Chlorate of potassium is very frequently met with as an ingredient in gargles. In dissolving it, the use of the mortar is necessary. Any portion undissolved must also be placed in the bottle, which should be labelled with directions to shake. The following gargle is frequently prescribed with the object of exhibiting chlorine in solution, the gas being liberated by the action of the hydrochloric acid on chlorate of potassium. *R.* Potass. Chlorat.,  $\mathfrak{z}\text{i.}$ ; Acid Hydrochloric, *m.*  $\text{xvi.}$ , Glycerin pur.,  $\mathfrak{z}\text{i.}$ ; Aquæ ad.  $\mathfrak{z}\text{viii.}$  *Misce; fiat gargar.* In dispensing this prescription, the chlorate of potassium should be placed in the bottle first, and the hydrochloric acid added to it. Cork the bottle loosely, and allow the gas to evolve. When the bottle is apparently full of the yellowish gas, add about four ounces of water and shake well for some time, then add the glycerin, and after further shaking for several minutes, make up to the required quantity with water.

*Cachets.*—The method of administering in-



soluble and unpalatable drugs in an envelope composed of thin wafer paper called a cachet, has been largely employed on the continent, and France in particular, for a considerable time. Within the last few years this mode of administration has become very popular in our own country. The cachets in general use are those of Morstadt or Finot, and consist of two circular bowl-shaped discs with flat edges. The drug to be enclosed should be reduced to fine powder, and then packed into the bowl part of one of the discs. The edges of another disc, having been slightly moistened, are placed over that containing the powder, and the edges or rims pressed together. Several handy machines are made, by means of which a dozen or more cachets can be filled and sealed with very little trouble. In this form the most nauseous drugs may be easily swallowed by the most fastidious patient.

*Capsules.*—The capsule is another method of administering both solid and liquid medicines which has become very popular with prescribers. For liquid medicines, flexible capsules of gelatine are made to hold from 5 to 30 minims. They are usually egg-shaped in form, with an aperture at one end, by means of which they are filled with the aid of a pipette, or small syringe. They are sealed by passing a camel-hair brush charged with a solution of gelatine over the



aperture, then allowing it to become hard. They should afterwards be polished by gently rubbing with an oiled cloth. By this method, terebene, eucalyptus oil, creosote, cascara sagrada, cod-liver oil, and castor-oil can be readily swallowed without tasting the drug. Flexible capsules are now also largely used for administering the ingredients contained in Blaud's pill, with various combinations. For administering solids, cylindrical capsules are made of thin but firm gelatine, with a cap, or top, which may be removed to insert the drug. After filling, the cap is replaced and the joint sealed with a solution of gelatine.

*Tablets.*—This method of administering drugs in a compressed form is now very largely used. Tablets are generally manufactured on a large scale. They may be composed of a single drug or a combination of several, mixed with some inert adhesive powder and compressed into small lenticular discs. There are several varieties of hand machine in use, which are fitted with steel dies, for making 1, 3, 5, and 10 grain tablets. The plunger used as a compressor is worked by a lever. The powdered drug is compressed between two concave surfaces, and so formed into a tablet. The three main points in tablet-making are: First, to carefully regulate the pressure; second, to ensure proper cohesion of



the particles of substance under compression ; and, third, to prevent adhesion of those particles to any part of the machine. The material to be compressed should not be too finely pulverised, but be reduced to a granular powder. It may be prepared by simply damping with ether or alcohol, or by rubbing up with a little powdered soap and afterwards passing through a sieve. In other cases, powdered gum acacia, starch, or sugar, are mixed with the drug.

*Enemas.*—The preparation of enemas in most cases comes more within the province of the nurse than the dispenser. The amount of fluid administered by this method varies from 2 to 30 ounces for adults. The manner of preparing the ordinary enemas of gruel, soap, olive and castor oils, we need not describe. The pharmacopœia formerly included five medicated enemas, *viz.*, aloes, asafoetida, sulphate of magnesium, opium and turpentine. The enema of aloes is composed of aloes, carbonate of potassium, and mucilage of starch, and is simply made by rubbing the solids together in a mortar and mixing with the mucilage. Enema of asafoetida is prepared by rubbing 30 grains of asafoetida in a mortar, with 4 ounces of water, added gradually, so as to form an emulsion. Enema of sulphate of magnesia is made by dissolving 1 ounce of sulphate of magnesia in 15 fluid ounces of mucilage of starch, then adding 1 fluid ounce

of olive oil, and mixing well together. Enema of opium is simply made by adding  $\frac{1}{2}$  fluid drachm of tincture of opium to 2 fluid ounces of mucilage of starch, and mixing. Enema of turpentine is prepared by shaking together 1 fluid ounce of oil of turpentine with 15 fluid ounces of mucilage of starch.

*Hypodermic Injections.*—The preparation of hypodermic injections requires the greatest care and accuracy. They should always be freshly prepared when possible, or if kept, they must be preserved in well-stoppered bottles away from the light. Distilled water should always be used. In most cases they are simple solutions of the active agent in water, but sometimes a preservative or solvent medium must be added. One per cent. of pure carbolic acid is usually added to the injection of ergotine, while the injection of physostigmine is prepared by rubbing down the extract with rectified spirit, then adding powdered gum acacia and water.



## XIV.

LOTIONS—LINIMENTS—PIGMENTS AND OLEATES—  
OINTMENTS.

A LOTION is a liquid preparation used as an external application or wash to various parts of the body. An eye lotion is usually termed a collyrium. Solution of subacetate of lead is a very frequent ingredient in lotions, and when diluting, distilled water should be used, otherwise the solution will turn opaque. It is often prescribed with tincture of opium, and a very ugly precipitate results on mixing the two liquids; but this may be prevented if a small quantity of glycerin be mixed with the lead solution before adding the tincture. Acetate of lead is sometimes ordered in combination with alum or sulphate of zinc, with the result that a copious precipitate of sulphate of lead is thrown down. Such precipitates should not be strained out unless specially ordered. Solid extracts, when met with in lotions, should be placed in a mortar and rubbed down with hot water until dissolved, and then strained. Insoluble bodies, such as oxide of zinc, should be reduced to very fine powder and



well diffused throughout the liquid menstruum. Lotions should always be dispensed in coloured bottles and bear distinctive labels, to prevent them being mistaken for medicines intended for internal use.

*Liniments.*—The liniment or embrocation is the name given to a liquid application to be rubbed over the surface of the body. Liniments generally consist of a mixture of oils, soaps, or spirituous preparations, simple or compound. The liniments met with in dispensing are usually those of the pharmacopœia, or a mixture of the same, as in the following instance: *R.* Lin. Belladonna,  $\bar{z}i$ .; Lin. Chloroform Co.,  $\bar{z}iv$ .; Lin. Saponis,  $\bar{z}iv$ . Misce fiat linimentum. A liniment of this kind presents no difficulty, the ingredients being simply mixed together in a bottle.

Liniments are sometimes prescribed in the form of an emulsion or soap, as for example: *R.* Lin. Camph.,  $\bar{z}iiss$ .; Liq. Ammon.,  $\bar{z}ii$ .; Tr. Opii,  $\bar{z}ii$ . Misce. In dispensing, the camphor liniment should first be placed in the bottle, and shaken well with the solution of ammonia until a creamy emulsion is formed. Then add the tincture of opium, and again shake until the whole is thoroughly mixed.

The following liniment is frequently met with: *R.* Spt. Terebinth.,  $\bar{z}ii$ .; Acid. Acetic fort.,  $\bar{z}i$ .; Ovi Vitel.,  $i$ .; Aquam,  $\bar{z}iii$ . Misce. Place the yolk



of egg in a mortar and add the turpentine in small quantities, stirring well between each addition, until it is thoroughly emulsified. Next add the acetic acid, and finally the water, then transfer to the bottle and shake well. The liniment of potassium iodide with soap, of the British Pharmacopœia, is an example of a liniment with a soap base. It is made by dissolving curd soap in fine shavings in glycerin and water, over a water bath. The iodide of potassium is placed in a mortar and powdered, and the soap solution gradually added to it, the whole being well stirred until cold. Oil of lemon is finally added.

Liniments must always be dispensed in coloured bottles bearing a distinctive label, and marked "for external use only".

*Pigments and Oleates.*—An application that is directed to be applied by means of a brush is usually termed a pigment or paint. Spirit or glycerin generally forms the base of such applications, with some active agent in solution. The glycerins of acids, carbolic, gallic, and tannic, also of alum, of the pharmacopœia, may be taken as examples of preparations of this class, all of which are easily prepared. Glycerin of belladonna, which is very often prescribed, may be prepared by placing 1 ounce of extract of belladonna in a warm mortar and rubbing it down to a smooth paste with 1



drachm of hot water, then adding sufficient glycerin to produce 2 ounces.

There are certain solid bodies which, when rubbed together, become liquid, as, for instance, chloral hydrate and camphor, chloral hydrate and menthol, also chloral hydrate and thymol. A warm mortar aids the process. These compounds are frequently employed as pigments. Oleates are formed by the combination of oleic acid, and with most metallic oxides. The acid acts as a solvent, the result being a solution of oleate in an excess of oleic acid. Another form of oleate which occurs in the form of fine powder is made by the double decomposition of a soluble metallic salt, as, for instance, sulphate of zinc and castile soap. Thus made, the oleates contain no free oleic acid, and are often prescribed for dusting purposes in certain skin diseases. Oleates are very readily absorbed by the skin, and are used for applying mercury, bismuth, copper, lead, and zinc. Oleate of mercury is prepared of varied strengths. It is made by gradually adding 1 part of yellow oxide of mercury to 19 of oleic acid, in a mortar, and stirring constantly until the oxide is dissolved. A solution of 5 per cent. remains liquid when finished, but if over 10 per cent., it assumes a semi-solid consistency. Alkaloids, such as morphine and quinine, are soluble in oleic acid, but their salts are not.



The oleate of zinc in powder is prepared by the other process as follows: Dissolve 1 lb. of castile soap in 6 pints of boiling water, and in another 16 ounces of boiling water dissolve 7 ounces of sulphate of zinc: add this to the former solution, stir well, separate the water from the oleate floating on the top, and wash the latter with hot water till free from sulphate, then cool, dry, and reduce to fine powder.

*Ointments.*—An ointment may be described as a semi-solid application, the basis of which consists of a fatty body, such as lard, soft paraffin, lanoline, or combination of wax and oil, etc.

Ointments are prepared by simply mixing the ingredients on a suitable glazed slab with a flexible spatula, or rubbing them together in a mortar; or the base may be melted over a water bath and added to the medicinal agents, the whole being well stirred until cool. The latter method is generally adopted when a solid substance has to be dealt with. It must first be reduced to fine powder in a mortar, and rendered free from grittiness. Should the powder be bulky, it may be rubbed into a smooth paste with a little almond oil before adding the base to it. When the active ingredient is an alkaloid, and there is only a small quantity of it, a solvent is generally used, which ensures its thorough distribution throughout the base. Thus, in the case of ointment of atropine



of the pharmacopœia, which contains atropine, 10 grains ; oleic acid, 40 grains ; lard, 450 grains, dissolve the atropine in the oleic acid with gentle heat, add the lard, and mix thoroughly. In this, and similar cases, the base, of course, should not be melted ; and so, in dispensing ointments, the student must be guided by the nature of the ingredients ordered as to the best means of combining them. Thymol should be heated in the melted base until dissolved, as undissolved particles are apt to produce irritation when applied to the skin. Iodoform, on the other hand, should not be heated, but incorporated with the base while it is cooling. When mixing glycerin with fats, the mortar used should be slightly warmed, and soft extracts should be rubbed down to a smooth paste with a few drops of hot water before the base is added.

An ointment, when finished, should be bland and smooth throughout, and free from lumps and grittiness.



## XV.

SUPPOSITORIES—PESSARIES—BOUGIES—PLASTERS  
AND BLISTERS.

SUPPOSITORIES are used for the administration of drugs per rectum, and consist of some active medicinal agent mixed with a solid base, such as oil of theobroma, stearine, or soap and starch, that melt about the temperature of the body. They are moulded or formed into the shape of a small cone. The moulds generally used are made of metal, and can be divided into two parts, which are held together by a screw.

In making suppositories, the chief art lies in properly incorporating the medicinal ingredients with the base, and transferring the mixture at the right time to the moulds.

Oil of theobroma, the base most frequently used, is a concrete oil that melts at a temperature between 86 degrees and 95 degrees Fahr. To illustrate the process of making suppositories, we will describe how the following prescription should be prepared: *R. Pulv. Opii, gr. i.; Ext. Belladon. Alcohol., gr. ii.; Ol Theobrom. q.s.; ft. supposit, mitte vi.* First weigh



sufficient of the theobroma oil to make six suppositories (each of which should weigh 15 grains), and melt it in a small porcelain dish with gentle heat over a water bath. While this is being done, prepare the moulds by coating them with soap liniment, and leave them moist, which will prevent the suppository adhering. Next weigh the powdered opium and extract of belladonna, and placing them on a slab, rub them down to a thin paste with a little of the melted oil by means of a soft spatula. When thoroughly mixed, place in the dish with the remainder of the melted oil, and stir the whole thoroughly until it assumes a creamy consistence and will only just pour; then, still stirring, rapidly transfer to the moulds, and allow to stand in a cool place till set.

Another method of mixing when the active ingredients are in the form of powder, is to melt the base in a wide-mouthed bottle and add the other ingredients; cork, and shake well till incorporated, then pour into the moulds. The ordinary extracts of the pharmacopœia not prepared with alcohol, may be easily mixed with the base if first rubbed down on a slab with a few drops of boiling water. Substances of a crystalline nature, such as bromide of potassium, chloral hydrate, or tannic acid, must be reduced to a fine powder before being mixed with the base. Iodoform should not be heated but mixed



on a slab, after the base has been melted. Heat must also be avoided when chloral hydrate is used. Iodide of lead, oxide of zinc, and other heavy ingredients should be rubbed to a smooth paste with a little of the melted oil on a slab, and not transferred to the moulds until just before setting, as they are apt to settle into a hard mass at the apex of the cone.

Glyco-gelatine is largely used as a basis for suppositories, which when not medicated are popularly known as "glycerin suppositories". The base may be prepared as follows: Take of fine gelatine, ℥vi.; glycerin, ℥iss.; water, ℥x. Moisten the gelatine first with a little water, then add the glycerin and the remainder of the water, and heat over a water bath until dissolved. The moulds should be oiled or painted with soap liniment.

*Pessaries and Bougies.*—Pessaries are prepared in the same manner as suppositories, only a larger quantity of material is used. They are usually made to weigh 60 or 75 grains each, and run into moulds of suitable capacity.

Medicated bougies are made to weigh 20 grains each, and should be about two and a half inches in length, gradually tapering to a point.

Nasal bougies are usually prepared with a glyco-gelatine base, and are introduced into one of the nasal passages for treatment of chronic affections of the nasus. They should be about



three inches long, and a quarter of an inch in diameter at the base, the whole gradually tapering towards the apex.

*Plasters and Blisters.*—The spreading of a plaster is an operation that requires a considerable amount of practice and skill. It consists in melting, and evenly spreading by means of a warm spatula, a medicated compound with a base of wax and resin, etc., over a given space of thin leather or other material suitable for the purpose. The plasters met with in dispensing are chiefly those of the pharmacopœia. They are usually kept in convenient rolls, weighing about half a pound. In melting, a very gentle heat is required, which may be applied by means of the warm spatula, or a sufficiency of the plaster may be cut off the roll and melted in a small pan. As little heat as possible should be used throughout the process. The material on which plasters are generally spread is the prepared white skin known as "plaster skin". Chamois leather, swansdown, brown holland, calico, etc., are also used for the purpose. Plasters for application to the chest are made heart-shaped, and those for the side or back, oblong or reniform. Those for application to the breast should be made circular. In order to follow out the process in detail, we will take the following prescription as an example: *R.* Emplast. Plumbi, 10 × 6. *Fiat emplast.* The



plaster spatula or iron must first be heated. If the ordinary iron is used, it may be heated over a Bunsen burner, or by being placed in the fire for a few minutes. While this is being done cut out the exact pattern of the plaster from a piece of fairly stout paper, leaving a margin of about an inch in depth around the shape. A piece of leather may now be cut, at least an inch and a half each way larger than the dimensions given for the plaster, and several folds of paper placed between it and the counter to form a soft bed to work upon. The paper shape must next be affixed carefully to the leather by means of some weak gum or soft soap, the inner edge being closely pressed to prevent the plaster getting underneath. The plaster having been melted as described above, take the spatula, and with long strokes carefully spread it evenly over the surface of the leather, working from left to right. After allowing it to cool for a few minutes, strip off the paper shape, which should leave a clean sharp edge.

A blister is usually spread on adhesive plaster or thin leather, the shape being cut out of paper, as that for a plaster. Cantharides or blistering plaster being of a soft nature, the spatula is not necessary, and a sufficient quantity being cut off the roll, it is well worked between the fingers until it is quite plastic and soft. It is then placed on the base to which the shape has been affixed,

and spread with the side of the thumb, first around the margins, and then over the centre, until the whole is evenly covered. The surface may be rendered smooth by applying a little olive oil with the thumb if necessary. The shape may now be removed and the margin trimmed. A blister should have a margin of from three-quarters of an inch to an inch, according to size. They are made of various shapes, according to the directions of the prescriber.

In the foregoing notes we have only been able to give the barest outline of some of the practical operations which the dispenser is called upon to perform, but we trust they may serve to excite an interest and desire for a closer acquaintance with the art of pharmacy.





## APPENDIX.

Latin terms used in prescriptions, with their English meanings :—

Acidum	= An acid.
Adde, addendus	= Add, to be added.
Alias	= Another.
Alter	= Any.
Alternis horis	= Every other hour.
Ana, aa.	= Of each ingredient.
Ante	= Before.
Aqua bulliens	= Boiling water.
Aqua fervens	= Hot water.
Aqua fontana	= Spring water.
Articulus	= A joint.
Auris	= The ear.
Balneum maris	= A warm bath.
Balneum vaporis	= A vapour bath.
Bibe	= Drink.
Bis in dies	= Twice a day.
Capiat	= Let the patient take.
Cephalagia	= Headache.
Cibus	= Meals, food.
Cochlear	= Spoon.
Cochleare amplum	= A tablespoonful.
Cochleare magnum	= A tablespoonful.
Cochleare medium	= A dessertspoonful.
Cochleare modicum	= A dessertspoonful.
Cochleare parvum	= A small or teaspoonful.
Cochleare theæ	= A teaspoonful.



Cochleatina	= By spoonfuls.
Coenam	= Supper.
Cola	= Strain.
Compositus	= Compound.
Continuentur remedia	= Let the medicine be continued.
Coque	= Boil.
Cortex	= A bark.
Coryza	= Cold in the head.
Coxa	= The hip.
Crastino	= To-morrow.
Crastino mane sumendus	= To be taken to-morrow morning.
Crastino nocte	= To-morrow night.
Crastino vespere	= To-morrow morning.
Cubitus	= The elbow. <i>elbow</i>
Cujus	= Of which.
Cum	= With.
Cyatho theæ	= In a cup of tea.
Cyathus, cyathus vinarius	= A wineglassful.
Decoctum	= A decoction.
Dejectiones alvi	= Liquid stool.
Detur	= Let (it be given).
Diebus alternis	= Every other day.
Dilue	= Dilute.
Dimidius	= One half.
Donec	= Until.
Donec alvus dejiciatur	= Until the bowels have been moved.
Donec somnus obrepat	= Until sleep comes on.
Dolore lateris urgente	= Pain in the side.
Dosis	= Dose.
Ejusdem	= Of the same.
Electuarium	= An electuary.
Enema	= An injection.
Ex	= In.

Exhibeatur	= Let it be exhibited.
Extende super alutam mollem	= Spread upon soft leather.
Extractum	= An extract.
Fiat fiant	= Let it be made.
Fiat haustus	= Let a draught be made.
Fiat secundum artem	= Let it be made according to art.
Fluidus	= Liquid.
Frons	= The forehead.
Gargarisma	= A gargle.
Gena	= The cheek.
Granum	= A grain.
Gutta	= A drop.
Guttur	= The neck.
Hora decubitus	= At bed time.
Hora somni	= At bed time.
Horis consuetis	= At the accustomed hours.
Incisus	= Being cut.
Indies	= Daily, or from day to day.
Infusum	= An infusion.
Initio	= At first.
In pulmento	= In gruel.
Jam	= At once.
Jentaculum	= Breakfast.
Lagena obturata	= A stoppered bottle.
Liquoris	= A solution.
Mane nocteque	= Night and morning.
Mane primo	= Early in the morning.
Massa pilularum	= A pill mass.
Media nocte	= Midnight.
Meridies	= Noon.
Mica panis	= Bread crumb.
Minimum	= A minim.
Misce	= Mix.
Mistura	= A mixture.



Mitte	= Send.
More dicto	= In the manner directed.
More solito	= In the usual way.
Nasus	= The nose.
Nullus	= None.
Occulus	= The eye.
Omni hora	= Every hour.
Omni bihoris	= Every two hours.
Omni mane	= Every morning.
Omni nocte	= Every night.
Omni quadrante horæ	= Every quarter of an hour.
Ovi vitellus	= Yolk of an egg.
Parte sexta hora	= Every ten minutes.
Partes æquales	= Equal parts.
Pectus	= The breast.
Pharmacopœia Britannica	= British Pharmacopœia.
Phialâ agitâtâ	= Shake the bottle.
Pilula	= A pill.
Poculum	= A cup.
Pomeridie	= Evening.
Post	= After.
Post aurem	= Behind the ear.
Post cibum	= After meals.
Post prandium	= After dinner.
Pro re nata	= If occasion requires.
Pulvis	= Powder, a powder.
Quantum sufficiat	= As much as sufficient.
Sabinde	= Now and then.
Scatula	= A box.
Semel, septemane, hebdomada	= Once a week.
Semi	= Half.
Semi hora	= Half an hour.
Sesquihora	= An hour and a half.
Sesuncia	= An ounce and a half.
Sero nocte	= Late at night.

Si	= If.
Si opus sit	= If required.
Signatura	= Label.
Solus	= Alone.
Statim	= Immediately.
Stet	= Let it stand.
Sumat	= Let him take.
Sumatur sumendus	= To be taken.
Syrupus	= A syrup.
Tabella	= A tablet.
Tinctura	= A tincture.
Totus	= The whole.
Trihorio	= Every third hour.
Tritura	= Triturate.
Trochisci	= Lozenge.
Tussi urgente	= When the cough is troublesome.
Vespertina	= Evening.

The *cardinal* numbers are : *Unus*, one ; *duo*, two ; *tres*, three ; *quatuor*, four ; *quinque*, five ; *sex*, six ; *septem*, seven ; *octo*, eight ; *novem*, nine ; *decem*, ten ; *undecim*, eleven ; *duodecim*, twelve, etc., etc.

To express the fractional part or a number an *ordinal* is used : as *primus*, first ; *secundus*, second ; *tertiis*, third.

Numeral adverbs : *Semel*, once ; *bis*, twice ; *ter*, thrice, or three times ; *quater*, four times ; *quintus*, five times, etc.









