Physiological Action and Therapeutics.

Ginger is sialogogue when chewed, sternutatory when inhaled, and externally a rubefacient. Internally it is a grateful stimulant and carminative, produces a sensation of warmth at the epigastrium, promotes the expulsion of flatus, and reflexly stimulates the heart and the central nervous system. In large doses it is a gastro-intestinal irritant. It is used in domestic medicine as a stimulant carminative in colic, also in hot water for the cramps of suppressed menstruation due to exposure to cold. It may be employed with advantage in flatulence and atonic dyspepsia, in the latter being usually combined with other remedies. Though decidedly constipating by itself the Oleoresin is frequently used in purgative pills, to prevent griping; also as a stimulant ingredient of tonic pills. The troches are employed to increase the secretion of saliva, also in relaxed conditions of the throat; and the syrup is a favorite flavoring ingredient for prescriptions. Preserved Ginger is a favorite condiment, and carbonated water flavored with ginger is a common beverage under the name "ginger ale."

Ginger Beer is a favorite temperance beverage, but most of the preparations sold under its name are simply carbonated water flavored with ginger. The following recipe is furnished by Dr. William Hardman, of Blackpool, in whose family it has been used for over fifty years, and the excellence of which he guarantees:

Take 1½ oz. of the best ginger well bruised, 1 oz. of cream of tartar, and 1½ lb. of cane loaf sugar. Put all the ingredients into an earthen vessel and pour on a gallon of boiling water; when nearly cold add a gill of yeast, cover over with a blanket and let it stand in a warm place until next morning. Then skim it and run it through a filtering bag, bottle it, cork well with good corks and tie down the corks with string. In three days it will be fit for use. The bottles must be clean and sweet. A little lemon juice is considered an improvement by some. (*Lancet.*)

PART II.

PHARMACY AND PRESCRIPTION WRITING.

Pharmacy (φάρμακον, a drug or medicament),—may be defined as the art of selecting and preserving medicines, and preparing them for administration. It may be divided into—

Official or *Galenical Pharmacy*,—dealing with the processes and preparations of the Pharmacopœia; and—

Extemporaneous or *Magistral Pharmacy*,—which includes the operations of compounding and dispensing remedies as directed in the extemporaneous prescriptions of physicians.

Pharmacopœias and Dispensatories.

A Pharmacopœia is an official list of the drugs and their preparations recognized by the medical profession of a certain country. In other countries the Pharmacopœia is published under government auspices and has the force of a legal standard; in the United States its publication is left to the medical and pharmaceutical professions and it is revised every ten years by a convention called for that purpose. The official Pharmacopœias in the English languages, with the dates of their latest revision or additions, are as follows, viz.—

The Pharmacopœia of the United States of America, 8th Decennial Revision, 1900; official from September 1, 1905.

The British Pharmacopœia, 1898.

Besides the above there are—The Pharmacopœa Germanica; the Pharmacopée Française (Codex Medicamentarius); the Austrian, Pharmacopœa Austriaca; Russian, Ph. Rossica; the Swedish, Ph. Suecica, the Norwegian, Ph. Norvegica; the Danish, Ph. Danica; the Belgian, Ph. Belgica; the Swiss, Ph. Helvetica; the Spanish, Farmacopea Española; the Portuguese, Ph. Portugueza; the Indian, Ph. of India; the Hungarian, Ph. Hungarica; the Netherlands', Ph. Neerlandica; the Roumanian, Ph. Româña; the Finnish, Ph. Finnica; the Chilian, Farmacopea Chilena; the Greek, Ph. Hellenica; the Japanese, Ph. Japonica; the Mexican, Neuva Farmacopea Mexicana; the Croatia-Slavonian, Ph. Croatico-Slavonica; and the Italian, Farmacopea Italiana.

A Dispensatory is a commentary on one or more pharmacopœias, giving the physical and medicinal history of drugs and preparations, with their doses, physiological action and therapeutics, and includes similar information about many drugs which are not official in any pharmacopœia but are of occasional use or general interest. A dispensatory is a private publication, of authority

according to the reputation of its author. The principal dispensatories are American publications, and are veritable drug-encyclopædias, so elaborately do they deal with every subject embraced therein. Those of acknowledged value are—

The Dispensatory of the United States of America, by Dr. Geo. B. Wood and Dr. Franklin Bache. 18th edition, revised and largely rewritten, by Professors H. C. Wood, J. P. Remington, and S. P. Sadtler. Philadelphia, J. B. Lippincott & Co. 1899.

The National Standard Dispensatory, by Drs. Hare, Caspari and Rusby. Philadelphia, Lea Bros. & Co. 1906.

The American Dispensatory, by King & Lloyd, Cincinnati, is the recognized authority of the "eclectic" practitioners. 18th edition, 1899.

A Companion to the U. S. Pharmacopœia, by Drs. Oldberg and Wall; New York, Wm. Wood & Co.—is an excellent book, but not so exhaustive as the others in its method of treating the subjects embraced in it.

A Companion to the British Pharmacopœia, by Peter Squire; 17th edition, London, 1899; is the nearest English approach to the American dispensatories, and is the standard text-book on the general materia medica in Great Britain. Although a very good book it does not compare as a work of reference with either of the two great American Dispensatories first above named.

WEIGHTS AND MEASURES.

The working formulæ of the U. S. Pharmacopœia of 1880 were constructed on the system of parts by weight for all articles, whether solids or fluids, except in the case of fluidextracts, for which the metric weights and measures were employed. On this system it really made no difference what unit of weight was adopted in official pharmacy. The pharmacopœia of 1900 in most cases employs definite weights for solids, and measures for liquids, in terms of the metric system. In certain cases, where weighing is decidedly more convenient or where the product is adjusted to a percentage by weight which would be rendered uncertain if the ingredients were taken by measure, liquids are ordered to be weighed. In some cases (Aqua Destillata, Aqua Aurantii Florum), the quantities are directed simply by volume. In most cases, therefore, *solids* are officially directed to be *weighed by grammes*, and *liquids* to be *measured by cubic centimeters*. At the same time, however, the weights and measures generally used by physicians in prescribing and by pharmacists in dispensing medicines, are and will doubtless continue to be, in the United States those of the Apothecaries' or Troy System of weights, having 480 grains to the ounce and 5760 grains to the pound; and the Apothecaries' Measure. The drachm (60 grains) and the scruple (20 grains), are intermediate units of weight which are still used but are becoming obsolete.

The units of the Apothecaries' Measure are the minim (♏), which in water at its maximum density equals gr. 0.95; the fluidrachm (60 minims) and the

fluidounce (8 fluidrachms or 480 minims). The signs used to denote these units are ♏ minim, ℈ scruple, ʒ drachm, ℥ ounce, and in the case of liquids an f to denote fluid is often placed before the sign, thus fʒ for fluidrachm, f℥ for fluidounce. The relations between these units of weight and measure in water at 4° C. or 39.2° F. are as follows:—

Measure.		*Weight.*	*Weight.*		*Measure.*
♏j, One minim	=	0.95 grains	grain j	=	1.05 minims.
fʒj, One fluidrachm	=	57.0 "	ʒj	=	63.1 "
f℥j, One fluidounce	=	456.4 "	℥j	=	504.8 "

Table of Troy or Apothecaries' Weight.

Pound. *Libra.*		Ounce. *Uncia.*		Drachm. *Drachma.*		Scruple. *Scrupulum.*		Grain. *Granum.*
lb		℥		ʒ		℈		gr.
1	=	12	=	96	=	288	=	5760
		1	=	8	=	24	=	480
				1	=	3	=	60
						1	=	20

Table of Apothecaries' Fluid Measure.

Gallon. *Congius.*		Pint. *Octarius.*		Fluidounce. *Fluiduncia.*		Fluidrachm. *Fluidrachma.*		Minim. *Minimum.*
C.		O.		f℥		fʒ		♏
1	=	8	=	128	=	1024	=	61440
		1	=	16	=	128	=	7680
				1	=	8	=	480
						1	=	60

The British Pharmacopœia recognizes only the Imperial Standard or Avoirdupois Weight, having 437½ grains to the ounce, 16 ounces to the pound (instead of 12), and 7000 grains to the pound; and the Imperial Measure, having 20 ounces to the pint (instead of 16, as with us).

Table of British Pharmacopœial Weight.

Troy grain, Avoirdupois ounce and pound.

Pound. *Libra.*		Ounce. *Uncia.*		Grain. *Granum.*
lb		oz.		gr.
1	=	16	=	7000
		1	=	437½

The Troy ounce contains 42½ grains more than the avoirdupois ounce, but the Troy pound contains 1240 grains less than the avoirdupois pound. The grain is the only unit common to both.

Table of British Pharmacopœial Measure.

Gallon. *Congius.*		Pint. *Octarius.*		Fluidounce. *Fluiduncia.*		Fluidrachm. *Fluidrachma.*		Minim. *Minimum.*
C.		O.		floz.		fldr.		min.
1	=	8	=	160	=	1280	=	76800
		1	=	20	=	160	=	9600
				1	=	8	=	480
						1	=	60

The Metric, or Decimal System of Weights and Measures, is now official in the United States, having been adopted throughout the last two revisions of the U. S. Pharmacopœia. It is in general use on the continent of Europe

and is employed by French and German physicians in this country. Its three standard units are as follows,—

A Meter, the standard unit of linear measure and also of the whole system, is the ten-millionth part of the quadrant or fourth part of the terrestrial meridian, the quadrant being the distance from the equator to the pole. One-tenth of a meter is a Decimeter, the cube of which contains one Liter of pure water at 4° C., the temperature of its maximum density, which liter of water weighs one Kilogramme, or 1000 grammes.

A Liter, the unit of volume, is the volume of one cubic decimeter (1000 cubic centimeters) of pure water at 4° C., which volume of water weighs one Kilogramme (1000 grammes). One-thousandth of a liter is a Milliliter (or cubic centimeter), which volume of pure water at its maximum density weighs one Gramme.

A Gramme, the unit of weight, is the one-thousandth part of a kilogramme, and is therefore the weight of one-thousandth of a liter (a milliter or cubic centimeter) of water at 4° C., the temperature of its maximum density. Its tenth is the Decigramme, its hundredth is the Centigramme, and its thousandth part is the Milligramme.

The original and French spelling is *metre, litre, gramme*; the Anglicized form is *meter, liter, gram*. The U. S. Pharmacopœia sanctions a combination of both, thus—*meter, liter, gramme*.

The metric terms used in pharmacy are few, and are generally confined to the gramme, milligramme, and cubic centimeter (fluid-gramme); but the system embraces many other terms of increase and decrease of the units, as set forth in the following table, viz.—

10000.	Myriameter.	10000.	Myrialiter.	10000.	Myriagramme.
1000.	Kilometer.	1000.	Kiloliter.	1000.	Kilogramme.
100.	Hectometer.	100.	Hectoliter.	100.	Hectogramme.
10.	Dekameter.	10.	Dekaliter.	10.	Dekagramme.
1.	**Meter.**	**1.**	**Liter.**	**1.**	**Gramme.**
.1	Decimeter.	.1	Deciliter.	.1	Decigramme.
.01	Centimeter.	.01	Centiliter.	.01	Centigramme.
.001	Millimeter.	.001	Milliliter (Cubic Centimeter).	.001	Milligramme.

The figures are the numerals employed to represent the various terms of increase or decrease, thus—1000. represents a kilometer, a kiloliter, or a kilogramme; and .001 represents a millimeter, a milliliter, or a milligramme; therefore the unit should be added in each case to show which series it belongs to, thus—1000. Meter, .001 Gramme.

There is only one relation between the terms of these three series, which relation may be expressed by either of the following formulæ, viz.—

A Decimeter cubed contains a Liter, which weighs a Kilogramme.

A Centimeter cubed contains a Milliliter (or Cubic Centimeter), which weighs a Gramme.

If the three series were arranged so as to bring these three related terms on one line, the able would be deceptive, as no corresponding relation exists between the other terms which would also be on the same lines.

Relations between the Metric Weights and Measures and those of the Apothecaries' system are as follows,—

1 meter	= 39.3704 inches.	1 grain	= 0.0648 gramme.
1 liter	= 2.1134 pints.	1 minim	= 0.0616 cubic centimeter.
1 gramme	= 15.4323 grains.	1 fluidounce	= 29.5737 cubic centimeters.

The Metric System is making way but slowly in this country, although its progress is aided by every process of forcing which scientific bodies can bring into action, and it remains to be seen how much its adoption by the U. S. Pharmacopœia will influence the medical profession in its behalf. With all the influence brought to bear in its favor it certainly has not yet been adopted by any considerable proportion of native-born and home-educated physicians and

pharmaceutists. One of its greatest difficulties for the physician is the absence of any correspondence or relation between the unit of weight (gramme) and the unit of measure (liter), and the consequent want of fluid denominations below the cubic centimeter, corresponding with the decigramme, centigramme and milligramme of the weight scale. Its chief disadvantage is one which is inherent to any decimal system,—that the number ten cannot be divided more than once without producing a fraction. This is partly compensated for by the practice of dividing five into the three parts 2, 2 and 1, and on this principle metric weights are usually constructed. Our five-cent nickel coin is exactly 2 centimeters in diameter, and weighs 5 grammes.

Approximate or **Domestic Measures** become necessary in apportioning doses for a patient, when liquid medicines are used. Of these the measure most commonly employed is the teaspoonful, which is generally taken as equivalent to a fluidrachm, though as now manufactured the teaspoon usually contains about 75 minims, or 25 per cent. more than the theoretical quantity. The dessertspoonful is about equal to two teaspoonsful, and the tablespoonful to about 4 teaspoonsful or f℥ss, while the wineglass is supposed to contain about f℥ij. The use of graduated medicine glasses is strongly recommended instead of these approximate measures. They may be obtained at a trifling cost in any well-stocked drug store.

Drops (Guttæ) are very variable in size, though generally supposed to equal minims; the variations in their relative dimensions being due to the viscidity of the liquid, the shape and surface of the orifice from which they escape and sundry other circumstances. The Syrups and Mucilages produce large drops, while Bromine, Chloroform and other heavy mobile liquids produce very small ones. These differences are well illustrated in the following table, which gives the number of drops in a fluidrachm of several liquids of certain classes, arranged in the order of their increase. A more complete table is given in the Appendix.

Syrupus Acaciæ, 44	Oleum Ricini, 77.
Syrupus Scillæ, 75.	Oleum Copaibæ, 123.
Aqua, 60.	Oleum Juniperi, 148.
Liquor Potassii Hydroxidi, 62.	Spiritus Camphoræ, 143.
Liquor Hydrargyri Nitratis, 131.	Spiritus Chloroformi, 150.
Acetum Opii, 90.	Fluidextr. Digitalis, 134.
Vinum Opii, 100.	Fluidextr. Ipecac., 120.
Tinctura Opii Deodorati, 110.	Fluidextr. Cinchonæ, 138.
Tinctura Opii Camph., 130.	Fluidextr. Zingiberis, 142.
Tinctura Opii, 130.	Fluidextr. Buchu, 150.
Tinctura Iodi, 148.	Fluidextr. Hyoscyami, 160.
Tinctura Aconiti, 146.	Æther, 176.
Alcohol Dilutum, 137.	Bromum, 250.
Alcohol, 146.	Chloroformum, 250.

Specific Gravity is the relative weight of equal bulks of different bodies. The specific gravity of water at a certain temperature (generally 77° F.) is taken as 1, and that of all other substances is expressed in terms of this unit. The

Pharmacopœia gives very complete tables of percentages and specific gravities of Alcohol, Ammonia Water, Acetic, Hydrochloric, Nitric, Sulphuric and Phosphoric Acids. The specific gravity of any substance is expressed by the quotient obtained by dividing the weight of a given measure of the substance by the weight of an equal measure of water. In pharmacy the specific gravity of solids is not of any importance, but that of liquids is a matter of constant value, and is determined in most cases by means of a specific gravity bottle or by a hydrometer, instruments which are described in any standard work on chemistry or physics. Modifications of the hydrometer with scales adapted to particular work are the urinometer, saccharometer, lactometer, etc.

Specific Volume is the relative bulks of equal weights of different bodies. In pharmacy it means the volume of the weight of a liquid compared with the volume of an equal weight of water at 77° F. The specific volume of a body is therefore inversely as its specific gravity, and is expressed by the quotient obtained by dividing unity by the specific gravity. $\frac{1}{\text{sp. gr.}}$ = sp. vol. and therefore sp. gr. × sp. vol. = 1.

PRESCRIPTIONS.

Extemporaneous Prescriptions are formulæ written on the instant (*ex tempore*) to meet the requirements of individual cases.

A prescription should begin with the name of the person for whom it is designed and the date on which it is written. Then follows the Latin word *Recipe*, usually abbreviated to the sign ℞, and signifying "Take;" next, the names and quantities of the ingredients to be used, which are also expressed in Latin; then the directions to the compounder, followed by the directions to the patient, the last being now usually expressed in English; and finally the signature and address of the prescriber.

A prescription then has four component parts, as follows: the—

Superscription,—consisting of the name of the party for whom it is designed, the date and the sign ℞ signifying "Take thou."

Inscription,—the body of the prescription, consisting of one or more of the following sub divisions: the—

Basis,—or chief, active ingredient.
Adjuvant,—to assist the action of the basis.
Corrective,—to correct some injurious quality of the other ingredients.
Vehicle or Excipient,—giving the prescription a suitable form.

Subscription,—the directions for the compounder, usually expressed in contracted Latin.

Signature,—the instructions for the guidance of the one administering the medicine, expressed in English, followed by the signature of the prescriber.

A prescription may, however, contain the base alone, or the base with the adjuvant, or the base with a simple vehicle or diluent. A single ingredient may serve a double or a triple office, as the Syrupus Rhei Aromaticus with Quinine, in which case the syrup serves as an adjuvant to increase the action of the quinine, as an excipient to cover the taste, and as a vehicle to facilitate the administration of the dose directed. Again, the basis may need no aid in doing its work and may require no corrective of its action nor any special vehicle. On the other hand, there is no limit to the number of ingredients which may be used, provided that the prescriber has a clear idea of something to be accomplished by each one, and that there is no chemical or medicinal incompatibility between them. In olden times prescriptions were very complex and contained a great many curious and incongruous ingredients. As Dr. Piffard has well said, "the tendency of the present age is toward mono- rather than poly-pharmacy, and prescriptions with the orthodox *adjuvans* and *corrigens* are less frequently seen than formerly." There is danger, however, in carrying this simplicity too far, for there is no doubt that proper combinations of medicines will often produce effects for the patient's good which could not be obtained from the use of any one remedy.

Procedure in Writing a Prescription.

In writing an extemporaneous prescription, the first step is to write the patient's name and address, the date and the sign ℞. Then the title of each ingredient should be written in Latin and in the genitive case, except that when a certain number only of an ingredient is ordered the name of the ingredient should be in the accusative case, for example, "*Vitellum unum*,—one yolk-of-egg." Next, the quantity of each ingredient sufficient for one dose should be mentally determined and multiplied by the number of doses which the mixture is to contain, and the result set down in signs and Roman numerals. The directions to the pharmacist and patient being added and the prescriber's name or initials affixed, the prescription is completed; but when very active agents are used, it is a good plan to go over the calculations a second time before letting the prescription leave the hands of the person most responsible for the result. For pills or powders the same process should be employed, slightly varied according to the requirements of each case. Frequently the ingredients and quantities for but one pill, powder or suppository are named, with instructions to make a certain number after the formula. When an unusually large dose of any poisonous drug is prescribed, it is customary to underline the quantity, so as to call the attention of the compounder to the fact that the prescriber is aware that the dose is above the average.

An Example will perhaps make the foregoing more comprehensible, and at the same time serve to indicate the style of writing usually employed. The following formula represents the preparation known as *Black Draught*, but