C. G. Putnam.

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A CONDENSED COMPENDIUM

OF

Pharmaceutical Knowledge

A QUIZ BOOK

BY

H. C. GRAY, PH. G.

TWELFTH EDITION.

Revised to conform with the U. S. Pharmacopœia of 1890.

DESIGNED FOR THE USE OF PHARMACEUTICAL STUDENTS PREPARING THEMSELVES FOR EXAMINATION IN COLLEGES OF PHARMACY, AND BEFORE THE PHARMACEUTICAL EXAMINING BOARDS OF THE VARIOUS STATES.

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PREFACE.

THE rapid progress and development of pharmacy makes a new edition of our Quiz Compend necessary, as we desire to keep it, as heretofore, a standard work of its kind. The liberal sale the former editions met with convinces us that this work meets a long-felt want, and we shall take the occasion of this revision to improve the book in many respects, and hope to make it invaluable to pharmaceutical students for daily reference in the store, as well as for those preparing for an examination. It is not our object to teach new facts, but to bring points and technicalities of the drug business to the mind in a condensed form, to assist the student in memorizing them. We omit, as out of place in a condensed work of this kind, formulæ and descriptions of the preparations of the pharmacopœia, which make up the bulk of most Quiz Compends, and for such matter refer you to the proper text-books, which every one should have at hand.

THE AUTHOR.

GRAY'S PHARMACEUTICAL

QUIZ COMPEND.

TWELFTH EDITION.

ABBREVIATIONS.

A, āā	Ana	Of each
Add	Addantur	Add
Ad libit	Ad libitum	At pleasure
Admov	Admoviatur	Apply
Adst. febr	Adstante febre	When fever is on
Altern. hor	Alternis horis	Every other hour
Alt. noct	Alternis noctibus	Every other night
Aq. Bull	Aqua Bulliens	Boiling water
Aq. dest	Aqua destillata	Distilled water
Aq. com	Aqua communis	Common water
Aq. fluv	Aqua fluviatilis	River water
Aq. pluv	Aqua pluvialis	Rain water
Aliquot		Some
Amplus		Large
Alter		The other
Bibe		Drink
Bene tere		Rub well
Bis in die or Bis indies		Twice a day

Bolus		A large pill
Caute		Cautiously
Cap	Capiat	Let him (or her) take
Cibus		Food
Collut	Collutorium	A mouth-wash
Cola		Strain
Cum		With
Chart	Chartula	A powder
Coch. mag	Cochleare magnum	A tablespoonful
Coch. med	Cochleare mediocre	A dessertspoonful
Coch. parv	Cochleare parvum	A teaspoonful
Colet	Coletur	It should be strained
Collyr	Collyrium	Eye water
Comp	Compositus	Compound
Cort	Cortex	A bark
Cong	Congius	A gallon
Decanta		Pour off
Decoct	Decoctum	A decoction
Dim	Dimidius	One-half
Dieb. alt	Diebus alternis	Every other day
Ejusd	Ejusdam	The same
Emp	Emplastrum	A plaster
Enema		An injection or clyster
Et		And
Ft. pil	Fiat pilulæ	Make pills
Ft. haust	Fiat haustus	Make a draught
Ft. mass	Fiat massa	Make a mass
F. S. A	Fiat secundum artem	Make according to art
Fl	Fluidus	Liquid
Fol	Folia	Leaves
Garg	Gargarisma	A gargle
Gr	Granum	A grain
Gtt	Gutta	A drop
Hor. decub.	Hora decubitus	At bedtime

In. d	In die	Daily
Inf	Infusum	An infusion
Infunde		Pour in
Lb. lb	Libra	A pound
M	Misce	Mix
Mass	Massa	A mass
Manipulus		A handful
Mic. pan	Mica panis	Crumb of bread
Min	Minim	The 60th of a drachm
Mist	Mistura	A mixture
Misce		Mix
Mitte		Send
Non		Not
No	Numero	In number
O	Octarius	A pint
Om. hor	Omni hora	Every hour
Omni nocte		Every night
Opt	Optimus	The best
P. æ	Partes æquales	Equal parts
Pil	Pilula vel pilulæ	A pill or pills
P. C	Post cibus	After eating
Pondere		By weight
Ppt	Præparata	Prepared
Pro re nata		Occasionally
Pulv	Pulvis	A powder
Parvus		Little
Pro		For
Q. S	Quantum sufficit	A sufficient quantity
Quantum libet		As much as you please
℞	Recipe	Take
Sem	Semen	A seed
S. or sig	Signa	Write
Semel		Once
S. A	Secundum artem	According to art
Ss	Semis	A half

Trit .....Triturate.....Rub to a powder
Utendum .....To be used
Ut dictum.....As directed
Vel .....Or

DEFINITIONS.

CARBONIZATION—Is the process of heating organic substances without the access of air, until they are charred. The volatile products are driven off, but combustion is prevented.

CALCINATION—Is the process of driving off volatile substances, such as gas or water, from inorganic matter, by heat without fusion.

COLATION—Straining.

COMMINUTION—Reducing drugs to fine particles.

DEFLAGRATION—Is the process of heating one inorganic substance with another capable of yielding oxygen (usually a nitrate or a chlorate); decomposition ensues, accompanied by a violent, noisy, or sudden combustion.

DESICCATION—Is depriving solid substances of moisture at a low temperature.

DELIQUESCENCE—Is the absorption of moisture from the air by a salt.

DISTILLATION—Vaporizing and condensing a liquid.

DESTRUCTIVE DISTILLATION—Is that in which the substance is consumed and the products of combustion are condensed and collected.

DIGESTION—Is maceration with the addition of gentle heat.

DECANTATION—The process of separating a fluid from a solid by allowing the solid to deposit at the bottom of the vessel and pouring off the liquid.

DIALYSIS—Is separating crystallizable from uncrystallizable solids by placing a solution containing both in a porous diaphragm, the under surface of which is in contact with water.

EFFLORESCENCE—A loss of moisture by a salt in presence of air.

ELUTRIATION—Is obtaining a fine powder by suspending an insoluble powder in water and decanting the liquid containing the lighter particles.

EMULSION—An aqueous preparation in which oily or resinous substances are suspended by the agency of viscid or gummy substances.

EXSICCATION—Depriving solid substances of moisture at a high temperature.

EFFERVESCENCE—Ebullition from chemical reaction.

FRACTIONAL DISTILLATION—Distillation where a lighter liquid is to be separated from a heavier one.

FUSION—Is the process of liquifying bodies by heat.

FILTRATION—Separating liquids from solids by passing the liquids through a filter.

GRANULATION—Obtaining a coarse powder by constantly stirring a liquid containing a solid in solution while the liquid is being evaporated.

ISOMERIC—An epithet applied to different bodies which agree in composition, but differ in properties.

ISOMORPHOUS—An epithet applied to different bodies which have the same crystalline form.

IGNITION—Consists in strongly heating solid or semi-solid substances to obtain a definite residue.

INCINERATION—Is the burning of organic substances to ashes in air. The ash is the part sought.

LEVIGATION—Is reducing substances to a minute powder by trituration after they have been made into a paste with water.

MACERATION—Soaking the drug in a menstruum to extract its virtues.

PRECIPITATION—Is separating solids from liquids by heat, light, or chemical reaction.

PERCOLATION—Passing a menstruum through a powdered drug in a percolator.

SOLUTION—To dissolve in a liquid.

SUBLIMATION—Vaporizing and condensing a solid.

TORREFACTION—Is the process of roasting organic substances. The constituents are modified but not charred.

TRITURATION—Rubbing in a mortar.

THERAPEUTIC CLASSIFICATION OF MEDICINES.

ANTACIDS—Remedies which neutralize acids.

ANTIPYRETICS—Reduce the temperature of the body.

APHRODISIACS—Excite the functions of the genital organs when morbidly depressed.

ANTISPASMODICS—Relieve or prevent spasmodic pain or the spasmodic action of the muscles.

ANÆSTHETIC—Gaseous vapors employed to produce surgical anæsthesia.

ANTHELMINTICS—Medicines which destroy worms, or expel them from the bowels.

ALTERATIVE—A medicine employed to modify the nutritive process of the body when in a diseased condition.

ANTISEPTIC—Substances which prevent putrefaction.

ASTRINGENT—A substance which causes contraction of the tissues.

CARMINATIVES—Aid in the expulsion of gases from the stomach and intestines.

CATHARTICS—Cause evacuations of the bowels.

CHOLAGOGUE—A medicine which increases the flow of bile.

DÈMULCENT—A substance which lubricates the surface to which applied, and prevents the contact of irritating substances.

DIAPHORETIC—A medicine which increases the cutaneous discharge.

DEODORIZER—Substances which decompose offensive effluvia.

DISINFECTANT—Substances which decompose putrid and infectious matter.

DIURETIC—A medicine which acts on the kidneys and produces an increased flow of urine.

EMMENAGOGUE—A medicine which excites the menstrual secretion.

EMOLLIENT—A substance which serves as a vehicle for the application of warmth and moisture.

EMETIC—A medicine which acts on the stomach, producing vomiting.

EXPECTORANTS—Aid or modify the secretions of the air passages and promote expulsion of mucous and other fluids from the lungs and trachea.

HYPNOTICS—Remedies inducing sleep, they may be narcotics, which stupefy, or anodynes, which lessen excitement and relieve pain.

IRRITANTS—Are applied locally to produce counter-irritation, inflammation, vesication, etc.

OXYTOCICS—Increase the contractile power of the uterus.

UTERINE SEDATIVES—Diminish uterine contractions.

NARCOTICS—Medicines which have a sedative

influence, frequently promote sleep, relieve pain and produce insensibility.

TONICS—Medicines which stimulate the nutritive processes.

Weight, Measure and Specific Gravity.

What is Weight? Weight is the difference between the attraction of the earth and that of surrounding bodies for bodies on the surface of the earth.

What is meant by Volume? Volume is the space occupied by a certain amount of matter.

What standards are used upon which to base the system of weights? The Grain and the Meter.

What systems of weights used in Pharmacy are based on the Grain? The Troy or Apothecaries' system and the Avoirdupois system.

State the denominations of each. Troy or Apothecaries' Weight: 20 grains = 1 scruple; 3 scruples = 1 drachm; 8 drachms = 1 ounce; 12 ounces = 1 pound. Avoirdupois Weight: 437½ grains = 1 ounce; 16 ounces = 1 pound.

State the Symbols of each. Troy: Grain or grains, gr.; scruple, ℈; drachm, ʒ; ounce, ℥. Avoirdupois: Ounce, oz.; pound, ℔.

How many grains do the ounce of each system contain, respectively, and what is the difference in grains between the Troy and Avoirdupois ounce? Avoirdupois ounce = 437½ gr.; Troy ounce = 480 gr. Troy ounce 42½ grains greater.

What is the difference in grains between the Avoirdupois and Troy pound? Avoirdupois pound,

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What are the units of the Metric System? Meter, Liter, Gramme, Are, and Stére.

The above names are pronounced thus:

Meter pronounced meeter.

Liter pronounced leeter.

Gram pronounced gram.

Are pronounced like the verb are.

Stére pronounced stair.

The denominations representing the subdivisions of any unit are expressed by prefixing the Latin numerals *deci*, *centi*, and *milli* to the unit—meaning respectively one tenth, one hundredth, and one thousandth; the multiples are expressed by prefixing the Greek numerals, *deka*, *hecto*, *kilo*, and *myria* —meaning ten, hundred, thousand, and ten thousand.

What is a Meter? One 40-millionth of the circumference of the earth at its poles.

How many inches in a Meter? 39.37.

What is a Liter? The cube of a tenth part of a meter.

What is its equivalent in ounces? 33.8149.

What is a Stére? It is a cubic meter, and is used for measuring large bulks of dry substances.

How does the Liter compare with one Quart? It is 6 per cent greater.

What is a Gramme? The weight of a cubic Centimeter of water at 4° Centigrade.

How many grains does one "gramme" weigh? 15.432 grains.

What is an Are? The Are is one square dekameter or 100 square meters. It is equal to 2471 acres.

Give tables of the Metric System,

MEASURES OF LENGTH.

Millimeter	0.001	of a meter,	0.0394 inch
Centimeter	0.01	" "	0.3937 "
Decimeter	0.1	" "	3.9370 inches.
METER	1	meter,	39.3704 "
Dekameter	10	meters,	393.7043 "
Hectometer	100	"	328 feet, 1 inch.
Kilometer	1,000	"	3280 " 10 inches.
Myriameter	10,000	"	6.2137 miles.

MEASURES OF SURFACE.

Centare	1	square meter,	1550 square inches.
ARE	100	square meters,	119.6 square yards.
Hectare	10,000	square meters,	2.471 acres.

MEASURES OF VOLUME.

Milliliter	0.001	of a liter (1 cu. cm.)	0.0610 cubic inch.
Centiliter	0.01	" "	0.338 fluid ounce,
Deciliter	0.1	" "	0.1056 quart.
LITER	1	cubic decimeter,	61.0271 cubic inches.
Dekaliter	10	cubic decimeters,	2.6417 gallons (U. S.)
Hectoliter	100	" "	26.417 " "
Kiloliter(stére)	1,000	" "	264.17 " "

WEIGHT.

Milligram	0.001	ms.	1 cu. mm. water,	0.0154 grain Av.
Centigram	0.01	"	10 " " "	0.1543 " "
Decigram	0.1	"	0.1 cu. cm. "	1.5432 grains "
GRAM	1	"	1 " " "	15.4323 " "
Dekagram	10	"	10 " " "	0.3527 ounce "
Hectogram	100	"	1 deciliter "	3.5274 ounces "
Kilogram	1,000	"	1 liter "	2.2046 pounds "
Myriagram	10,000	"	10 liters "	22.0462 " "
Quintal	100,000	"	1 hectoliter "	220.4621 " "
Tonneau	1,000,000	"	1 cu. meter "	2204.6212 " "

What is the equivalent of one minim in the metric system? 0.06 c. c.

What is the equivalent of one grain in the metric system? 0.065 grm.

How would you convert the weights and measures in ordinary use into metric weights and measures? Multiply the quantities by the corresponding metric equivalent.

To convert Cubic Centimeters into minims, multiply by 16.

To convert Grams into drachms, divide by 4.

To convert Cubic Centimeters into ounces, divide by 32.

To convert Minims into c.c. or grains into grams, divide by 16.

To convert fl. dr. into c.c. or drachms into grams, multiply by 4.

TABLE OF EQUIVALENTS.

LIQUIDS.	APPROXIMATE EQUIVALENT.	EXACT EQUIVALENT.
1 minim	0.06 Cubic centimeter.	0.061 C. c.
1 fl. drachm	4 C. c.	3.696 C. c.
1 fl. oz.....	30 C. c.	29.574 C. c.
4 fl. ozs. or ¼ pint....	118 C. c. (⅛ Liter.)	118.295 C. c.
16 fl. ozs. or 1 pint	473 C. c. (½ Liter.)	473.182 C. c.
2 pints	1 Liter (1000 C. c.)	.946 Liter.
1 gallon	4 Liters.	3.785 Liters.
1 Cubic centimeter.	16 minims.	16.23 minims.
4 C. c.....	1 fluid drachm.	1.084 fl. drs.
15 C. c.....	½ fl. oz. (4 fl. drs.)	4.056 fl. drs.
30 C. c.....	1 fl. oz.	1.014 fl. ozs.
60 C. c.....	2 fl. ozs.	2.028 fl. ozs.
100 C. c.....	3⅓ fl. ozs.	3.381 fl. ozs.
120 C. c.....	4 fl. ozs. (¼ pint.)	4.057 fl. ozs.
300 C. c.....	10 fl. ozs.	10.141 fl. ozs.
470 C. c.....	1 pint.	15.860 fl. ozs.
1,000 C. c. (1 Liter)	2 1-10 pints.	2.113 pints.
4 Liters.....	1 gallon.	1.056 gals.
SOLIDS.		
1–120 gr.....	0.00054 grm.	0.000539 grm.
1–100 gr.....	0.00065 grm.	0.000647 grm.
1–64 gr.....	0.001 grm.	0.001013 grm.
1–40 gr.....	0.0016 grm.	0.001620 grm.
1–32 gr.....	0.002 grm.	0.002025 grm.
1–10 gr.....	0.0065 grm.	0.006479 grm.
1–3 gr.....	0.021 grm.	0.021599 grm.
1 gr.....	0.065 grm.	0.064798 grm.

SPECIFIC GRAVITY.

What is Specific Gravity? The comparative weight of bodies of equal bulk. It is ascertained by weighing the bodies with an equal weight of pure water at a given temperature and atmospheric pressure, which is given as one.

Specific Gravity is also called Specific Weight.

Give two methods of taking the specific gravity of liquids.

Hydrometer and Specific Gravity bottle.

In order to obtain specific gravity, we must have a standard of comparison. For convenience sake, we use pure water at its maximum density as the standard for liquids, and hydrogen gas as the standard for gases.

What is meant by the maximum density of a liquid is that temperature of the liquid at which a given bulk will weigh the most. Thus, a given bulk of water of 4° centigrade or (39.2° F.) will become lighter in weight as the temperature either rises above that point or falls below it. Pure water at (4° C.) is therefore the standard for solids and liquids.

The pharmacist will have no use for the specific gravities of gases; therefore solids and liquids alone will claim his attention.

The methods of obtaining the specific gravities of solids and liquids are different; hence they will be considered separately.

To obtain the specific gravity of a solid, first

weigh the solid, then weigh an equal bulk of water, and divide the weight of the solid by the difference in weight between the solid and the water.

Since it would be difficult to obtain a bulk of water exactly equal to a given solid, a plan has been adopted which depends on the fact that a body emersed in a liquid loses as much weight as its own bulk of that liquid would weigh. This being true, we can estimate the specific gravity of solids which are heavier than water and insoluble in water, by first weighing it in the air and then weighing it in water. Secondly, divide the weight in the air by the loss of weight in water, and the quotient will be the specific gravity.

The loss of weight when weighed in water, according to the above law, is, of course, equal to the difference between the weight of the solid and the same bulk of water.

When the solid is soluble in, but heavier than water. oil, benzin or some liquid in which the substance is insoluble is selected. Then, by knowing the relative weight the oil or other liquid bears to water, one can, by proportion, easily obtain its relative weight to water, which will be the specific gravity.

(Thus as the specific gravity of the oil is to the specific gravity of water, so is the loss of weight in the oil to the loss of weight in water. So divide the weight of the solid by its loss of weight in water.

Solids soluble in, but lighter than water, require the selection of a liquid lighter than the solid itself and in which it is not soluble. Then proceed the same as before.

Solids insoluble in, but lighter than water. This requires the aid of a heavy insoluble body, which is attached to the light body so as to secure the immersion of

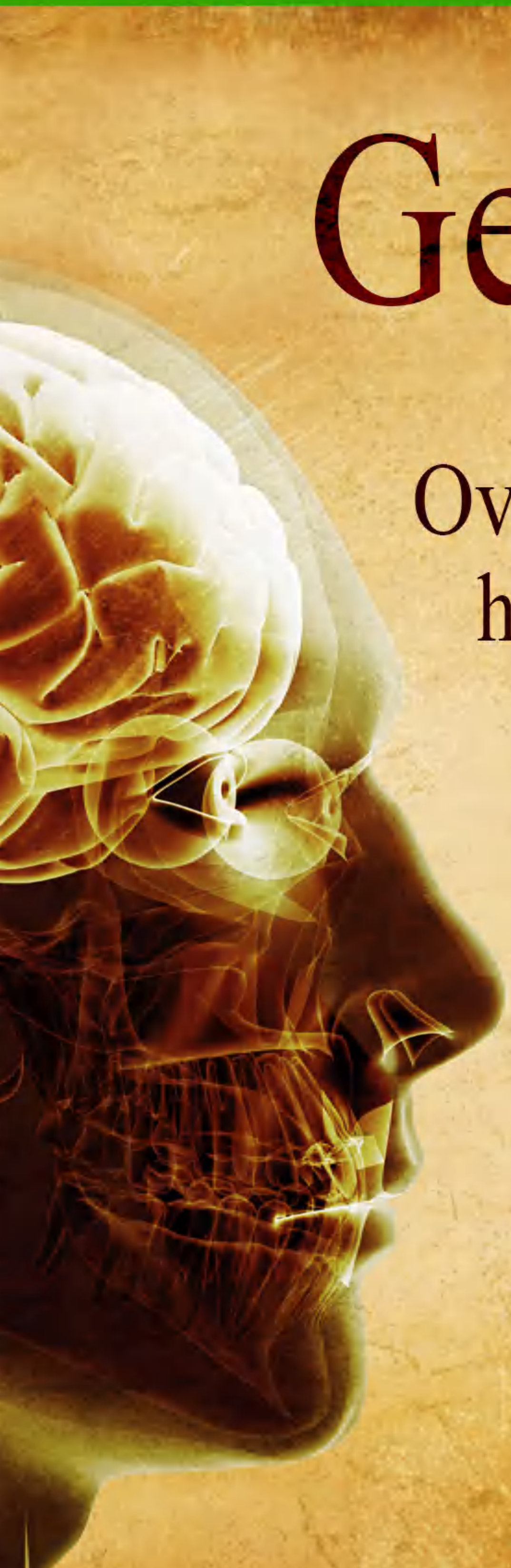
both. Deduct the loss of weight of the heavy body from the loss of weight of both, which leaves the loss of weight of the light body. Then divide the weight of the body by its loss of weight in water.

The specific gravities of liquids are, however, easier determined than solids. The most common methods are by means of the specific gravity bottle and the hydrometer.

The specific gravity bottle is made to hold one thousand grains of water at a certain temperature. Now, if the bottle be filled with a liquid which we wish to obtain the specific gravity of, and the liquid carefully weighed, by this method we will find the exact difference in weight between equal bulks of the given liquid and water. Now, divide the weight of the liquid by one thousand, which is the weight of water, and we will have the specific gravity.

The hydrometer is a graduated floating instrument which is used to indicate the specific gravity of a liquid by sinking it to a depth corresponding to the density of the liquid. It acts in accordance with a law of physics, namely, that any body will sink into a liquid until it has displaced a quantity of water equal to its own weight. Thus, a piece of wood will not sink into a dish full of mercury so far as into a dish full of water. The reason is because it requires less mercury to be displaced to equal the weight of the wood than it does of the water.

Hydrometers are generally made of glass, and loaded at the lower end in order to sink it to the proper depth in the fluid. It has also a stem on which marks are placed, showing the specific gravity of a liquid in which the hydrometer will sink to a given mark.



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by the sp. w.; and to find the volume of any number of Gm. in Cc., multiply the Gm. by the sp. vol. If the sp. vol. of glycerin be 0.800, then one Kilogram of it measures 800 Cc. When any number is multiplied by the sp. w. the product is equal to the quotients obtained by dividing the same number by the sp. vol.; and a division by the sp. w. gives the same result as a multiplication by the sp. vol.

What is the Specific Gravity of the Following?

Benzinum	0.670
Æther	.725
Alcohol Albsolutum	.797
Alcohol Deodoratum	.816
Alcohol	.820
Spiritus Ætheris Nitrosi	.836– .842
Oleum Terebinthinæ	.855– .870
Aqua Ammoniæ Fortior	.901
Spiritus Frumenti	.917– .930
Spiritus Vini Gallici	.925– .941
Alcohol Dilutum	.936
Aqua Ammoniæ	.960
Acidum Aceticum Dilutum	1.008
Acidum Sulphurosum	1.035
Açidum Hypophosphorosum Dil	1.046
Acidum Aceticum	1.048
Acidum Hydrochloricum Dil	1.050
Acidum Phosphoricum Dil	1.057
Acidum Nitricum Dil	1.057
Acidum Aceticum Glaciale	1.058
Creosotum	1.070
Acidum Hydrochloricum	1.163

Glycerinum	1.250
Syrupus	1.317
Acidum Nitricum	1.414
Chloroformum	1.490
Acidum Phosphoricum	1.710
Acidum Sulphuricum	1.835
Bromum	2.990
Iodum	4.948
Hydrargyrum	13.5584

HEAT.

What is Heat? Heat is molecular motion. How is heat measured? By the thermometer. What are the three scales? Fahrenheit, Centigrade and Réaumur.

Describe each.

Fahrenheit scale—The freezing point of water is 32°, the boiling point 212, and the intervening space is divided into 180 equal parts called degrees.

Centigrade—The freezing point of water is zero, the boiling point 100° and the intervening space is divided into 100 equal parts called degrees.

Réaumur—The freezing point is zero, and the boiling point 80°.

Formulæ for the Conversion of Degrees of One Thermometric Scale into Those of Another.

F.=Fahrenheit. C.=Centigrade. R.=Réaumur. D.=Observed Degree.

If above the freezing point of water (32° F.; 0° C.; 0° R.),

F. into C	(D—32)÷9× 5
F. " R	(D—32)÷9× 5
C. " F	D÷ 5 ×9+32
R. " F	D÷ 4 ×9+32

If below 0° F. (—17.77°C.—14.22° R.),

F. into C.....—(D+32)÷9× 5
F. " R.....—(D+32)÷9× 4
C. " F.....—(D÷ 5×9)—32
R. " F.....—(D÷ 4×9)—32

If below freezing, but above 0° F. (—17.77° C.; —14.22° R.),

F. into C.....—(32—D)÷9 5
F. " R.....—(32—D)÷9 4
C. " F.....32—(D÷5×9)
R. " F.....33—(D÷4×9)

For all degrees,

C. into R.....D÷5×4
R. " C.....D÷4×5

To convert Centigrade degrees into those of Fahrenheit above 32, multiply by 1.8 and add 32.

To convert Fahrenheit degrees above 32 into those of Centigrade, subtract 32 and divide by 1.8.

What is meant by the latent heat of water? That heat which water absorbs or discharges on passing from the liquid to the gaseous, or liquid to solid state, without affecting its own temperature. Thus, the temperature of boiling water never rises above 212° F., because the steam absorbs the excess of heat which is necessary for its gaseous state.

What is the official thermometer? The Centigrade.

What is "Gentle heat," U. S. P.? 32° to 38° C.

Why is mercury especially adapted for use in thermometers? On account of the uniformity with which it increases in temperature.

At what point does mercury congeal? 39° F.

How is temperature below this measured? By the alcohol thermometer.

ELEMENTARY CHEMISTRY.

The infinite variety of solid, liquid and gaseous substances of which our earth and atmosphere are composed may be resolved with more or less difficulty into distinct forms of matter appropriately termed Elements, because by no known means can they be further decomposed. Sixty-nine elements have been proved to exist. A few occur naturally in the uncombined state, but the greater number are combined in so subtle a manner as to conceal them from ordinary methods of observation. Thus none of the common properties of water indicate that it is composed of two elements, both gases, but differing much from each other.

The art by which this and all other compound substances are resolved into their elements is termed *Chemistry*.

Persons who practice the art and science of Chemistry are known as *Chemists*.

The *art* of Chemistry also includes the construction of compounds from elements and the conversion of substances of one character into those of another. The general principles or leading truths relating to the elements, to the manner in which they severally combine, and to the properties of the compound substances formed by their union constitute the *science* of Chemistry.

From these few words concerning the nature of the art and science of Chemistry it will be seen that

in most of the occupations that engage the attention of man, Chemistry plays an important part, and in few more so than in the practice of Pharmacy.

Air, water, drugs and chemicals, in short all substances, are composed of a few elements. An intimate knowledge of the properties of these, and of the various substances they form by combining with each other, a knowledge of the power or force by which the elements contained in those compounds are held together, and an application of such knowledge to Pharmacy must be the object sought to be attained by the learner.

Of the sixty-nine known elements, about one-half are of pharmaceutical interest; of these about two-thirds are metals and one-third non-metals; the remainder are so seldom met with in nature as to have received no practical application either in medicine or art. Before intimately studying the elements it is desirable to acquire some general notions concerning them.

Each elementary substance has a symbol (or a short-hand character), which usually is a capital letter, or a capital and one small letter.

It has four functions:

1. It is a short-hand for the *name* of the element.
2. It represents one *atom* of the element.
3. It stands for a constant *weight* of the element —the atomic weight or combining weight.
4. Symbols represent single and equal *volumes* of gaseous elements.

A Chemical Compound is one in which definite weights of two or more elementary substances have combined, and, during combination have undergone an entire change of properties. A *compound* in pharmacy is an intimate mixture of substances, but

still only a mixture; it is not a *chemical* compound, the ingredients have not entered into *chemical* union or combination.

Chemical Force, like other forces, cannot be described, for, like them, it is only known by its effects. It is distinguished from other forces by the facts that—

First, it produces an entire change of properties in the bodies on which it is exerted, and,

Second, that it is exerted only between definite weights and volumes of matter. Like the *force of cohesion*, which is the name given to the attraction which molecules have for each other, and which is great in solids, small in liquids, and apparently absent in gases, and like the *force of adhesion* which is the name given to the attraction which a mass of molecules has for another mass, *the chemical force* acts only within immeasurable distances; indeed, inasmuch as the chemical force appears to reside in atoms, that is to say, is exerted inside a molecule, while all other forces affect entire molecules, the chemical force may be said to be distinguished.

Third, by being exerted within a smaller distance than that which any other force is exerted.

LAWS REGULATING CHEMICAL COMBINATION.—First. A definite compound always contains the same elements and the same proportions of those elements—by weight or volume.

Second. When two elements unite in more than one proportion, they do so in simple multiples of that proportion.

Third. The proportions in which two elements unite with a third are the proportions in which they unite with each other.

CHEMICAL ACTION.—By acting *chemically* what is

meant is *so affecting each other that the substances are greatly altered in properties.* A *mixture* of oxygen and hydrogen is still a gas; a *chemical compound* of oxygen and hydrogen is a liquid, namely, water; here is a great alteration in leading properties. Iodine is only slightly soluble in water, and forms a brown-colored solution, and iron is insoluble; but when iodine and iron are *chemically* combined, the product is very soluble in water, forming a light green solution in which the eye can detect neither iodine nor iron, and which is utterly unlike iron or iodine in any one of their properties.

Tartaric acid, carbonate of sodium, and water added to each other, form a *chemical compound*, containing neither tartaric acid nor carbonate of sodium, these bodies having attacked each other and formed fresh combinations. These illustrations show that *chemical* action is distinguished from all other actions by (*a*) producing an entire change of properties in the bodies on which it is exerted, and further by (*b*) the fact that it only takes place between definite weights and volumes of matter. This (*a* and *b*) cannot be said of any other action—the action of any of the other great forces of nature (gravitation, heat, light, electricity, etc.); hence the statements (*a* and *b*) furnish a sharp and precise definition of *chemical* action or the chemical force.

ATOMS.—In a chemical compound, what has become of the constituents? Let the reader place before him specimens of sulphur, iron, and sulphide of iron. In the sulphide of iron what has become of the sulphur and of the iron from which it was made? The *mixture* of sulphur and iron in *combining* to form sulphide of iron has not lost weight, and, indeed, by certain processes it is possible to recover

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general employment. Moreover, any difficulty in forming a definite conception of an atom is met by regarding an item, not necessarily as something which *cannot* be divided, but as a particle of matter which undergoes no further division *in chemical metamorphoses*.

THE CHEMICAL FORCE.—What power binds the atoms of a chemical compound together in such marvelous closeness of union that in the couple or group they lose all individuality? Clearly an attractive force of enormous power, a force remotely resembling, perhaps, that which attracts a piece of iron to a magnet. Were not this force thus all-powerful, the carbon in wood would show its blackness and other qualities, and the hydrogen and oxygen give indications of their gaseous and other characters. This attractive force is commonly termed the *chemical force*, sometimes *chemical affinity*.

MOLECULES.—An atom free and uncombined cannot exist in a state of isolation, at common temperature, for any appreciable length of time. For we must regard an atom as the home of an attractive force of great intensity, and the moment such an atom is liberated from a state of combination, it finds itself in proximity to another atom having similar desires for union, so to speak; the result is an impetuous rushing together and formation of either couples, trios, or groups, according to the nature of the atoms. It is, doubtless, possible to keep some pairs of atoms apart by the aid of heat, just as the magnet and steel may be parted by a superior amount of force, but such a condition of things is probably abnormal. These pairs and other groups of atoms are conveniently designated by the one word molecule. Dissimilar kinds of atoms seem to

have greater attraction to each other than similar kinds; for, first, the masses of matter met with in nature in the great majority of cases contain two or more dissimilar elements; and, secondly, at the moment certain elements are liberated from their combination, they are very specially active in combining with other different elements; that is to say, the chances are not equal that the liberated elements will either retain their elementary condition or combine to form compounds, but the cases in which compounds are formed are in great majority.

CHEMICAL NOTATION (from *noto*, I mark)—Is the art or practice of recording chemical facts by short marks, letters, numbers, or other signs. Already the first capital letter or the first and one of the small letters of the Latin names of the elements have been employed as contractions, or short-hand expressions, or *symbols* of the whole *name*. The H has been used for the word "hydrogen," and Cl for "chlorine." A *second function* of such a symbol is that of indicating one *atom*. Thus H stands not only for the word or substance "hydrogen," but for one atom of hydrogen. Large and small figures (2 or $_2$) indicate a corresponding number of atoms, the small figure only multiplying the one particular symbol to which it is attached, while a larger figure multiplies all the symbols it precedes. Thus H_2 means two atoms of hydrogen, and Cl_2 two atoms of chlorine; while 2HCl means two atoms of hydrogen and two atoms of chlorine, or, in one word, two molecules of hydrochloric acid.

The *position* of symbols counts for something. Thus HCl indicates not only the substances hydrogen and chlorine, single atoms of each of the substances, but also that the two substances are *joined*

together by the chemical force. If the two letters were placed one under the other, or at some distance apart, or were separated by a comma or a plus sign (+), they would be understood to mean a mere mixture of the elements; but placed as close as the printer's types will conveniently and consistently allow they must be considered to stand for a compound of the elements, that is to say, hydrochloric acid gas (HCl). The collection of symbols representing a molecule is termed a *formula.*

A Chemical Formula represents a *molecule* either of an element or of a compound. It has four other functions:

1. It indicates at a glance the *names* of the elements in a molecule.

2. Its symbol or symbols, together with a small figure attached to the foot of any symbol, show the *number of atoms* in the molecule.

3. It stands for a constant weight of a compound —the molecular weight—the sum of the combining *weights* or of the weights of the atoms in the molecule.

4. It represents *two volumes* of the substance, if volatilizable, in the state of gas or vapor, and the number of volumes of gaseous elements from which two volumes of any gaseous compound were obtained.

H_2, Cl_2 and HCl are the *formulæ* of hydrogen, chlorine, and hydrochloric acid gas.

$$H_2 + Cl_2 = 2HCl.$$

Such a set of letters, figures, and marks as that on the preceding line is collectively termed an *equation*, because it indicates the equality of the number and nature of the atoms before and after chemical action. On the left hand of the sign of equality are shown

two molecules, and on the right hand two molecules; but of the molecules on the left one contains two atoms of hydrogen and the other two atoms of chlorine, while of the molecules on the right each contains one atom of hydrogen and one of chlorine. The equation forms a short and convenient plan of recording the facts of experiment.

Nature does not always permit man to mix things in any proportion he pleases. She does sometimes, if he only uses the attractions of adhesion or cohesion in binding the material together; but if he employs chemical attraction, she restricts him to special proportions. That is to say, if the things mixed do not attack one another or intimately combine then admixture may be effected in any proportion; and the mixture is a mere mixture having the mean properties of its components.

When compounds unite to form definite chemical substances, they always combine in the same proportions.

A definite compound always contains the same elements in the same proportions.

While many substances only unite chemically in one proportion, others combine in two or even more.

When two elements unite in more than one proportion, the resulting compounds contain, to a constant proportion of one element, simple multiple proportions of the other—or the weights of the constituent elements bear some similar simple relations to each other.

ATOMIC WEIGHTS.—It is a fact that when elements unite with one another in the peculiar and intimate manner termed chemical, they do not combine in the haphazard proportions of a mere mixture, but in one fixed and constant proportion. Such proportions or weights represent the weights of their atoms. Oxygen unites with other elements in proportions of

16, therefore 16 is the weight of the atom of oxygen. Chlorine unites with other elements in proportions of 35½, and therefore 35½ is the atomic weight of chlorine. And for a similar reason the atomic weights of hydrogen will be 1, carbon 12, and iodine 127. It will be understood that these are the *relative* weights of atoms, for we cannot know the absolute weights. All that is known that the chlorine atom, for instance, is 35.5 times as heavy as the hydrogen atom, whatever the absolute weight of the latter may be, and the iodine atom 127 times as heavy. The quantity of metal which with 35.5 of chlorine will form a chloride, will require 127 of iodine to form an iodide.

QUANTIVALENCE OF ATOMS.—Turning from the *weights* of atoms, their *value* may now be considered; *quantivalence* may be stated. The chemical value of atoms in relation to each other may be compared to the exchangeable value of coins. As compared with a dime, the twenty cent piece would be two valued and the fifty cent piece five valued. Here again, hydrogen is conveniently adopted as the standard of comparison. Chlorine, iodine, and bromine, as well as potassium, sodium and silver among the metals, are like hydrogen univalent (u-niv′-a-lent, from *unus*, one, and *valens*). An atom of oxygen in its relation to an atom of hydrogen is bivalent (pronounced thus, biv′-a-lent, of double worth, from *bis*, twice, and *valens*); an atom of it will displace two atoms of hydrogen, or combine with the same number; nitrogen is usually trivalent (triv′- a-lent, from *tres*, three, and *valens*); and carbon, quad-riv′-a-lent (from *quatuor*, four, or *quater*, four times, and *valens*). Phosphorus, arsenicum, antimony and bismuth, like nitrogen, usually exhibit

trivalent properties, but the composition of certain compounds of these five elements shows that the several atoms are sometimes quinquivalent (quin-quiv′-a-lent; *quinquies*, five times). Sulphur, chromium, manganese, iron, cobalt, and nickel are sexivalent (sex-iv′-a-lent, from *sex*, six, or *sexies*, six times, and (*valens*), but frequently exert only bivalent, trivalent, or quadrivalent activity.

Roman numerals I, II, III, IV, V, VI, are attached to the symbols of each element to indicate atomic univalence, bivalence, trivalence, quadrivalence, quinquivalence, or sextivalence. Dashes ('H′, O″, N‴) similar to those used in accentuating words are often used instead of figures in expressing quantivalence. The quantivalence of elements, as they one after another come under notice, should be carefully committed to memory; for the composition of compounds can often be thereby predicted with accuracy and remembered with ease.

ACIDULOUS RADICALS.

Below we give a table of the more important acidulous radicals, together with their quantivalence. These compounds are termed *radicals*, each being the common *root* (*radix*) in a series of salts. Why compound radicals (as NO_3, SO_4, PO_4, etc.) differ in quantivalence can not well be explained. Their constituent atoms doubtless always exert the same amount of attractive force, nearly but not quite all this force being exerted in retaining the atoms in one group, and the remainder probably determining the quantivalence. Some of the compound radicals are obtainable in the free state, others have yet to be proved capable of isolated existence.

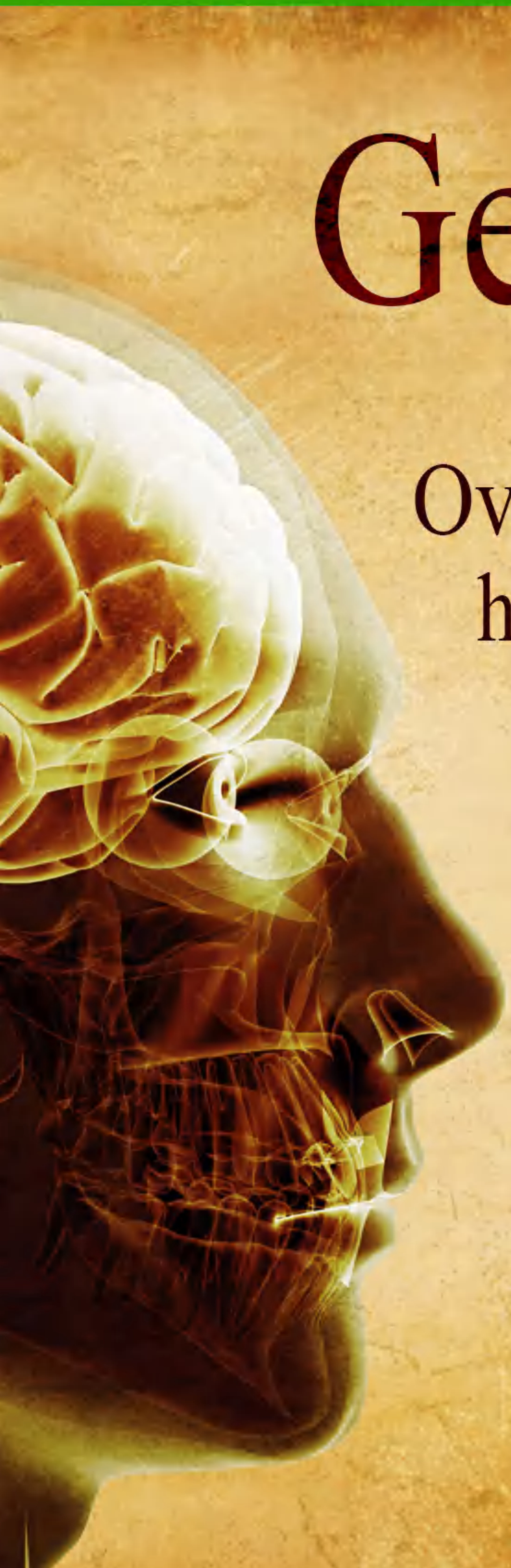
These radicals unite with bases to form salts, which are called Sulphates, Nitrates, etc., according to the radical. The chemical formulæ and quantivalence of these radicals should be thoroughly learned and then when speaking of a salt one will understand that it is the result of a union of a base with a certain radical.

FORMULÆ AND QUANTIVALENCE OF THE MOST IMPORTANT ACIDULOUS RADICALS:

Chloride Radical	Cl	Univalent radicals.
Bromide Radical	Br	
Iodide Radical	I	
Cyanide Radical	CN	
Hydrate Radical	HO	
Nitrate Radical	NO_3	
Chlorate Radical	ClO_3	
Acetate Radical	$C_2H_3O_2$	
Oxide Radical	O	Bivalent radicals.
Sulphide Radical	S	
Sulphite Radical	SO_3	
Sulphate Radical	SO_4	
Carbonate Radical	CO_3	
Oxalate Radical	C_2O_4	
Tartrate Radical	$C_4H_4O_6$	
Citrate Radical	$C_6H_5O_7$	Trivalent radicals.
Phosphate Radical	PO_4	
Borate Radical	BO_3	

ACIDS.

Hydrochloric Acid	HCl
Hydrobromic Acid	HBr
Hydrofluoric Acid	HF
Hydriodic Acid	HI
Hydrocyanic Acid	HCN



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gases, at the same temperature and pressure, contain the same number of molecules.

THE LAW OF BOYLE OR MARRIOTTE.—The volume of a given weight of gas, the temperature remaining the same, will be inversely as the pressure upon it.

THE LAW OF CHARLES.—The volume of a given weight of gas, the pressure being unchanged, will vary directly as the absolute temperature.

MOLECULAR WEIGHTS.—These are the weights of equal volumes of gases or vapors, under equal circumstances of temperature and pressure, and relative not to 1, but to 2 of hydrogen. In the case of non-volatile bodies, molecular weight is deduced from the observed analogies of the bodies with those whose molecular weight admits of proof. The molecular weight of a compound is the sum of the atomic weights.

ATOMIC WEIGHTS are, first, the proportions in which elements are found to combine with each other by weight. (The figures showing these proportions are purely relative, but all chemists agree to make this relation fixed by giving the number 1 to hydrogen.) Secondly, they are the weights of equal volumes of elements in the state of gas (relative to 1 of hydrogen).

The principal varieties of chemical compounds are Oxides, Hydrates and Salts.

A HYDRATE is the combination of a Base with Hydroxyl $(OH)^1$, which is a hypothetical union of oxygen and hydrogen.

AN OXIDE is the combination of a Base with oxygen.

A SALT is the combination, either wholly or in part, of a base with an acid radical.

There are three kinds of salts.

NORMAL, or Neutral Salts, where all the replaceable hydrogen of the acid is replaced by the base.

ACID SALTS, where but part of the hydrogen is replaced by the base.

BASIC SALTS, where the hydrogen is replaced in part by the base, and in part by an oxide or hydrate of the base.

The term *Salt* is also applied to most solid chemical substances, but more especially to those having a crystalline form.

Some metals form two or more classes of salts, according to their valencies, in which case the name of the salt in which the element has the lower valence ends in "ous," the higher in "ic," as "arsenous" and "arsenic."

A BASE is a substance which replaces the hydrogen of an acid and forms a salt. The direct union of two elements or salts, whose name end in "ide," such as Iodides, Bromides, Chlorides and Sulphides.

AN ACID is a chemical compound formed by the union of hydrogen with an acidulous radical, and forms salts by having its hydrogen replaced by a base.

All acids must contain hydrogen. Farther, acids may or may not contain oxygen. Those which contain no oxygen are called Hydracids, those which do contain oxygen are termed Oxyacids. Acids containing carbon are styled Organic acids. (Carbonic acid, however, is generally classed with the Inorganic acids.)

The names of salts from the "ous" oxyacids end in "ite," as nitrite (from nitrous acid), sulphite (from sulphurous acid); those from "ic" oxyacids end in "ate," sulphate (from sulphuric acid), nitrate (from nitric acid), etc. (As a general thing the names of salts from the organic acids end in "ate.")

Anhydrous bodies (i. e. without water) are compounds from which water has been taken, but whose essential chemical properties are unaltered. Salts containing water are *hydrous* bodies; of these the larger portion are crystalline, and their water is then termed *water of crystallization*. Non-crystalline *hydrous* compounds were formerly spoken of as *hydrated* substances; *hydrates* are, however, a distinct class of bodies; salts derived from water by one-half of its hydrogen becoming displaced by an equivalent quantity of another radical. *Anhydrides* form still another distinct class of chemical substances; they are derived from acids; in short, they are acids from which, not exactly water as water, but the elements of water have been removed, the essential chemical (acid) properties being thereby greatly altered.

The following prefixes are used in the nomenclature of salts and acids:

LATIN.	GREEK.	
un- or uni-	mono- or mon-	meaning, one or single.
duo-bi- or bis-	di- or dis-	" two or twice.
ter- or tri-	tri- or tris-	" three or thrice.
quadri- or quadra-	tetra-	" four.

super- and hyper, meaning above, over, in excess.
per , meaning thorough, to full extent.
sesqui-, meaning one and a half.
hypo-, or sub-, meaning below or under.
proto-, meaning first or lower.
ortho-, meaning original or regular.
meta-, meaning beyond, derived from.
pyro-, meaning produced by high heat.
Bi, Bin and Dueto, used for double; as Bi-carbonate, Bin-oxalate, Dueto-iodide.

ELEMENTARY SUBSTANCES.

The following list gives the names, symbols and atomic value of the elementary substances, with which the student should become perfectly familiar:

	Symbols and Atomic Value.
Aluminum (Al_2^{VI})	Al^{I}
Antimony (Sb^{III})	Sb^{V}
Arsenicum (As^{III})	As^{V}
Barium	Ba^{II}
Beryllium (Glucinum)	Be^{II}
Bismuth (Bi^{III})	Bi^{V}
Boron	B^{III}
Bromine	Br^{I}
Cadmium	Cd^{III}
Cæsium	Cs^{I}
Calcium	Ca^{II}
Carbon (C^{II})	C^{IV}
Cerium (Ce^{III})	Ce^{VI}
Chlorine	Cl^{I}
Chromium (Cr_2^{VI})	Cr^{VI}
Cobalt (Co^{II})	Co^{VI}
Columbium (Niobium)	Cb^{V}
Copper	Cu^{II}
Didymium	D^{III}
Erbium?	Eb^{II}
Flourine	F^{I}
Gallium	Ga^{IV}
Gold (Au^{I})	Au^{III}

Germanium ..... Ge
Hydrogen ..... H^{I}
Indium ..... In^{VI}
Iodine ..... I^{I}
Iridium ..... Ir^{IV}
Iron (Fe^{II} & $Fe_2{}^{VI}$) ..... Fe^{VI}
Lanthanum ..... La^{II}
Lead ($^{II}Pb^{II}$) ..... Pb^{IV}
Lithium ..... L^{I}
Magnesium ..... Mg^{II}
Manganese (Mn^{II} & Mn^{IV}) ..... Mn^{VI}
Mercury ..... Hg^{II}
Molybdenum ..... Mo^{VI}
Nickel (Ni^{II}) ..... Ni^{VI}
Nitrogen (N^{I} & N^{III}) ..... N^{V}
Osmium ..... Os^{IV}
Oxygen ..... O^{II}
Palladium ..... Pd^{IV}
Phosphorus (P^{III}) ..... P^{V}
Platinum ..... Pt^{IV}
Potassium ..... K^{I}
Rhodium ..... Rh^{IV}
Rubidium ..... Rb^{I}
Ruthenium ..... Ru^{IV}
Samarium .....
Scandium .....
Selenium or Selenion ..... Se^{VI}
Silicon ..... Si^{IV}
Silver ..... Ag^{I}
Sodium ..... Na^{I}
Strontium ..... Sr^{II}
Sulphur (S^{II} & S^{IV}) ..... S^{VI}
Tantalum ..... Ta^{V}
Tellurium ..... Te^{VI}
Terbium? ..... Tb^{II}

Thallium ..... Tl^{III}
Thorinum or Thorium ..... Th^{II}
Tin (Sn^{II}) ..... Sn^{IV}
Titanium ..... Ti^{IV}
Tungsten ..... W^{VI}
Uranium ..... U^{VI}
Vanadium ..... V^{V}
Ytterbium? ..... Yb
Yttrium ..... Y^{II}
Zinc ..... Zn^{II}
Zirconium ..... Zi^{III}

Of these sixty-nine elements, fifty-five are metals and fourteen non-metals.

CHEMICAL EQUATIONS.

Illustrating the manufacture of some of the most important acids and salts.

Acidum Nitricum, HNO_3:—

$$\underset{\text{Sodium Nitrate.}}{NaNo_3} + \underset{\text{Sulphuric Acid.}}{H_2SO_4} = \underset{\text{Acid Sodium Sulphate.}}{NaHSO_4} + \underset{\text{Nitric Acid.}}{HNO_3}.$$

Acidum Nitrohydrochloricum:—

$$\underset{\text{Nitric Acid.}}{HNO_3} + \underset{\text{Hydrochloric Acid.}}{3HCl} = \underset{\text{Nitrosyl Chloride.}}{NOCl} + \underset{\text{Chlorine.}}{Cl_2} + \underset{\text{Water.}}{2H_2O}.$$

Acidum Sulphuricum, H_2SO_4:—

$$\underset{\text{Sulphurous Oxide.}}{2SO_2} + \underset{\text{Nitrogen Tetroxide.}}{N_2O_4} = \underset{\text{Sulphuric Oxide.}}{2SO_3} + \underset{\text{Nitrogen Dioxide.}}{N_2O_2}.$$

then

$$\underset{\text{Nitrogen Dioxide.}}{N_2O_2} + \underset{\text{Oxygen (from air, etc.).}}{O_2} = \underset{\text{Nitrogen Tetroxide.}}{N_2O_4};$$

(Continuously furnishing O_2 as above and converting SO_2 into SO_3.)

then

$$\underset{\text{Sulphuric Oxide.}}{SO_3} + \underset{\text{Water.}}{H_2O} = \underset{\text{Sulphuric Acid.}}{H_2SO_4}.$$

Acidum Sulphurosum, SO_2:—

$$4H_2SO_4 + C_2 = 4SO_2 + 2CO_2 + 4H_2O.$$

Sulphuric Acid. **Carbon.** **Sulphurous Anhydride.** **Carbon Dioxide.** **Water.**

Acidum Phosphoricum, H_3PO_4:—

$$3P_4 + 20HNO_3 + 8H_2O = 12H_3PO_4 + 20NO.$$

Phosphorus. **Nitric Acid.** **Water.** **Phosphoric Acid.** **Nitrogen Oxide.**

Acidum Hydrochloricum, HCl:—

$$2NaCl + H_2SO_4 = HCl + NaCl + NaHSO_4.$$

Sodium Chloride. **Sulphuric Acid.** **Hydrochloric Acid.** **Sodium Chloride.** **Acid Sodium Sulphate.**

$$NaCl + Na\ H\ SO_4 = HCl + Na_2SO_4.$$

Sodium Chloride. **Acid Sodium Sulphate.** **Hydrochloric Acid.** **Sodium Sulphate.**

Argenti Nitras, $AgNO_3$.

$$Ag_3 + 4HNO_3 = 3AgNO_3 + NO + 2H_2O.$$

Silver. **Nitric Acid.** **Silver Nitrate.** **Nitrogen Monoxide.** **Water.**

Acids with names ending in "ic" unite with bases to form "ate" salts.

Zinci Sulphas, $ZnSO_4$.

$$2Zn + 2H_2SO_4 + H_2O = 2ZnSO_4 + 4H + H_2O.$$

Zinc. **Sulphuric Acid.** **Water.** **Zinc Sulphate.** **Hydrogen.** **Water.**

Hydrargyri Chloridum Mite, Hg_2Cl_2.

$$2H_2SO_4 + Hg = HgSO_4 + SO_2 + 2H_2O.$$

Sulphuric Acid. **Mercury.** **Mercuric Sulphate.** **Sulphurous Acid.** **Water.**

$$HgSO_4 + Hg = Hg_2SO_4.$$

Mercuric Sulphate. **Mercury.** **Mercurous Sulphate.**

$$Hg_2SO_4 + 2NaCl + \text{High heat} = Hg_2Cl_2 + Na_2SO_4.$$

Mercurous Sulphate. **Sodium Chloride.** **(Sublimation.)** **Mercurous Chloride.** **Sodium Sulphate.**

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Potassii Acetas, $CK_2H_3O_2$.

$$KHCO_3 + HC_2H_3O_2 = KC_2H_3O_2 + CO_2 + H_2O.$$

Potassium Bicarbonate. | Acetic Acid. | Potassium Acetate. | Carbon Dioxide. | Water.

Acidum Citricum, $H_3C_6H_5O_7H_2O$.

Obtained from the juice of limes and lemons.

Potassii Citras, $K_3C_6H_5O_7H_2O$.

$$3KHCO_3 + H_3C_6H_5O_7 = K_3C_6H_5O_7 + 3H_2O + 3CO_2.$$

Potassium Bicarbonate. | Citric Acid. | Potassium Citrate. | Water. | Carbon Dioxide.

Acidum Tartaricum, $H_2C_4H_4O_6$.

Made by purifying argols, and converting the cream of tartar into a calcium salt by means of $CaCO_3$ and CaCl, decomposing the resulting Ca, tartrate with diluted H_2SO_4 and allowing the filtered solution to crystallize.

Acidum Benzoicum, $HC_7H_5O_2$.

Found naturally in benzoin, balsam of peru and other resinous substances.

Ammonii Benzoas, $NH_4C_7H_5O_2$.

$$HC_7H_5O_2 + HN_4HO = NH_4C_7H_5O_2 + H_2O.$$

Benzoic Acid. | Water of Ammonia. | Ammonium Benzoate. | Water.

Acidum Tannicum, $C_{14}H_{10}O_9$.

Tannic acid exists in many vegetable substances, such as oak bark, salix, kino, catechu, etc., but the official acid is obtained from nutgalls.

Acidum Salicylicum, $HC_7H_5O_3$.

An organic acid, existing naturally, in combination, in various plants, but generally prepared synthetically from carbolic acid.

Acidum Stearicum, $HC_{18}H_{35}O_2$.

An organic acid obtained from the more solid fats, chiefly tallow.

CHEMICAL FORMULÆ.

We give below a few Chemical Formulæ which are in common use in Pharmaceutical literature, and should be learned:

Acid Acetic.....$HC_2H_3O_2$
Acid Arsenous.....As_2O_3
Acid Boric.....H_3BO_3
Acid Carbonic.....H_2CO_3
Acid Carbolic.....C_6H_5OH
Acid Hydriodic.....HI
Acid Hydrochloric .....HCl
Acid Hydrocyanic.....HCN
Acid Nitric.....HNO_3
Acid Nitrous.....HNO_2
Acid Phosphoric.....H_3PO_4
Acid Salicylic.....$HC_7H_5O_3$
Acid Sulphuric.....H_2SO_4
Acid Sulphurous.....H_2SO_3
Æther.....$(C_2H_5)_2O$
Alcohol .....C_2H_5OH
Aldehyd.....C_2H_4O
Ammonia .....NH_3
Benzol .....C_6H_6
Camphor .....$C_{10}H_{16}O$
Carbon Dioxide.....CO_2
Carbon Disulphide.....CS_2
Caustic Potash.....KOH
Chloroform.....$CHCl_3$
Glycerin .....$C_3H_5(OH)_3$
Hydrogen Dioxide .....H_2O_2

Iodoform.....CHI_3
Lime.....CaO
Mercuric Chloride (corr. sublim.).....$HgCl_2$
Mercurous Chloride (Calomel).....Hg_2Cl_2
Methane.....CH_4
Potassium Iodide .....KI
Paraldehyde .....$C_6H_{12}O_3$
Potassium Bicarbonate.....$KHCO_3$
Potassium Bromide.....K Br
Silver Nitrate.....Ag NO_3
Sodium Bicarbonate.....Na HCO_3
Sodium Chloride (common salt).....Na Cl
Sodium Nitrate.....Na NO_3
Sodium Nitrite.....Na NO_2
Sulphur Dioxide.....SO_2
Terebene.....$C_{10}H_{16}$
Water.....H_2O

Botany.

THE INORGANIC WORLD OR MINERAL KINGDOM.—The earth itself with the air that surrounds it, and all things naturally belonging to them which are destitute of life, make up the mineral kingdom, or inorganic world. These are called *inorganic* or unorganized, because they are not composed of *organs*, that is, of parts which answer to one another, and make up a whole. They are formed, but they did not grow, nor proceed from previous bodies like themselves, nor have they the power of producing other similar bodies.

THE ORGANIC WORLD.—The organic world consists of two kinds of beings, namely: First, *Plants* or *Vegetables*, which make up what is called the *Vege-*

table Kingdom; and second, *Animals*, which compose the *Animal Kingdom.* These consist of *organs;* or parts which go to make up an *individual*, a *being.* And each individual owes its existence to a preceding one like itself, that is, to a parent. It was not merely formed, but *produced.* At first, small and imperfect, it grows and develops by powers of its own; it attains maturity, becomes old, and finally dies. It was formed of inorganic or mineral matter, that is, of earth and air, indeed, but only of this matter under the influence of life; and after the life departs, it decomposes into earth and air again.

The difference between plants and animals seems at first sight so obvious and so great that it would appear more natural to inquire how they resemble, rather than how they differ from each other. What likeness does the cow bear to the grass it feeds upon? The one moves freely from place to place, in obedience to its own will, as its wants or convenience require; the other is fixed to the spot of earth where it grew, manifests no will, and makes no movements that are manifest to ordinary observation. The one takes its food into an internal cavity (the stomach), from which it is absorbed into the system; the other absorbs its food directly by its surface, by its roots, leaves, etc. Both possess organs, but the limbs or members of the animal do not at all resemble the roots, leaves, blossoms, etc., of the plant. All these distinctions, however, gradually disappear, as we come to the lower kinds of plants and the lower animals.

BOTANY is the name of the science of the vegetable kingdom in general. PHYSIOLOGY is the study of living beings.

THE COURSE OF VEGETATION.—We see plants

growing from the seed in springtime, and gradually developing their parts; at length they blossom, bear fruit, and produce seed like those from which they grew.

To study plant life, it is best to begin with the seed and trace the plant's growth from the very beginning.

Every seed contains a rudimentary plantlet called an *Embryo*.

Its little stem is named the *Radicle*, because it was supposed to be the root. Its seed-leaves it bears on its summit are technically called *Cotyledons*. The little bud of undeveloped leaves, which is to be found between the cotyledons before germinating in many cases (as in the pea and bean), has been named the PLUMULE.

In the seed, either in the embryo itself or around it, the mother plant has stored up the proper nourishing matter, or prepared food, of which the root is to be made up, and the plantlet is to be nourished until it is able to provide for itself.

When the seed is placed in the soil provided with the proper warmth and moisture, it soon begins its growth, the root is formed from the surrounding nourishment, the stem or radicle is lengthened, and the plumule, enveloped in the cotyledons, is pushed up to the light and air. The cotyledons open out and the plumule grows up on a stem and opens out a second pair of leaves, and continues to grow upward in joints, each from the summit of the one below.

The opposite growth of root and stem began at the beginning of germination, and it continues through the whole life of the plant. While yet buried in the soil, and perhaps in total darkness, as soon as

it begins to grow, the stem end of the embryo points toward the light—curving or turning quite around if it happens to lie in some other direction—and stretches upward into the free air and sunshine; while the root end as uniformly avoids the light, bends in the opposite direction to do so if necessary, and ever seeks to bury itself more and more in the earth.

But the object of this instinct is obvious. It places the plant from the first in the proper position, with its roots in the moist soil, from which they are to absorb nourishment, and its leaves in the light air, where alone they can fulfill their office of digesting what the roots absorb.

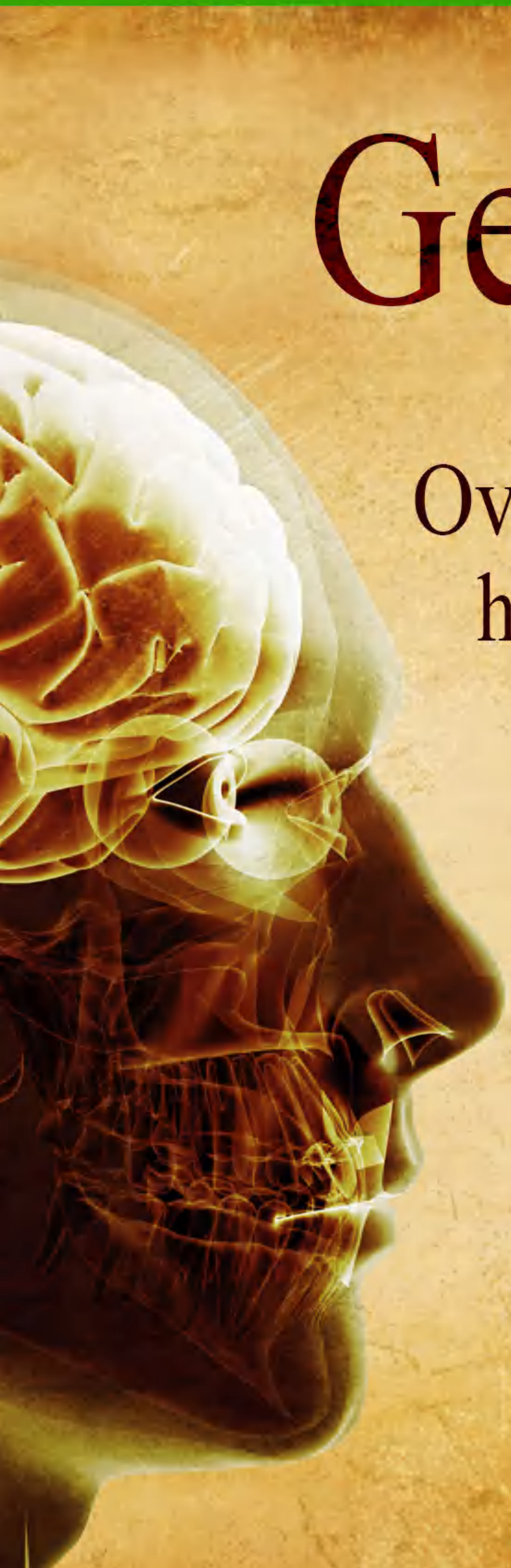
The different mode of growth of root and stem may also be here mentioned. Each grows, not only in a different direction but in a different way. The stem grows by producing a set of joints, each from the summit of its predecessor; and each joint elongates throughout every part, until it reaches its full length. The root is not composed of joints, and it lengthens only at the end.

So the seedling plantlet finds itself provided with all the organs of vegetation that even the oldest plant possesses—namely, root, stem, and leaves; and has these placed in the situation where each is to act—the root in the soil, the foliage in the light and air. Thus established, the plantlet has only to set about its proper work.

THE KINDS OF EMBRYO AS TO THE NUMBER OF COTYLEDONS.—The embryo, heretofore spoken of, consists of a radicle or stemlet, with a pair of cotyledons on its summit. Botanists, therefore, call it *dicotyledonous*—an inconveniently long word to express the fact that the embryo has two cotyledons or seed-leaves.

In many plants, however, the embryo has only one cotyledon, and it is therefore termed by the botanists *monocotyledonous*—extremely long word, like the other, of Greek derivation, which means *one-cotyledoned*. The rudiments of one or more other leaves are, indeed, commonly present in this sort of embryo, as is plain to see in Indian corn, but they form a bud situated above or within the cotyledon, and inclosed by it more or less completely, so that they evidently belong to the plumule; and these leaves appear in the seedling plantlet, each form within its predecessor, and, therefore, originating higher up on the forming stem.

The monocotyledonous embryo is simpler than the former, consisting apparently of a simple oblong or cylindrical body, in which no distinction of parts is visible; the lower end is radicle, and from it grows the root; the rest is a cotyledon, which has wrapped up in it a minute plumule, or bud, that shows itself when the seeds sprout in germination. The first leaf which appears above ground in all these cases is not the cotyledon. In all seeds with one cotyledon to the embryo, this remains in the seed, or at least its upper part, while its lengthening base comes out, so as to extricate the plumule, which shoots upward, and develops the first leaves of the plantlet. These appear one above or within the other in succession, the first commonly in the form of a little scale or imperfect leaf, the second or third and the following ones as the real, ordinary leaves of the plant. Meanwhile, from the root end of the embryo, a root, or soon a whole cluster of roots, makes its appearance, and begin to absorb moisture from the soil. The growth of plants is accomplished by the repeated division of each cell into two which increase in size and again divide.



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a leaf is the blade, or expanded portion, one face of which naturally looks toward the sky, the other toward the earth. The blade is often raised on a stalk of its own, and on each side of the stalk at its base there is sometimes an appendage called a *stipule*. A complete leaf, therefore, consists of a *blade*, a *foot-stalk* or *leaf-stalk*, called the *petiole*, and a pair of *stipules*.

The leaves of growing plants absorb carbonic acid gas from the air, and give off moisture and oxygen.

NATURE AND USE OF THE FLOWER.—The object of the flower is the production of seed. The flower consists of all those parts, or organs, which are subservient to this end. Some of these parts are necessary to the production of seed. Others serve merely to protect or support the more essential parts.

THE ESSENTIAL ORGANS OF THE FLOWER.—These are placed one above or within the other; namely, first, the *Stamens* or fertilizing organs, and second, the *Pistils*, which are to be fertilized and bear the seed.

Surrounding the stamens and pistils is the *Corolla*, each leaf or separate piece of which is called a *Petal*. Surrounding the corolla and forming the outer envelope of the flower is the *Calyx*, each leaf of which is called a *Sepal*.

A stamen consists of two parts, namely, the *Filament* or stock and the *Anther*. The latter is the only essential part. It is a case, commonly with two lobes or cells, each opening lengthwise by a slit, at the proper time, and discharging a powder or dust-like substance, usually of yellow color. This powder is the *Pollen*, or fertilizing matter, to produce which is the sole office of the stamen.

A pistil is distinguished into three parts, namely—beginning from below—*Ovary*, the *Style* and the *Stigma*. The ovary is the hollow case or young pod containing the rudimentary seeds, called *Ovules*.

The style is the tapering part above, sometimes long and slender, sometimes short, and not rarely altogether wanting, for it is not an essential part, like the two others. The stigma is the tip or some other portion of the style (or of the top of the ovary when there is no distinct style), consisting of loose tissue, not covered like the rest of the plant, by a skin or epidermis. It is upon the stigma that the pollen falls; and the result is that the ovules contained in the ovary are fertilized and become seeds, by having an embryo formed in them. To the pistil, therefore, all the other organs of the blossom are in some way or other subservient; the stamens furnish pollen to fertilize its ovules; the corolla and the calyx form coverings which protect the whole.

CRYPTOGAMOUS PLANTS.—Plants of the lower order of vegetation, such as Ferns, Mosses, Lichens, Fungi and Mushrooms, do not bear blossoms (with stamens and pistils), nor seed. Instead of seed they have spores, which are usually simple cells, from which the new plant grows.

THE FRUIT.—The ripened ovary, with its contents, becomes the *Fruit*. When the tube of the calyx adheres to the ovary, it also becomes a part of the fruit; sometimes it even forms the principal bulk of it, as in the apple and pear.

THE SEED.—The ovules, when they have an embryo (or undeveloped plantlet) formed in them, become seeds.

The *Pepo*, or *Gourd-Fruit*, is a sort of berry which belongs to the Gourd family, mostly with a hard

rind and the inner portion softer. The pumpkin, squash, cucumber, and melon are the principal examples.

The *Pome* is the name applied to the apple, pear and quince; fleshy fruits like a berry, but the principal thickness is calyx, only the papery pods arranged like a star in the core really belong to the pistil itself.

The *Tuber* is a thickened portion of a rootstock.

The *Rootstock*, or *Rhizoma*, in its simplest form, is merely a creeping stem or branch, growing beneath the surface of the soil, or partly covered by it.

THE FORMS OF STEMS AND BRANCHES ABOVE GROUND.--The stem is accordingly—

Herbaceous, when it dies down to the ground every year, or after blossoming.

Suffrutescent, when the bottom of the stem above the soil is a little woody, and inclined to live from year to year.

Suffrutiscose, when low stems are decidedly woody below, but herbaceous above.

Fruticose, or *shrubby*, when woody living from year to year, and of considerable size—not, however, more than three or four times the height of a man.

Arborescent, when tree-like in appearance or approaching a tree in size.

Diffuse, when loosely spreading in all directions.

Declined, when turned or bending over to one side.

Decumbent, reclining on the ground, as if too weak to stand.

Assurgent, or *ascending*, when rising obliquely upward.

Procumbent, when lying flat on the ground from the first.

Creeping or *repent*, when prostrate stems on or just beneath the ground strike root as they grow; as does the White Clover.

An *annual herb* flowers in the first year and dies, root and all, after ripening its seed. Mustard, Peppergrass, Buckwheat, etc., are examples.

A *biennial herb*—such as the Turnip, Carrot, Beet, Cabbage—grows the first season without blossoming, survives the winter, flowers after that and dies, root and all, when it has ripened its seed.

A *perennial herb* lives and blossoms year after year, but dies down to the ground, or near it, annually—not, however, quite down to the root, for a portion of the stem, with its buds, still survives, and from these buds the shoots of the following year arise.

A *shrub* is a perennial plant, with woody stems, which continues alive and grows year after year.

A *tree* differs from a shrub only in its greater size.

CLASSIFICATION OF PLANTS.—All plants are classified accorning to their relationship or origin. We conclude that a definite number of different plants existed from the beginning, and have continued by propagation, each after its kind. These are termed *Species*. There are from seventy-five thousand to one hundred thousand species known. Plants of the same species which differ only in the shape or proportion of their parts, are said to belong to one *Genus*. Some show a more general resemblance, such as having their flowers and seeds constructed on the same plan, but with some differences in detail; these are classified as the same *Order* or *Family*. Classes are great assemblages of orders.

Hence, the order of classification is: Class, Order, Genus, and Species. These are further divided into

Sub-class, Sub-order, Tribe, Sub-tribe, Sub-genus, and Variety.

BOTANICAL NAME.—This is the systematic name recognized by botanists for plants. It is the name of its genus, followed by that of the species. Capsicum fastigiatum is the botanical name for the variety of Cayenne Pepper, which is official. Capsicum indicates the genus, and fastigiatum the species to which the plant belongs.

BOTANICAL ORIGIN.

Give the Botanical name of the plant from which derived and part used of the following:

ABSINTHIUM—The leaves and tops of Artemisia Absinthium. Nat. Ord. Compositæ.

ACACIA—A gummy exudation from Acacia Senegal. Nat. Ord. Leguminosæ.

ACONITUM—The tuberous root of Aconitum Napellus. Nat. Ord. Ranunculaceæ.

ALLIUM—The bulb of Allium sativum. Nat. Ord. Liliaceæ.

ALOE BARBADENSIS—The inspissated juice of the leaves of Aloe vera. Nat. Ord. Liliaceæ.

ALOE SOCOTRINA—The inspissated juice of the leaves of Aloe Perryi. Nat. Ord. Liliaceæ.

AMMONIACUM—A gum resin obtained from Dorema Ammoniacum. Nat. Ord. Umbelliferæ.

AMYGDALA AMARA—The seed of Prunus Amygdalus, var. amara. Nat. Ord. Rosaceæ.

AMYGDALA DULCIS—The seed of Prunus Amygdalus, var. dulcis. Nat. Ord. Rosaceæ.

AMYLUM—The fecula of the seed of Zea Mays. Nat. Ord. Gramineæ.

ALTHÆA—The root of Althæ officinalis. Nat. Ord. Malvaceæ.

ANISUM—The fruit of Pimpinella Anisum. Nat. Ord. Umbelliferæ.

ANTHEMIS—The flower heads of Anthemis nobilis. Nat. Ord. Compositæ.

APOCYNUM—The root of Apocynum cannabinum. Nat. Ord. Apocynaceæ.

ARNICÆ FLORES—The flower heads of Arnica montana. Nat. Ord. Compositæ.

ARNICÆ RADIX—The rhizome and roots of Arnica montana. Nat. Ord. Compositæ.

ASAFŒTIDA—A gum resin from the root of Ferula fœtida. Nat. Ord. Umbelliferæ.

ASCLEPIAS—The root of Asclepias tuberosa. Nat. Ord. Asclepiadaceæ.

ASPIDIUM—The rhizome of Dryopteris marginalis and Dryopteris Felix-mas. Nat. Ord. Filices.

ASPIDOSPERMA—The bark of Aspidosperma Quebracho-blanco. Nat. Ord. Apocynaceæ.

AURANTII AMARI CORTEX—The rind of the fruit of Citrus vulgaris. Nat. Ord. Rutaceæ.

AURANTII DULCIS CORTEX—The rind of the fresh fruit of Citrus Aurantium. Nat. Ord. Rutaceæ.

BALSAMUM PERUVIANUM—A balsam obtained from Tuluifera Pereiræ. Nat. Ord. Leguminosæ.

BALSAMUM TOLUTANUM—A balsam obtained from Tuluifera Balsamum. Nat. Ord. Leguminosæ.

BELLADONNÆ FOLIA—The leaves of Atropa Belladonna. Nat. Ord. Solanaceæ.

BELLADONNÆ RADIX—The root of the same.

BENZOINUM—A balsamic resin obtained from Styrax Benzoin. Nat. Ord. Styraceæ.

BRYONIA—The root of Bryonia alba and Bryonia Dioica. Nat. Ord. Cucurbitaceæ.

BUCHU—The leaves of Barosma Betulina. Nat. Ord. Rutaceæ.

CALAMUS—The rhizome of Acorus Calamus. Nat. Ord. Aroideæ.

CALENDULA—The fresh flowing herb of Calendula officinalis. Nat. Ord. Compositæ.

CALUMBA—The root of Jateorrhiza palmata. Nat. Ord. Menispermaceæ.

CARBO LIGNI—Charcoal prepared from soft wood.

CAMBOGIA—A gum-resin obtained from Garcinia Hanburii. Nat. Ord. Guttiferæ.

CAMPHORA—A stearopten derived from Cinnamomum Camphora. Nat. Ord. Laurineæ.

CANNABIS INDICA—The flowering tops of the female plant of Cannabis sativa. Nat. Ord. Urticaceæ.

CAPSICUM—The fruit of Capsicum fastigiatum. Nat. Ord. Solonaceæ.

CARDAMOMUM—The fruit of Ellattaria repens. Nat. Ord. Zingiberaceæ.

CARUM—The fruit of Carum Carvi. Nat. Ord. Umbelliferæ.

CARYOPHYLLUS—The unexpanded flowers of Eugenia aromatica. Nat. Ord. Myrtaceæ.

CASCARILLA—The bark of Croton Eluteria. Nat. Ord. Euphorbiaceæ.

CASSIA FISTULA—The fruit of Cassia Fistula. Nat. Ord. Leguminosæ.

CASTANÆ—The leaves of Castanea dentata. Nat. Ord. Cupuliferæ.

CATECHU—An extract prepared from the wood of Acacia Catechu. Nat. Ord. Leguminosæ.

CAULOPHYLLUM—The rhizome and roots of Caulophyllum thalictroides. Nat. Ord. Berberidaceæ.

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COLCHICI RADIX—The corm of Colchicum autumnale. Nat. Ord. Liliaceæ.

COLCHICI SEMEN—The seed of Colchicum autumnale. Nat. Ord. Liliaceæ.

COLOCYNTHIS—The fruit of Citrullus Colocynthis. Nat. Ord. Cucurbitaceæ.

CONIUM—The full grown fruit of Conium maculatum. Nat. Ord. Umbelliferæ.

CONVALLARIA—The rhizome and roots of Convallaria majalis. Nat. Ord. Liliaceæ.

COPAIBA—The oleoresin of Copaiba Langsdorffii. Nat. Ord. Leguminosæ.

CORIANDRUM—The fruit of Coriandrum sativum. Nat. Ord. Umbelliferæ.

CROCUS—The stigmas of Crocus sativus. Nat. Ord. Irideæ.

CUBEBA—The unripe fruit of Piper Cubeba. Nat. Ord. Piperaceæ.

CUSSO—The female inflorescence of Hagenia abyssinica. Nat. Ord. Rosaceæ.

CYPRIPEDIUM—The rhizome and rootlets of Cypripedium pubescens. Nat. Ord. Orchidaceæ.

DIGITALIS—The leaves of the Digitalis purpurea. Nat. Ord. Scrophulariaceæ.

DULCAMARA—The young branches of Solanum Dulcamara. Nat. Ord. Solanaceæ.

ELASTICA—The prepared milk-juice of various species of Hevea. Nat. Ord. Euphorbiaceæ. Known in commerce as Para Rubber.

ELATERINUM—A neutral principle obtained from Elaterinum, a substance deposited by the juice of Ecballium Elaterium. Nat. Ord. Cucurbitaceæ.

ERGOTA—The sclerotium of Claviceps purpurea (class Fungi), replacing the grain of rye, Secale cereale. Nat. Ord. Gramineæ.

ERIODICTYON—The leaves of Eriodictyon glutinosum. Nat. Ord. Hydrophyllaceæ.

EUCALYPTUS—The leaves of Eucalyptus globulus. Nat. Ord. Myrtaceæ.

EUPATORIUM—The leaves and flowering tops of Eupatorium perfoliatum. Nat. Ord. Compositæ.

EUONYMUS—The bark of Euonymus atropurpureus. Nat. Ord. Celastraceæ.

FICUS—The fleshy receptacle of Ficus Carica. Nat. Ord. Urticaceæ.

FŒNICULUM—The fruit of Fœniculum capillaceum. Nat. Ord. Umbelliferæ.

FRANGULA—The bark of Rhamnus Frangula. Nat. Ord. Rhamneæ.

GALLA—Excrescences on Quercus lusitanica. Nat. Ord. Cupuliferæ.

GELSEMIUM—The rhizome and rootlets of Gelsemium sempervirens. Nat. Ord. Loganiaceæ.

GENTIANA—The root of Gentiana lutea. Nat. Ord. Gentianaceæ.

GERANIUM—The rhizome of Geranium maculatum. Nat. Ord. Geraniaceæ.

GLYCYRRHIZA—The root of Glycyrrhiza glabra. Nat. Ord. Leguminosæ.

GOSSYPII RADICIS CORTEX—The bark of the root of Gossypium herbaceum. Nat. Ord. Malvaceæ.

GOSSYPIUM PURIFICATUM—The hairs of the seed of Gossypium herbaceum freed from impurities, and deprived of fatty matter.

GRANATUM—The bark and root of Punica Granatum. Nat. Ord. Lythrarieæ.

GRINDELIA—The leaves and flowering tops of Grindelia robusta. Nat. Ord. Compositæ.

GUAIACI LIGNUM—The heart wood of Guaiacum officinale. Nat. Ord. Zygophylleæ.

GUAIACI RESINA—The resin of the wood of Guaiacum officinale. Nat. Ord. Zygophylleæ.

GUARANA—A dry paste prepared from the crushed seed of Paullinia sorbilis. Nat Ord. Sapindaceæ.

HÆMATOXYLON—The heartwood of Hæmatoxylon campechianum. Nat. Ord. Leguminosæ.

HAMAMELIS—The leaves of hamamelis virginia. Nat. Ord. Hamamelaceæ.

HEDEOMA—The leaves and tops of Hedeoma pulegioides. Nat. Ord. Labiatæ.

HUMULUS—The strobiles of Humulus Lupulus. Nat. Ord. Urticaceæ.

HYDRASTIS—The rhizome and rootlets of Hydrastis canadensis. Nat. Ord. Ranunculaceæ.

HYOSCYAMUS—The leaves of Hyoscyamus niger. Nat. Ord. Solanaceæ.

ILLICIUM—The fruit of Illicium verum. Nat. Ord. Magnoliaceæ.

INULA—The root of Inula Helenium. Nat. Ord. Compositæ.

IPECACUANHA—The root of Cephælis Ipecacuanha. Nat. Ord. Rubiaceæ.

IRIS—The rhizome and rootlets of Iris versicolor. Nat. Ord. Irideæ.

JALAPA—The Tuberous root of Ipomæa Jalapa. Nat. Ord. Convolvulaceæ.

JUGLANS—The inner bark of the root of Juglans cineræ. Nat. Ord. Juglandaceæ.

KAMALA—The glands and hairs from the capsules of Mallotus philippinensis. Nat. Ord. Euphorbiaceæ.

KINO—The inspissated juice of Pterocarpus Marsupium. Nat. Ord. Leguminosæ.

KRAMERIA—The root of Krameria triandra. Nat. Ord. Polygaleæ.

LACTUCARIUM—The concrete milk-juice of Lactura virosa. Nat. Ord. Compositæ.

LAPPA—The root of Arctium Lappa. Nat. Ord. Compositæ.

LEPTANDRA—The rhizome and rootlets of Veronica virginica. Nat. Ord. Scrophulariaceæ.

LIMONIS CORTEX—The rind of the fruit of Citrus Limonum. Nat. Ord. Rutaceæ.

LINUM—The seed of Linum usitatissimum. Nat. Ord, Lineæ.

LOBELIA—The leaves and tops of Lobelia inflata. Nat. Ord. Lobeliaceæ.

LUPULINUM—The glandular powder separated from the strobiles of Humulus Lupulus. Nat. Ord. Urticaceæ.

LYCOPODIUM—The spores of Lycopodium clavatum. Nat. Ord. Lycopodaceæ.

MACIS—The arillode of the seed of Myristica fragrans. Nat. Ord. Myristicaceæ.

MANNA—The concrete saccharine exudation of Fraxinus Ornus. Nat. Ord. Oleaceæ.

MARRUBIUM—The leaves and tops of Marrubium vulgare. Nat. Ord. Labiatæ.

MASTICHE—A concrete resinous exudation from Pistacia Lentiscus. Nat. Ord. Anacardieæ..

MATICO—The leaves of Piper angustifolium. Nat. Ord. Piperaceæ.

MATRICARIA—The flower heads of Matricaria Chamomilla. Nat. Ord. Compositæ.

MELISSA—The leaves and tops of Melissa officinalis. Nat. Ord. Labiatæ.

MENISPERMUM—The rhizome and roots of Menispermum canadense. Nat. Ord. Menispermaceæ.

MENTHA PIPERITA—The leaves and tops of Mentha piperita. Nat. Ord. Labiatæ.

MENTHOL—A stearopten obtained from oil of peppermint.

MENTHA VIRIDIS—The leaves and tops of Mentha viridis. Nat. Ord. Labiatæ.

MEZEREUM—The bark of Daphne Mezereum. Nat. Ord. Thymelaceæ.

MYRISTICA—The seed of Myristica fragrans. Nat. Ord. Myristicaceæ.

MYRRHA—A gum resin obtained from Commiphora Myrrha. Nat. Ord. Burseraceæ.

NUX VOMICA—The seed of Strychnos Nux-vomica. Nat. Ord. Loganiaceæ.

OPIUM—The concrete milky exudation obtained in Asia Minor by incising the unripe capsules of Papaver somniferum. Nat. Ord. Papaveraceæ.

PAREIRA—The root of Chondodendron tomentosum. Nat. Ord. Menispermaceæ.

PEPO—The seed of Cucurbita Pepo. Nat. Ord. Cucurbitaceæ.

PHYSOSTIGMA—The seed of Physostigma venenosum. Nat. Ord. Leguminosæ.

PHYTOLACCÆ RADIX—The root of Phytolacca decandra. Nat. Ord. Phytolaccaceæ.

PHYTOLACCÆ FRUCTUS—Fruit of the same.

PICROTOXINUM—A neutral principle obtained from the seed of Anamirta paniculata. Nat. Ord. Menispermaceæ.

PILOCARPUS—The leaflets of Pilocarpus selloanus and P. Jaborandi. Nat. Ord. Rutaceæ.

PIMENTA—The fruit of Pimenta officinalis. Nat. Ord. Myrtaceæ.

PIPER—The unripe fruit of Piper nigrum. Nat. Ord. Piperaceæ.

PIPERINUM—A neutral principle obtained from Pepper.

PIX BURGUNDICA—The prepared resinous exudation from Abies excelsa. Nat. Ord. Coniferæ.

PIX LIQUIDA—An empyreumatic oleo-resin, obtained by destructive distillation of the wood of Pinus palustris and other species of Pinus. Nat. Ord. Coniferæ.

PODOPHYLLUM—The rhizome and rootlets of Podophyllum peltatum. Nat. Ord. Berberidaceæ.

PRUNUM—The fruit of Prunus domestica. Nat. Ord. Rosaceæ.

PRUNUS VIRGINIANA—The bark of Prunus scrotina. Nat. Ord. Rosaceæ.

PULSATILLA—The herb of Anemone Pulsatilla and Anemone pratensis. Nat. Ord. Ranunculaceæ.

PYRETHRUM—The root of Anacyclus Pyrenthrum. Nat. Ord. Compositæ.

QUASSA—The wood of Picræna excelsa. Nat. Ord. Simarubaceæ.

QUERCUS ALBA—The bark of Quercus alba. Nat. Ord. Cupuliferæ.

QUILLAJA—Inner bark of Quillaja Saponaria.

RHAMNUS PURSHIANA—The bark of Rhamnus Purshiana. Nat. Ord. Rhamnaceæ.

RHEUM—The root of Rheum officinale. Nat. Ord. Polygonaceæ.

RHUS GLABRA—The fruit of Rhus glabra. Nat. Ord. Terebinthaceæ.

RHUS TOXICODENDRON—The leaves of Rhus radicans. Nat. Ord. Anacardieæ.

ROSA CENTIFOLIA—The petals of Rosa centifolia. Nat. Ord. Rosaceæ.

ROSA GALLICA—The petals of Rosa gallica. Nat. Ord. Rosaceæ.

RUBUS—The bark of the root of Rubus villosus, R. canadensis, and R. trivialis. Nat. Ord. Rosaceæ.

RUBUS IDÆUS—The fruit of Rubus Idæus. Nat. Ord. Rosaceæ.

RUMEX—The root of Rumex Crispus. Nat. Ord. Polygonaceæ.

SABINA—The tops of Juniperus Sabina, Nat. Ord. Coniferæ.

SACCHARUM—Obtained from Saccharum officinarum and other varieties of Sorghum. Nat. Ord. Gramineæ; also from Beta vulgaris. Nat. Ord. Chenopodiaceæ.

SALICINUM—A neutral principle obtained from several species of Salix and Populus. Nat. Ord. Salicaceæ.

SALVIA--The leaves of Salvia officinalis. Nat. Ord. Labiatæ.

SAMBUCUS—The flowers of Sambucus canadensis. Nat. Ord. Caprifoliaceæ.

SANGUINARIA—The rhizome of Sanguinaria canadensis. Nat. Ord. Papaveraceæ.

SANTALUM RUBRUM—The wood of Pterocarpus santalinus. Nat. Ord. Leguminosæ.

SANTONICA—The unexpanded flower heads of Artemisia pauciflora. Nat. Ord. Compositæ.

SANTONINUM—A neutral principal obtained from Santonica.

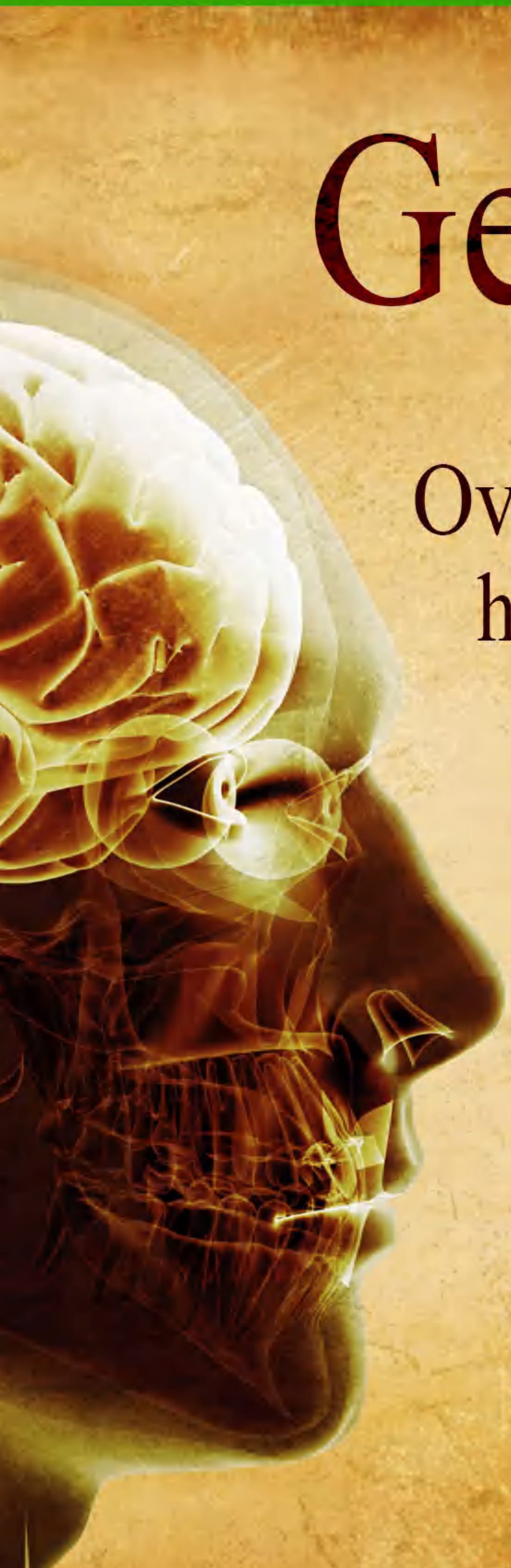
SARSAPARILLA--The root of Smilax officinalis, S. medica and Smilax papyracea. Nat. Ord. Liliaceæ.

SASSAFRAS—The bark of the root of Sassafras variifolium. Nat. Ord. Lauraceæ.

SASSAFRAS MEDULLA—The pith of Sassafras variifolium. Nat. Ord. Lauraceæ.

SCAMMONIUM—A resinous exudation from the root of Convolvulus Scammonia. Nat. Ord. Convolvulaceæ.

SCILLA—The sliced bulb of Urginea maritima. Nat. Ord. Liliaceæ.



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TANACETUM—The leaves and tops of Tanacetum vulgare. Nat. Ord. Compositæ.

TARAXACUM—The root of Taraxacum officinale. Nat. Ord. Compositæ.

TEREBINTHINA—A concrete oleo-resin obtained from Pinus palustris and other species of Pinus. Nat. Ord. Coniferæ.

TEREBINTHINA CANADENSIS—A liquid oleo-resin obtained from Abies balsamea. Nat. Ord. Coniferæ.

THYMOL—A phenol occurring in oil of Thymus vulgaris and Monarda punctata. Nat. Ord. Labiatæ.

TRAGACANTHA—A gummy exudation from Astragalus gummifer. Nat. Ord. Leguminosæ.

TRITICUM—The rhizome of Agropyrum repens. Nat. Ord. Gramineæ.

ULMUS—The inner bark of Ulmus fulva. Nat. Ord. Urticaceæ.

UVA URSI—The leaves of Arctostaphylos Uva-ursi. Nat. Ord. Ericaceæ.

VALERIANA—The rhizome and rootlets of Valeriana officinalis. Nat. Ord. Valerianaceæ.

VANILLA—The fruit of Vanilla planifolia. Nat. Ord. Orchideæ.

VERATRINA—A mixture of alkaloids obtained from the seed of Asagræa officinalis. Nat. Ord. Liliaceæ.

VERATRUM VIRIDE—The rhizome and rootlets of Veratrum viride. Nat. Ord. Liliaceæ.

VIBURNUM OPULUS—The bark of Viburnum Opulus. Nat. Ord. Caprifoliaceæ.

VIBURNUM PRUNIFOLIUM—The bark of Viburnum prunifolium. Nat. Ord. Caprifoliaceæ.

XANTHOXYLUM—The bark of Xanthoxylum americanum. Nat. Ord. Rutaceæ.

ZEA—The styles and stigmas of Zea Mays. Nat. Ord. Gramineæ.

ZINGIBER—The rhizome of Zingiber officinale. Nat. Ord. Scitamineæ.

From What Locality are the Following Obtained?

Asafœtida.....Persia
Acacia.....Egypt
Aconite.....Asia
Aloe.....Africa
Balsam Copaiba.....South America
Belladonna.....Europe
Balsam Peru.....South America
Balsam Tolu.....South America
Calabar Bean.....Africa
Calisaya.....South America
Camphor.....China and Japan
Colocynth.....Asia and Africa
Catechu.....East India
Cubeb.....Java
Damiana.....Mexico
Digitalis.....Europe
Glycyrrhiza.....Europe
Gentian.....Europe
Hyoscyamus.....England
Ipecacuanha.....South America
Jalap.....Mexico
Myrrh.....Arabia
Nux Vomica.....India and East India Islands
Opium.....Asia
Santonica.....Russia
Squills.....Spain and France

Senna	India
Saffron	Spain and England
Valerian	Europe
Zea	North America

PHARMACY.

The collection of substances employed in medicine is called the *Materia Medica.* The substances themselves are known as drugs.

Pharmacy is the science of preparing medicines.

Pharmacology is a term used to embrace these three divisions. Pharmacognosy treats of the natural origin, appearance, structure, and other means of identification of organic drugs. Galenical preparations are pharmaceutical preparations prepared by methods which do not include any chemical reactions or changes. Magistral pharmacy applies to drugs prepared on prescriptions. Therapeutics is the science of applying medicines to the treatment of the sick. A Pharmacopœia is an authoritative list of medicinal substantives, with definitions, descriptions and formulas for their preparation.

The first Pharmacopœia of the United States was issued in 1830, the last, known as the United States Pharmacopœia 1890 in 1893.

In the Pharmacopœia of 1890 the titles of medicinal substances are indicated by the Official Name, the Botanical Name, the English Name and the Synonym, and in the case of chemicals by the Symbolic Formula.

The Official Name should be used in prescriptions, on labels, and wherever precision is required.

The official name is in Latin because it is a dead language and not liable to change.

The English Name should be used in ordinary conversation and commercial transactions.

The Botanical Name is used to establish the identity of the drug.

The Symbolic Formula gives the chemical structure with the greatest brevity and exactness.

The United States Pharmacopœia, seventh decennial revision, issued by authority of the National Convention for revising the Pharmacopœia, is official from January 1, 1894.

The first change noticed upon opening the new Pharmacopœia is the substitution of *official* for the old term *officinal*. The work contains 994 titles.

The number of additions to the *official* articles is 89, and the number dismissed being 92, shows a loss of 3 in the number of official articles.

Cinnamomum of the Pharmacopœia of 1880 is represented in that of 1890 by two separate titles, viz., Cinnámomum Cassia and Cinnamomum Zeylanicum.

"Petrolatum Spissum" of the Pharmacopœia of 1890 was comprised under the title "Petrolatum" in that of 1880.

"Æther" now applies to the stronger ether, of previous Pharmacopœias.

Chloroformum now applies to the purified article, while the commercial has been dismissed.

"Emulsum" has been substituted for the word "Mistura."

Acetum Opii, Vinum Opii, Tinctura Opiī, and Tinctura Opii Deodorati are required to yield on assay 1.3 to 1.5 per cent. of crystallized morphine.

Although Acetanilid heads the list of additions,

we are pleased to note the absence of some of the more common allied synthetics, on account of the stand taken by the convention against patented or trade marked articles.

We find 11 new fluid extracts, 4 glycerites, 3 tinctures, and 4 spirits have been added.

Pepsin is one of the new articles and appears with the high standard of 1 to 3,000. The strength of the saccharated pepsin was increased slightly and now contains 10 per cent. of pepsin.

We note the following changes in the new pharmacopœia:

The strength of Infusions and Decoctions has been reduced from 10 to 5 per cent.

Water has been dropped from the formula of spirit of camphor.

Diluted alcohol is again made of equal parts of water and alcohol by measure.

All the abstracts have been dismissed,

Emulsions have been added to the list of official preparations.

Opium, cinchona and nux vomica were standardized.

The strength of acidum phosphoricum was increased from 50 per cent. to 85 per cent. The strenghth of acidum sulphurosum was increased 3 per cent., and now contains 6.4 per cent. by weight of sulphurous acid gas. The strength of nitric and sulphuric acids was decreased slightly. The former now contains 68 per cent. of HNO_3 and the latter 92.5 per cent. of H_2SO_4.

The most notable change in the new pharmacopœia is the adoption of the metric system of weights and measures, the weights of solids being expressed in grams, and the measure of liquids in cubic centimeters.

There are some instances, however, where liquids can be weighed, and with greater accuracy than they can be measured as in the case of some oils, viscid liquids and solutions of certain salts, in which considerable loss would be sustained in measuring. With these articles the old plan of parts by weight is retained, as shown below:

Liquors—all prepared by weight, except the Arsenic solutions and Magnesium citrate, Iron and Ammonium acetate and dilute Lead subacetete.

Spirits—Spirits Ætheris nitrosi, Ammonii, Glonoini, by weight.

Syrups—Syrup Acid Hydriodici, Ferri iodidi, by weight.

Honeys—By weight.

Glycerites—All but Glyc. Hydrastis by weight.

Oleates—All by weight.

Collodions—Cantharidal and flexile, by weight.

Liniments—Camphoræ and Terebinthinæ, by weight.

Mucilages—Acaciæ and Tragacanthæ, by weight.

In nomenclature, a step forward is noticed in the adoption of the terms—ous and—ic in the names of the mercury and iron salts and in placing the basylous or metallic component first in chemical compounds (as in Bismuth citrate) instead of the old Citrate of Bismuth. As a matter of precaution, however, the adjectives "corrosive," "mild," "red" and "yellow" have been retained in the respective mercury compounds.

CHANGES OF OFFICIAL LATIN TITLES.

PHARMACOPŒIA 1880.	PHARMACOPŒIA 1890.
Acidum Arseniosum.	Acidum Arsenosum.
Æther Fortior.	Æther.
Aloe.	Aloe Socotrina.
Aluminii Hydras.	Alumini Hydras.
Aluminii Sulphas.	Alumini Sulphas.
Aqua Aurantii Florum.	Aqua Aurantii Florum Fortior.
Aqua Creasoti.	Aqua Creosoti.
Aqua Rosæ.	Aqua Rosæ Fortior.
Arsenii Iodidum.	Arseni Iodidum.
Brayera.	Cusso.
Chloroformum Purificatum.	Chloroformum.
Cinnamomum.	Cinnamomum Cassia.
Cinnamomum.	Cinnamomum Zeylanicum.
Collodium cum Cantharide.	Collodium Cantharidatum.
Creasotum.	Creosotum.
Erythroxylon.	Coca.
Emplastrum Picis cum Cantharide.	Emplastrum Picis Cantharidatum.
Extractum Aloes Aquosum.	Extractum Aloes.
Extractum Belladonnæ Alcoholicum.	Extractum Belladonnæ Foliorum Alcoholicum.
Extractum Belladonnæ Fluidum.	Extractum Belladonnæ Radicis Fluidum.
Extractum Brayeræ Fluidum.	Extractum Cusso Fluidum.
Extractum Conii Alcoholicum.	Extractum Conii.
Extractum Erythroxyli Fluidum.	Extractum Cocæ Fluidum.
Extractum Hyoscyami Alcoholicum.	Extractum Hyoscyami.
Extractum Sarsaparillæ Compositum Fluidum.	Extractum Sarsaparillæ Fluidum Compositum.
Extractum Stramonii.	Extractum Stramonii Seminis.

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THE FOLLOWING ARTICLES WERE DISMISSED FROM THE PHARMACOPOEIA:

All Abstracts.
Acetum Lobeliæ.
Acetum Sanguinariæ.
Æther.
Ammonii Phosphas.
Ammonii Sulphas.
Amylum Iodatum.
Aurantii Flores.
Azedarach.
Cannabis Americana.
Ceratum Extracti Cantharidis.
Ceratum Sabinæ.
Charta Cantharidis.
Chinoidinum.
Chloroformum Venale.
Cinchona Flava.
Cornus.
Cupri Acetas.
Cydonium.
Elixir Aurantii.
Emplastrum Ammoniaci.
Emplastrum Asafœtidæ.
Emplastrum Galbani.
Emplastrum Picis Canadensis.
Extractum Cornus Fluidum.
Extractum Lactucarii Fluidum.
Extractum Malti.
Extractum Mezerei.
Fel Bovis Inspissatum.
Ferri Oxalas.
Galbanum.
Gaultheria.
Gutta-Percha.
Sodii Bicarbonas Venalis.
Sodii Santoninas.
Hydrargyri Sulphidum Rubrum.
Ignatia.
Infusum Brayeræ.
Juniperus.
Lavandula.
Linimentum Cantharidis.
Linimentum Plumbi Subacetatis.
Liquor Ferri et Quininæ Citratis.
Liquor Gutta-Perchæ.
Liquor Pepsini.
Magnesii Sulphis.
Magnolia.
Maltum.
Mistura Magnesiæ et Asafœtidæ.
Mistura Potassii Citratis.
Mucilago Cydonii.
Oleum Lavandulæ.
Oleum Rutæ.
Oleum Succini.
Oleum Valerianæ.
Origanum.
Pilulæ Ferri Compositæ.
Pilulæ Galbani Compositæ.
Pix Canadensis.
Potassii Sulphis.
Potassii Tartras.
Prinos.
Rosmarinus.
Salix.
Unguentum Acidi Gallici
Unguentum Mezerei.

Spiritus Odoratus.
Syrupus Ferri Bromodi.
Syrupus Limonis.
Thuja.
Tinctura Conii.
Tinctura Ferri Acetatis.
Tinctura Ignatiæ.
Trochisci Magnesiæ.
Trochisci Sodii Santoninatis.
Unguentum Sulphuris Alkalinum.
Ustilago.
Vinum Album Fortius.
Vinum Aloes.
Vinum Aromaticum.
Vinum Rhei.
Viola Tricolor.

ARTICLES ADDED TO THE PHARMACOPOEIA.

Acetanilidum.
Acidum Hypophosphorosum Dilutum.
Acidum Stearicum.
Adeps Lanæ Hydrosus.
Alcohol Absolutum.
Alcohol Deodoratum.
Aloe Barbadensis.
Aloinum.
Aqua Aurantii Florum (diluted).
Aqua Chloroformi.
Aqua Hydrogenii Dioxidi.
Aqua Rosæ (diluted).
Aspidosperma.
Barii Dioxidum.
Caffeina Citrata.
Caffeina Citrata Effervescens.
Calcii Sulphas Exsiccatus.
Cinnamomum Saigonicum.
Cocainæ Hydrochloras.
Convallaria.
Elastica.
Elixir Aromaticum.
Elixir Phosphori.
Eriodictyon.
Eucalyptol.
Extractum Apocyni Fluidum.
Glyceritum Acidi Carbolici.
Glyceritum Acidi Tannici.
Glyceritum Boroglycerini.
Glyceritum Hydrastis.
Hydrastininæ Hydrochloras.
Hyoscinæ Hydrobromas.
Hyoscyaminæ Hydrobromas.
Lithii Citras Effervescens.
Menthol.
Methyl Salicylas.
Naphtalinum.
Naphtol.
Oleatum Zinci.
Oleum Betulæ Volatile.
Oleum Cadinum.
Oleum Terebinthinæ Rectificatum.
Pancreatinum.
Paraldehydum.
Pepsinum.
Petrolatum Liquidum.
Petrolatum Spissum.
Physostigminæ Sulphas.
Pilulæ Catharticæ Vegetabiles.
Pilulæ Ferri Carbonatis.
Potassii Citras Effervescens.
Pyrogallol.

Extractum Asclepiadis Fluidum.
Extractum Aspidospermatis Fluidum.
Extractum Cimicifugæ.
Extractum Convallariæ Fluidum.
Extractum Eriodictyi Fluidum.
Extractum Jalapæ.
Extractum Lappæ Fluidum.
Extractum Menispermi Fluidum.
Extractum Phytolaccæ Radicis Fluidum.
Extractum Rhamni Purshianæ Fluidum.
Extractum Scoparii Fluidum.
Extractum Uvæ Ursi.
Extractum Viburni Opuli Fluidum.
Ferri et Quininæ Citras Solubilis.
Resorcinum.
Rhamnus Purshiana.
Salol.
Sodii Nitris.
Sparteinæ Sulphas.
Spiritus Amygdalæ Amaræ.
Spiritus Aurantii Compositus.
Spiritus Glonoini.
Spiritus Phosphori.
Strontii Bromidum.
Strontii Iodidum.
Strontii Lactas.
Strophanthus.
Suppositoria Glycerini.
Terebenum.
Terpini Hydras.
Tinctura Lactucarii.
Tinctura Quillajæ.
Tinctura Strophanthi.
Trochisci Santonini.
Viburnum Opulus.
Zea.

PERCOLATION.

Percolation is the process whereby a powdered substance contained in a suitable vessel (called a percolator) is deprived of its soluble constituents by the descent of a solvent through it. The solvent used is called the *menstruum*, and the liquid coming from the percolator after having passed through the drug is termed the *percolate*.

The percolator most suitable for the quantities contemplated by the U. S. Pharmacopœia should be nearly cylindrical, or slightly conical; with a funnel-shaped termination at the smaller end. The neck of this funnel-end should be rather short, and should gradually and regularly become narrower toward the orifice, so that a perforated cork, bearing a short glass tube, may be tightly wedged into it from within until the end of the cork is flush with the outer edge of the orifice. The glass tube, which must not project above the inner surface of the cork, should extend from 3 to 4 Cm. beyond the outer surface of the cork, and should be provided with a closely fitting rubber tube, at least one-fourth longer than the percolator itself, and ending in another short glass tube, whereby the rubber tube may be so suspended that its orifice shall be above the surface of the menstruum in the percolator, a rubber band holding it in position.

The shape of a percolator should be adapted to

the nature of the drug to be operated upon. For drugs which are apt to swell, particularly when a feebly alcoholic or an aqueous menstruum is employed, a *conical* percolator is preferable. A *cylindrical* or only slightly tapering percolator may be used for drugs which are not liable to swell, and when the menstruum is strongly alcoholic, or when ether or some other volatile liquid is used for extraction. The size of the percolator selected should be in proportion to the quantity of drug extracted. When properly packed in the percolator, the drug should not occupy more than two-thirds of its height.

The percolator is prepared for percolation by gently pressing a small plug of cotton into the neck above the cork, a thin layer of clean sand being then poured upon the cotton to hold it in place. The powdered substance to be percolated is put into a basin, the specified quantity of menstruum is poured on, and it is thoroughly stirred until it appears uniformly moistened. The moist powder is then passed through a coarse sieve—No. 40 powders, and those which are finer requiring a No. 20 sieve, while No. 30 powders require a No. 15 sieve for this purpose. Powders of a less degree of fineness usually do not require this additional treatment after the moistening. The moist powder is now transferred to a sheet of thick paper and the whole quantity poured from this into the percolator. It is then shaken down lightly and allowed to remain in that condition for a period varying from fifteen minutes to several hours, unless otherwise directed; after which the powder is pressed, by the aid of a plunger of suitable dimensions, more or less firmly, in proportion to the character of the powdered sub-

stance and the alcoholic strength of the menstruum; strongly alcoholic menstrua, as a rule, permitting firmer packing of the powder than the weaker. The percolator is now placed in position for percolation, and, the rubber tube having been fastened at a suitable height, the surface of the powder is covered by an accurately fitting disk of filtering paper, or other suitable material, and a sufficient quantity of the menstruum poured on through a funnel reaching nearly to the surface of the paper. If these conditions be accurately observed, the menstruum will penetrate the powder equally until it has passed into the rubber tube and has reached, in this, a height corresponding to its level in the percolator, which is now closely covered to prevent evaporation. The apparatus is then allowed to stand at rest for the time specified in the formula.

To begin percolation, the rubber tube is lowered and its glass end introduced into the neck of a bottle previously marked for the quantity of liquid to be percolated, if the percolate is to be measured, or of a tared bottle, if the percolate is to be weighed; and by raising or lowering this receiver the rapidity of percolation may be increased or decreased as may be desirable, care being taken, however, that the rate of percolation, unless the quantity of material be largely in excess of the pharmacopœial quantity, shall not exceed the limit of ten to thirty drops in a minute. A layer of menstruum must constantly be maintained above the powder, so as to prevent the access of air to its interstices, until all has been added, or the requisite quantity of percolate has been obtained.

What great advantage does percolation have over maceration in respect to the character of the liquid

left in the residue? Maceration leaves a finished tincture in the residue; in percolation, it is merely menstruum, the active portions of the drug having been dissolved in the preceding percolate.

MACERATION.

Maceration consists in soaking the powdered drug or substance in the menstruum until it is thoroughly penetrated and the soluble portions are dissolved. This is usually done by placing the powder in a bottle with the menstruum, corking tightly and agitate occasionally for a period of one to fourteen days, according to the drug, then pour off the liquid, express the residue and filter the mixed liquids.

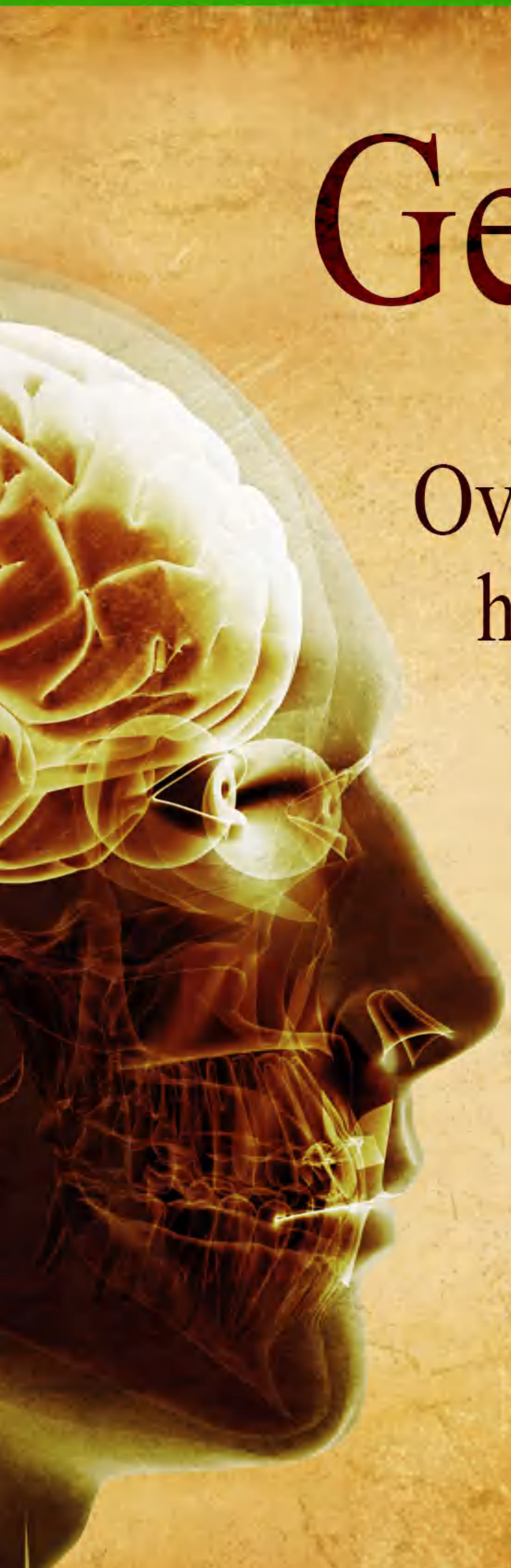
FILTRATION

Is the process of separating liquids from solids for the purpose of obtaining the liquid in a transparent condition. This is done by the use of porus substances called *Filters*, which intercept the solid particles and allow the liquid to pass through.

Filters are usually made of paper, sand, charcoal, asbestos, or porous stone.

DIALYSIS

Is the process of separating crystallizable from uncrystallizable substances, by suspending a mixture of both upon a porous diaphragm which has its under surface in contact with water. This diaphragm is composed of bladder or parchment.



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BALSAMS

Are resinous substances which contain Benzoic, Cinnamic, or an analogous acid.

How many official ones are there? Two.

Name them. Balsamum Tolutanum. Balsamum Peruvianum.

CERATA—Cerates

Are unctious substances of such consistency that they may be easily spread with a spatula.

The following substances are used as the bases of cerates: Oil, lard, petrolatum. Wax, and sometimes paraffine or spermaceti, in the presence of wax, are used to raise the melting point of the bases.

Cerates are prepared by two methods: By Fusion and Incorporation.

Ceratum is prepared by melting together 300 Gm. of White Wax and 700 Gm. of Lard.

There are six official cerates.

DECOCTA—Decoctions

Are liquid preparations made by boiling the drug in water.

The strength of decoctions has been reduced to 5 per cent of the drug, and should be so made when not otherwise ordered by the physician.

Decoctions are made by putting the coarsely comminuted drug in a vessel provided with a cover; pour the cold water upon it, cover well and boil for fifteen minutes; allow to cool to about 104°F.; express, strain the expressed liquid, and pass enough cold water through the strainer to make up for the loss by evaporation.

There are two official decoctions, viz.: Decoctum Cetrariæ and Decoctum Sarsaparillæ Compositum. The latter contains Sarsaparilla, Sassafras, Guaiacum Wood, Glycyrrhiza and Mezereum.

ELIXIRIA—Elixirs

Are aromatic sweetened, spirituous preparations containing small quantities of active medicinal substances.

There are two official elixirs, Elixir Aromaticum and Elixir Phosphori.

Elixir Aromaticum contains Compound Spirits of Orange, Syrup, Deodorized Alcohol and Water.

Elixir Phosphori contains Spirit of Phosphorus, Oil of Anise, Glycerin and Aromatic Elixir.

Each cubic centimeter of Elixir of Phosphorus represents about one-fourth milligramme of phosphorus.

EMPLASTRA—Plasters

Are substances for external application of such consistency that they adhere to the skin, and require heat in spreading.

On what are plasters usually spread? Plasters are usually spread on muslin, leather, paper, etc., and have, as a basis, lead plaster, a gum resin, or Burgundy pitch.

There are thirteen official plasters.

Give the official name for strengthening plaster. Emplastrum Ferri.

Give the official name for Court Plaster. Emplastrum Ichthyocollæ.

Give the ingredients of Capsicum Plaster. Resin Plaster, Oleo-resin of Capsicum, each Q. S.

EMULSUM—Emulsion.

Emulsions are aqueous, liquid preparations, in which oily or resinous substances are suspended by the use of gummy or viscid substances.

There are four official emulsions, viz.: Emulsum Ammoniaci, Emulsum Amygdalæ, Emulsum Asafœtidæ, Emulsum Chloroformi.

These preparations were formerly called mixtures.

EXTRACTA—Extracts

Are solids or semi-solids made by evaporating solutions of vegetable principles.

There are thirty-four official extracts, one alcoholic extract and one compound extract, viz.: Extractum Belladonnæ Foliorum Alcoholicum and Extractum Colocynthidis Compositum.

What are the ingredients of Extractum Colocynthidis Compositus?

Extract of Colocynth, Purified Aloes, Cardamon, Resin of Scammony, Soap, Alchohol.

Extractum Nucis Vomicæ should contain 15% of total alkaloids.

Extractum Opii should contain 18% of morphine.

EXTRACTA FLUIDA—Fluid Extracts

Are alcholic solutions of a drug, representing one gramme of the drug to each cubic centimeter. They possess the advantage over tinctures of being uniform, definite, and concentrated. They are prepared by maceration, percolation, or by both processes together.

There are eighty-seven official fluid extracts and one compound fluid extract.

TYPICAL FORMULA FOR AN OFFICIAL FLUID EXTRACT: One hundred grammes of the powdered drug is moistened with a certain quantity of menstruum, packed in a suitable percolator, and enough menstruum added to saturate the powder and leave a stratum above it; the lower orifice of the percolator is closed when the liquid begins to drop, and the percolator is closely covered to prevent evaporation and permit maceration for a specified time; additional menstruum is poured on, and percolation continued until the drug is exhausted. Usually from seven to nine-tenths of the first portion of the percolate is reserved, and the remainder evaporated at a temperature not exceeding 50° C. (122° F.) to a soft extract; this is to be dissolved in the reserved portion, and enough menstruum added to make the fluid extract measure 100 c. c.

What acid is used in making Fl. Ext. Ergot and Fl. Ext. Conii? Acetic Acid.

Why is glycerin used in Fluid Extracts? To prevent precipitation.

Name one made with pure alcohol. Fl. Ext. Lupulin.

Name one made with water and alcohol. Fl. ext. nux vomica.

Name one which contains glycerin. Fl. ext. wild cherry.

Why is ammonia used in making Fl. Ext. Glycyrrhiza? To dissolve the glycyrrhzin.

GLYCERITA—Glycerites

Are mixtures of medicinal substances with glycerine.

There are six official Glycerites, viz.: Glycerite of Carbolic Acid, Tannic Acid, Starch, Boroglycerin, Hydrastis, and Yolk of Egg.

GUMS

Gums are vegetable substances which form with water a thick, glutinous liquid—mucilage. They are insoluble in alchol.

There are two official gums, viz.: Acacia and Tragacantha. The former is soluble in water, but the latter only swells and forms a gelatinous mass.

Two proximate principles are found in these gums, Arabin, or arabic acid, $C_{12}H_{22}O_{11}$, found in acacia, is soluble, and Bassorin $C_{12}H_{20}O_{10}$, found in tragacanth, is insoluble.

GUM RESINÆ

Are natural mixtures of gum and resin obtained as exudations from plants.

Myrrha and Asafœtida are examples.

INFUSA—Infusions

Are liquid preparations made by treating the drug with hot or cold water without boiling.

There are three infusions and one compound infusion official.

The strength of infusions has been reduced to 5 per cent of the drug and should be so prepared when not otherwise directed by the pharmacopœia or the physician.

Infusions are prepared by placing the drug in a suitable vessel provided with a cover; pour the boiling water upon it, cover the vessel and allow to stand for half an hour; then strain.

Infusion of cinchona contains cinchona, aromatic sulphuric acid and water.

Infusion of digitalis contains digitalis, alcohol, cinnamon water, and water.

Infusion of senna compound contains senna, manna, magnesia sulphate, fennel, and water.

Infusion of wild cherry is made by percolation, and cold water is used to prevent the loss of the hydrocyanic acid.

LINIMENTA—Liniments

Are oily and alcoholic solutions of medicinal substances for external application.

There are nine official liniments, and they contain the following ingredients:

AMMONIA LINIMENT—Ammonia Water, Alcohol and Cotton Seed Oil.

BELLADONNA LINIMENT—Fl. Ext. Belladonna and Camphor.

LIME LINIMENT—Solution of Lime and Linseed Oil.

CAMPHOR LINIMENT—Camphor and Cotton Seed Oil.

CHLOROFORM LINIMENT—Chloroform and Soap Liniment.

SOAP LINIMENT—Soap, Camphor, Oil of Rosemary, Alcohol and Water.

LINIMENT OF SOFT SOAP—Soft Soap, Oil of Lavender Flowers, Alcohol and Water.

COMPOUND LINIMENT OF MUSTARD—Oil of Mustard, Fl. Ext. Mezereum, Camphor, Castor Oil and Alcohol.

TURPENTINE LINIMENT—Resin Cerate and Oil of Turpentine.

LIQUORS—Solutions

Are aqueous solutions of non-volatile substances, except such as form separate and distinctive classes.

How made?

Simple solution in water, Chemical solution in water.

There are twenty-four official liquors; their ingredients are as follows:

LIQUOR ACIDI ARSENOSI—One per cent. Oxide of Arsenic, 5 per cent. Hydrochloric Acid Dil.

LIQUOR ARSENI ET HYDRARGYRI IODIDI—One per cent. Iodide of Arsenic, 1 per cent. of Biniodide of Mercury.

LIQUOR CALCIS—Saturated solution of Hydrate of Calcium. Contains about 0.17 per cent.

LIQUOR AMMONII ACETATIS—Dil. Acetic Acid and Ammonium Carbonate.

LIQUOR FERRI ACETATIS—Contains 31 per cent. Ferric Acetate and water.

LIQUOR FERRI CITRATIS—Ferric Hydrate with Citric Acid (44 per cent. of Scaled Salt).

LIQUOR FERRI NITRATIS—An aqueous solution of Ferric Nitrate containing about 6.2 per cent. of the anhydrous salt, corresponding to 1.4 per cent. of metallic iron.

LIQUOR FERRI SUBSULPHATIS—An aqueous solution of Basic Ferric Sulphate, containing 43.7 per cent. of the salt, corresponding to about 13.6 per cent. of metallic iron.

LIQUOR FERRI TERSULPHATIS—An aqueous solution of normal Ferric Sulphate, containing 28.7 per cent. of the Salt, corresponding to about 8 per cent. of metallic iron.

LIQUOR FERRI CHLORIDI.—An aqueous solution of Ferric Chloride Fe_2Cl_6, containing about 37.8 per cent. of the anhydrous Salt, corresponding to about 13 per cent. of metallic iron.

LIQUOR FERRI ET AMMONII ACETATIS—Tincture of

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LIQUOR ZINCI CHLORIDI—Zinc, Nitric Acid, Precipitated Carbonate of Zinc, Hydrochloric Acid, Water, (Contains about 50 per cent. Chloride of Zinc.)

MASSA—Mass

Are mixtures of medicinal substances of a pilular consistence. There are three official, viz.: Massa Copaibæ, Massa Ferri Carbonatis and Massa Hydrargyri.

Give ingredients of Massa Hydrargyri? (Mercury, Glycyrrhiza, Althæa, Glycerin and Honey of Rose.)

MELLITA—Honeys

Are thick liquid preparations closely allied to syrups, differing merely in the use of honey as a base, instead of syrup.

There three official honeys:

1. Mel—Commercial Honey. A saccharine secretion deposited in the honey-comb by Apis Mellifica.

2. Mel Despumatum—Clarified Honey. Commercial honey clarified by heating and straining.

3. Mel Rosæ.

Give the ingredients of Mel Rosæ.

Fl. Ext. of Rose 12Cc., Clarified Honey Q. S. 100 Cc.

MISTURÆ—Mixtures

Are mechanical mixtures of insoluble substances in aqueous liquid preparations.

How many are official? Four, viz.:

Mistura Cretæ, Mistura Ferri Composita, Mistura Glycyrrhizæ Composita and Mistura Rhei et Sodæ.

MUCILAGINES—Mucilages

Are aqueous solutions of gums or substances closely allied to them.

Name the most important one. Mucilago Acaciæ.

How many are official? Four, viz.:

Mucilago Acaciæ, Mucilago sassafras Medullæ, Mucilago Tragacanthæ and Mucilago Ulmi.

OLEATA—Oleates

Are solutions of alkaloids or metallic salts in Oleic Acid.

How many are official? Three, viz.:

Oleatum Hydrargyri. (Contains 20 per cent. of Yellow Mercuric Oxide.)

Oleatum Vertrinæ. (Contains 2 per cent. of Veratrine.)

Oleatum Zinci. (5 per cent. of Zinc Oxide.)

What advantage do oleates possess over the fatty substances used in ointments? They are more readily absorbed.

OLEORESINÆ—Oleoresins

Are liquid preparations consisting principally of natural oils and resins, extracted from vegetable substances by percolation with stronger ether.

How do Oleoresins differ from fluid extracts?

They bear no uniform relation to the drug, and the menstruum used dissolves principles insoluble in alcohol. They are the most concentrated liquid preparations of drugs.

Give general formula for their preparation.

Percolate the powdered drug in a cylindrical per-

colator provided with a cover and a receptacle suitable for volatile liquids, with stronger ether, until exhausted, recovering the greater part of the ether by distillation, and exposing the residue in a capsule to spontaneous evaporation until the remaining ether has evaporated.

How many are official? Six, viz.:

Oleoresina Aspidii, Capsici, Cubebæ, Lupulini, Piperis and Zingiberis.

PILULÆ—Pills.

What are Pilulæ, or Pills?

Pills are small, solid bodies, of a globular, ovoid, or lenticular shape, which are intended to be swallowed, and thereby produce medical action.

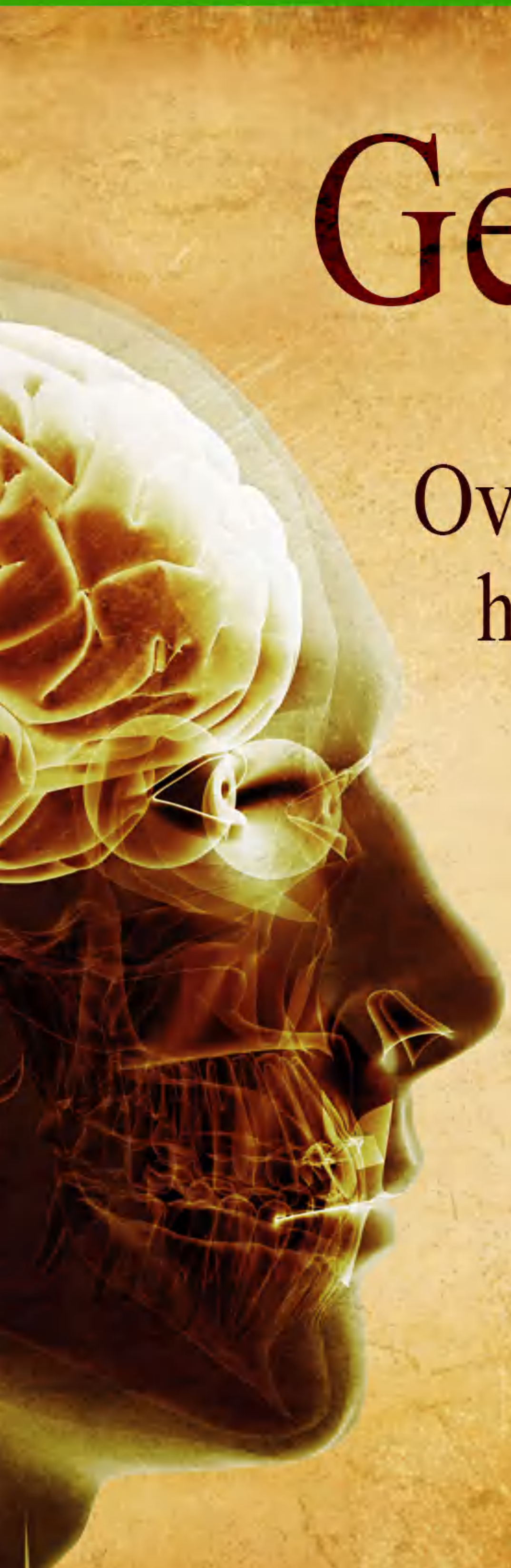
Of what is a pill mass composed? and what is required of it?

It is composed of ingredients and excipients. It is required that the mass be: 1, *adhesive;* 2, *firm;* 3, *plastic.*

The first step in making pills is to thoroughly mix the ingredients by powdering all dry substances and triturating well in a mortar. Where a minute quantity of some substance enters into the mixture it is often advisable to dissolve it in a few drops of solvent to facilitate its division through the mass. After the ingredients are well mixed an excipient must be selected suitable to the drugs comprising the powder.

Syrup of Acacia is used where considerable adhesiveness is required, and glucose is still more adhesive.

Cocao butter and resin cerate make good excipi-



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soaps as common rosin. When pure they are usually transparent, hard and brittle; when they contain water, are opaque, and no longer hard and brittle.

SPIRITUS—Spirits

Are Alcoholic solutions of volatile substances.

There are five methods used in preparing them, viz.:

No. 1—Simple solution.
No. 2—Solution and Maceration.
No. 3—Gaseous Solution.
No. 4—Chemical Reaction.
No. 5—Distillation.

Name one by each in above order.

No. 1—Spiritus Myrciæ.
No. 2—Spiritus Menthæ Piperitæ.
No. 3—Spiritus Aminoniæ.
No. 4—Spiritus Ætheris Nitrosi.
No. 5—Spiritus Frumenti.

What change was made in Spirits of Camphor in the U. S. P. of 1890? Water was dropped from its formula.

Spiritus Glonoini—An alcoholic solution of Nitroglycerin $C_3H_5(NO_3)_3$ containing 1 per cent. by weight of that substance, and Spiritus Phosphori are the most important additions to this class of preparations, the latter contains .12 per cent. of Phosphorus in Alcoholic Solution.

SYRUPA—Syrups

Are concentrated solutions of sugar in water.

There are three kinds of syrups.

1. Syrup, or Simple Syrup—Sugar and Water.

2. Medicated Syrups—Syrups containing various medicinal substances.

3. Flavored Syrup—Syrup used as a flavor only.

How many methods of preparation? Four. Name them.

No. 1. By solution with heat.

No. 2. By agitation without heat.

No. 3. Addition of medicated liquid to syrup.

No. 4. By digestion or maceration.

Give formula for making Syrupus.

Sugar .....85 Gm.
Water, Q. S.....100 Cc.

SYRUPUS ACIDI HYDRIODICI—A syrupy liquid containing about 1 per cent. by weight of absolute Hydriodic Acid (HI).

SYRUPUS FERRI IODIDI—Contains 10 per cent. by weight of Ferrous Iodide (FeI_2).

SUPPOSITORIA—Suppositories.

What are Suppositories? Suppositories are solid bodies intended to be introduced into the rectum, urethra, or vagina to produce medicinal action.

What are the requirements in preparing them? They should be prepared of materials of sufficient consistency to retain their shape when inserted, and, at the same time melt at the temperature of the body. Butter of cacao fulfills the requirements. Only in the hottest summer weather should its melting point be raised by the addition of spermaceti or wax, unless some softening ingredient is used in making the suppositories.

By what three methods are Suppositories shaped? By *rolling*, *molding* and *pressing*.

RECTAL SUPPOSITORIES—Should be cone-shaped and weigh about one gram.

VAGINAL SUPPOSITORIES—Should be globular in shape and weigh about three grams.

URETHRAL SUPPOSITORIES—Should be pencil-shaped and weigh about one gram.

There is only one official Suppository, viz.:

SUPPOSITORIA GLYCERINI—It is made as follows: Glycerin 60 Gm., Sodium Carbonate 3 Gm., Stearic Acid 5 Gm. Dissolve the Sodium Carbonate in the Glycerin on a water bath; then add the Stearic Acid and heat carefully until this is dissolved and the escape of carbonic acid gas has ceased. Pour into suitable molds; when cold remove the suppositories and wrap each in tin-foil.

What precaution is necessary in molding Ergotin Suppositories? To use the least amount of heat possible.

TINCTURÆ—Tinctures

Are Alcoholic solutions of non-volatile medicinal substances, except tincture of Iodine.

They are prepared by percolation, maceration, solution and dilution.

The menstrua used in preparing them are alcohol, diluted alcohol of various strengths, aromatic spirits of ammonia and mixtures of alcohol, water and glycerin.

There are 74 tinctures.

Glycerin is used in tinctures to prevent precipitation on standing.

Tincturæ Herbarum Recentium, when not otherwise directed, should be prepared as follows: 500 Gm. of the fresh herb bruised or crushed are macerated in 1,000 Cc. of alcohol for 14 days, then express and filter.

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Give modes of preparation. Fusion. Incorporation. Chemical reaction.

Give example of each. Fusion—Unguentum. Incorporation—Unguentum Hydrargyri. Chemical Reaction—Unguentum Hydrargyri Nitratis.

Unguentum is made by melting together 80 Gm. of lard and 20 Gm. of yellow wax. Unguentum Acidi Carbolici contains 5 per cent. of carbolic acid.

Unguentum Hydrargyri, 50 per cent. of mercury. Unguentum Hydrargyri Ammoniati, 10 per cent. Ammoniated Mercury.

Unguentum Hydrargyri Oxidi Flavi, 10 per cent. yellow mercuric oxide.

Unguentum Hydrargyri Oxidi Rubri, 10 per cent. red mercuric oxide.

Unguentum Iodi, 4 per cent. iodine, and 1 per cent. potassium iodide.

Unguentum Iodoformi, 10 per cent. iodoform.

Unguentum Veratrinæ, 4 per cent. veratrine.

VINA MEDICATA—Medicated Wines

Are liquid preparations, containing the soluble principles of medicinal substances dissolved in wine.

There are 10 official wines. Vinum Album and Vinum Rubrum (not medicated) are made from grapes, the fruit of Vitis vinifera, by fermentation, and should contain from 10 to 14 per cent. by weight of alcohol. The medicated wines are made as follows:

By Percolation—Vinum Ergotæ, Colchici Radicis.

By Maceration—Vinum Opii, Colchici Seminis.

By Solution—Vinum Antimonii, Ferri Amarum, Ferri Citratis, Ipecacuanhæ.

Drugs of Animal Origin.

ACIDUM LACTICUM—A liquid composed of 75 per cent. of absoluté Lactic acid and 25 per cent. of water.

ACIDUM OLEICUM—Obtained as a by-product in the manufacture of candles from fats.

ACIDUM STEARICUM—An organic acid obtained from the more solid fats, chiefly tallow.

ADEPS—The prepared internal fat of the abdomen of Sus scrofa.

ADEPS LANÆ HYDROSUS—The purified fat of the wool of sheep (Ovis Aries).

CANTHARIS—The insect Cantharis vesicatoria.

CERA ALBA—Yellow Wax bleached.

CERA FLAVA—A concrete substance prepared by Apis mellifica.

CETACEUM—A concrete fatty substance, obtained from Physeter macrocephalus.

COCCUS—The dried female of Coccus cacti.

FEL BOVIS—The fresh gall of Bos Taurus.

ICHTHYOCOLLA—The swimming-bladder of Acipenser Huso.

MOSCHUS—The dried secretion from the perputial follicles of Moschus moschiferus.

OLEUM ADIPIS—A fixed oil expressed from lard at a low temperature.

OLEUM MORRHUÆ—A fixed oil obtained from the fresh livers of Gadus Morrhua.

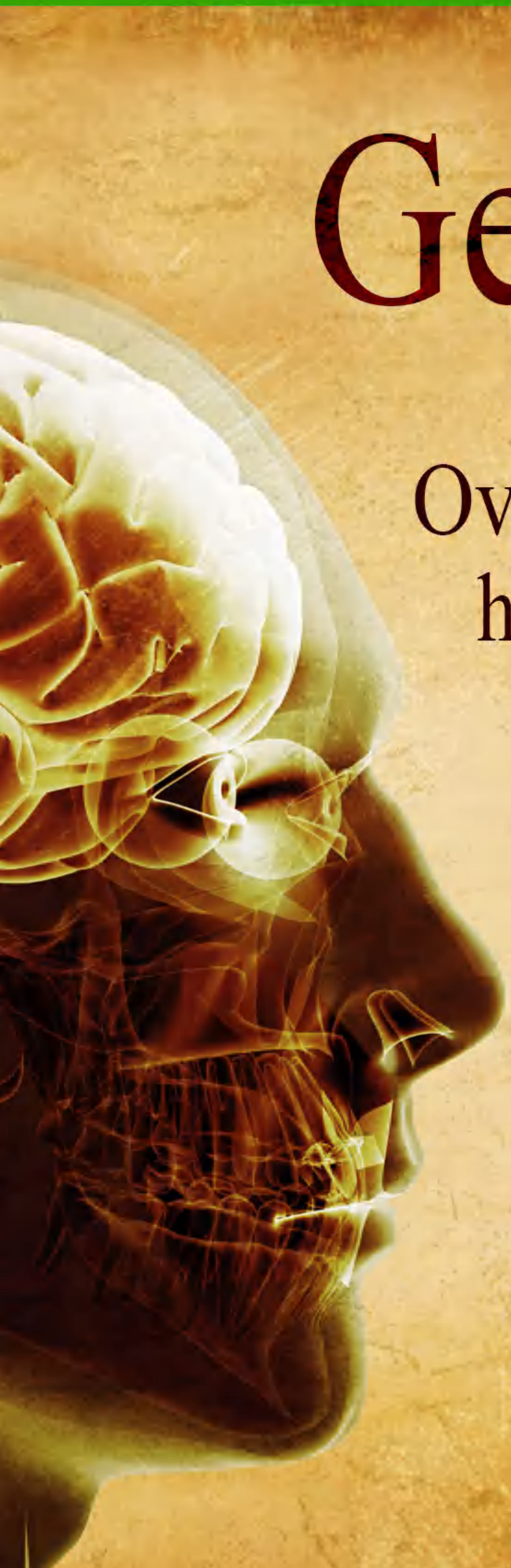
PANCREATINUM—A mixture of the enzymes existing in the pancreas of the hog (sus scrofa).

PEPSINUM—Pepsin is the digestive principle of the gastric juice obtained from the mucous membrane of the stomach of the hog.

SACCHARUM LACTIS—A crystalline sugar obtained from the whey of cow's milk.
SEVUM—The internal fat of the abdomen of Ovis-aries purified by melting and straining.
VITELLUS—The yolk of the egg of Gallus Bankiva.

OFFICIAL NAMES.

Absinthium ..... Wormwood
Acacia ..... Gum Arabic
Acetanilidum ..... Acetanilid
Aconitum ..... Aconite
Adeps ..... Lard
Adeps Lanæ Hydrosus ..... Wool-Fat
Æther ..... Ether
Alcohol ..... Alcohol
Allium ..... Garlic
Aloinum ..... Aloin
Alumen ..... Alum
Alumen Exsiccatum ..... Dried Alum
Ammoniacum ..... Ammoniac
Amylum ..... Starch
Anisum ..... Anise
Anthemis ..... Chamomile
Apocynum ..... Canadian Hemp
Asafœtida ..... Asafetida
Asclepias ..... Pleurisy Root
Aspidium ..... Male Fern
Aspidosperma ..... Quebracho
Atropina ..... Atropine
Benzinum ..... Benzin
Benzoinum ..... Benzoin
Bromum ..... Bromine
Bryonia ..... Bryony



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Crocus	Saffron
Cubeba	Cubeb
Cusso	Kousso
Cypripedium	Ladies' Slipper
Digitalis	Foxglove
Dulcamara	Bittersweet
Elastica	India Rubber
Elaterinum	Elaterin
Erioditon	Eriodictyon
Euonymus	Wahoo
Eupatorium	Thoroughwort
Fel Bovis	Oxgall
Ferrum	Iron
Ficus	Fig
Fœniculum	Fennel
Frangula	Buckthorn
Galla	Nutgall
Gelsemium	Yellow Jasmine
Gentiana	Gentian
Geranium	Cranesbill
Glycerinum	Glycerin
Glycyrrhiza	Liquorice
Granatum	Pomegranate
Guaiaci Resina	Guaiac
Hæmatoxylon	Logwood
Hamamelis	Witch Hazel
Hedeoma	Pennyroyal
Humlulus	Hops
Hydrargyrum	Mercury
Hydrastis	Golden Seal
Hyoscyamus	Henbane
Ichthyocolla	Isinglass
Illicium	Star-anise
Inula	Elecampane
Iodoformum	Iodoform

Iodum.....Iodine
Ipecacuanha.....Ipecac
Iris.....Blue Flag
Jalapa.....Jalap
Juglans.....Butternut
Kamala.....Rottlera
Krameria.....Rhatany
Lappa.....Burdock
Leptandra.....Culvers Root
Linum.....Linseed
Lupulinum.....Lupulin
Marrubium.....Horehound
Matricaria.....German Chamomile
Mel.....Honey
Mel Despumatum.....Clarified Honey
Melissa.....Balm
Menispermum.....Canadian Moonseed
Mentha Piperita.....Peppermint
Mentha Viridis.....Spearmint
Menthol.....Menthol
Morphina.....Morphine
Moschus.....Musk
Myristica.....Nutmeg
Myrrha.....Myrrh
Naphthalinum.....Naphtalin
Naphtol.....Beta Naphtol
Oleum Betulæ Volatile.....Volatile Oil of Betula
Oleum Cadinum.....Empyreumatic Oil of Juniper
Oleum Phosphoratum.....Phosphorated Oil
Oleum Theobromatis.....Cacao Butter
Pancreatinum.....Pancreatin
Paraldehydum.....Paraldehyde
Pareira.....Pareira Brava
Pepo.....Pumpkin Seed
Pepsinum.....Pepsin

Petrolatum Liquidum.....Liquid Petrolatum
Petrolatum Molle.....Soft Petrolatum Ointment
Petrolatum Spissum.....Hard Petrolatum
Physostigma.....Calabar Bean
Phytolaccæ Fructus.....Poke Berry
Picrotoxinum..... Picrotoxin
Pilocarpus .....Jaborandi
Pimenta ..... Allspice
Piperinum ..... Piperin
Pix Burgundica.....Burgundy Pitch
Pix Liquida ..... Tar
Podophyllum.....May Apple
Prunum..... Prune
Prunus Virginiana.....Wild Cherry
Pulvis Effervescens Compositus ....Seidlitz Powder
Pulvis Ipecacuanhæ et Opii.....Dover's Powder
Pyrethrum.....Pellitory
Pyrogallol ..... Pyrogallol
Pyroxylinum.....Gun Cotton
Quercus Alba.....White Oak
Quillaja.....Soap Bark
Resina..... Colophony
Resorcinum ..... Resorcin
Rhamnus Purshiana.....Cascara Sagrada
Rheum .....Rhubarb
Rhus Glabra.....Rhus Glabra
Rhus Toxicodendron.....Poison Ivy
Rosa Centifolia.....Pale Rose
Rosa Gallica.....Red Rose
Rubus.....Blackberry
Rubus Idæus..... Raspberry
Rumex ..... Yellow Dock
Sabina.....Savine
Saccharum .....Sugar
Saccharum Lactis.....Sugar of Milk

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Zanthoxylum .....Prickley Ash
Zea .....Corn Silk
Zingiber .....Ginger

How are the Following Made?

ACETANILID—By the reaction of Aniline and Glacial Acetic Acid, with the elimination of water.

ACETIC ACID—By the destructive distillation of wood.

ACID BENZOIC—By the sublimation of Gum Benzoin.

ACID OXALIC—Decomposing sugar by Nitric Acid.

ACID PYROGALLIC—By subliming Gallic Acid.

ETHER—By the action of Sulphuric Acid on Alcohol and Chloride of Lime.

ALCOHOL DILUTE—Equal parts by measure of Alcohol and water.

AQUA CALCIS—The lime is slacked with a little water; it is then shaken with more water, and this water poured off and rejected. Then the proper amount of water is added, and allowed to stand until ready for use.

Why is the first water rejected? Because it is liable to contain other soluble salts.

What per cent. of lime does lime water contain? 0.17 per cent.

BORIC ACID—By decomposing Borax with Hydrochloric Acid.

CHLORAL HYDRATE—By passing Chlorine through Alcohol.

CHLOROFORM—By distilling a mixture of Alcohol and Chlorinated Lime.

COLLODION—By dissolving Gun Cotton in Ether and Alcohol.

COLLODION STYPTICUM—By the addition of Tannic Acid to Collodion.

COLLODION FLEXILE—By mixing Collodion, Canada Turpentine and Castor Oil.

COLLODION CANTHARIDAL—By mixing Flexile, Collodion, Cantharides and Chloroform.

COLORLESS TINCTURE OF IODINE—Made by the addition of Aqua Ammonia or Soda Hyposulphite to the Tincture of Iodine.

HYDROCHLORIC ACID—By the action of the Sulphuric Acid on common salt.

INGLUVIN—Made from the gizzards of Gallus Bankiva by a process similar to that used in making pepsin.

IODOFORM—By the action of Iodine on Alcohol and Carbonate of Potash.

KOUMISS—By adding sugar and yeast to skimmed milk and allowing it to ferment in well-stoppered bottles.

NITRIC ACID—By the action of Sulphuric Acid on Nitrate of Potash.

PHENACETIN—By acting on Para-phenetidin with Glacial Acetic Acid.

QUININÆ BISULPHAS—Prepared by the action of Sulphuric Acid on Sulphate of Quinine. The bisulphate of quinine contains 13 per cent. less alkaloid than the sulphate.

SPIRITUS ÆTHERIS NITROSI—By the action of Nitric Acid on Alcohol.

SULPHURIC ACID—By burning Sulphur or Iron Pyrites and bringing the fumes in contact with steam and the fumes formed by decomposing nitre.

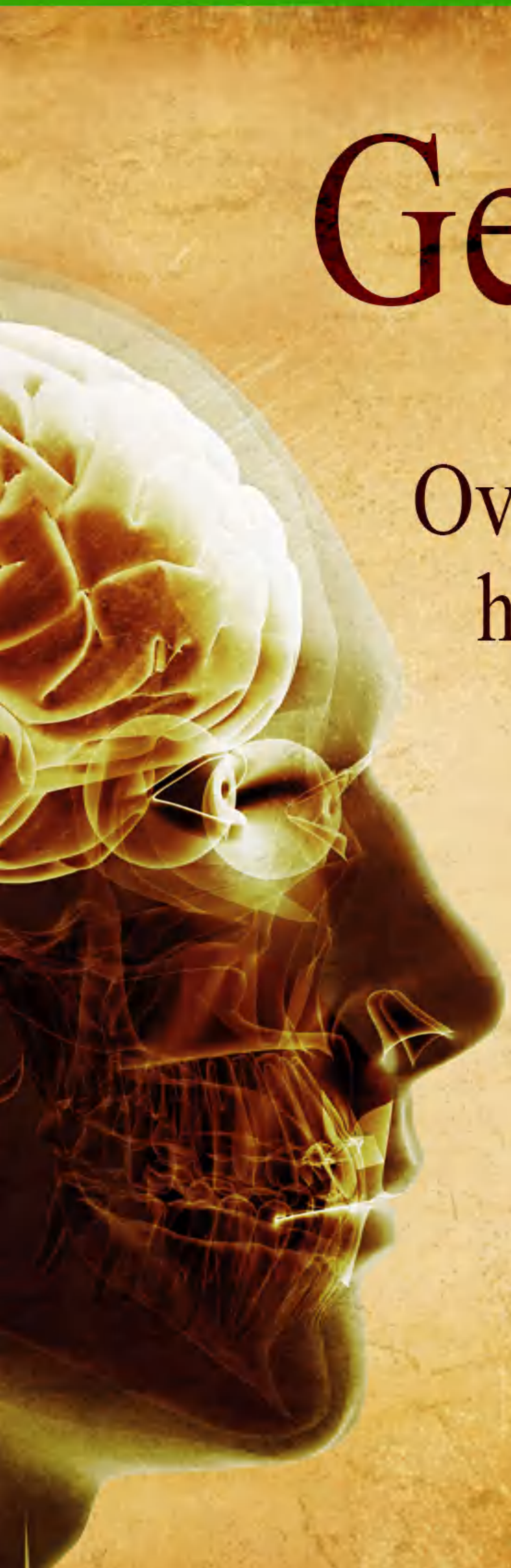
TINCTURÆ FERRI CHLORIDI—By mixing Solution of Ferric Chloride, 25 parts; Alcohol, 75 parts.

What is the Best Solvent for:

Acetanilid.....Alcohol
Alkaloids.....Dilute Acids
Arsenous Acid...Boiling Water, Hydrochloric Acid
Benzoin.....Alcohol
Boric Acid.....Glycerin and Hot Water
Camphor.....Alcohol
Corrosive Sublimate.....Alcohol
Gum Resins.....Alcohol
Gums.....Water
Gun Cotton.....Acetic Ether
Gutta Percha.....Chloroform
Ichthyol.....Alcohol and Ether
Iodine.....Alcohol
Iodoform.....Ether
Myrrh.....Alcohol
Phosphorus.....Ether and Fatty Oils
Pyoktanin.....Alcohol
Quinine.....Dilute Acids
Resins.....Alcohol
Phenacetine.....Alcohol
Phosphorus.....Ether
Strychnia.....Dilute Acids
Sulfonal.....Alcohol and Ether
Sulphur.....Bisulphide of Carbon
Tannic Acid.....Glycerin
Tartar Emetic.....Boiling Water
Tolu.....Alcohol
Urethan.....Water

What is the Active Principle of:

Aloes.....Aloinum
Aconite.....Aconitine
Belladonna.....Atropine



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Absolute Acid in Acid Hydrochloric Dilute
.....10 per cent
Absolute Acid in Acid Hypophosphorosum
Dilute.....10 per cent
Absolute Acid in Acidum Hydrobromicum
Dilute .....10 per cent
Absolute Acid in Acidum Lactitum.....75 per cent
Absolute Acid in Acid Nitric Dilute....10 per cent
Absolute Acid in Acid Nitric.....68 per cent
Absolute Acid in Acid Phosphoric Dilute
.....10 per cent
Absolute Acid in Acid Sulphuric.....92.5 per cent
Absolute Acid in Acid Sulphuric Dilute.10 per cent
Absolute Acid in Acid Sulphurous.....6.4 per cent
Aconite in Tincture Aconite.....35 per cent
Alcohol in Official Wines.....10 to 12 per cent
Alcohol in Spirits Frumenti:
44 to 50 per cent. by weight
50 to 58 per cent. by volume
Ammonia in Aqua Ammonia.....10 per cent
Ammonia in Aqua Ammonia Fortior....28 per cent
Ammonia in Spirits of Ammonia.....10 per cent
Arsenic in Solution of Chloride of Arsenic.1 per cent
Arsenious Acid in Fowler's Solution.....1 per cent
Calcium Hydrate in Lime Water.....0.17 per cent
Chlorine in Aqua Chlori.....0.4 per cent
Ethyl Oxide in Ether.....96 per cent
Ferrous Iodide in Syrupus Ferri Iodidi..10 per cent
Iodide of Arsenic and Biniodide of Mercury
in Donovan's Solution.....1 per cent. each
Iodine in Tincture of Iodine.....7 per cent
Mercury in Blue Mass.....33 per cent
Mercury in Blue Ointment.....50 per cent
Mercury in Mercury with Chalk.....38 per cent
Morphia in Liquor Morphia.....
.....About 0.2 per cent., or 1 gr. to 1 oz

Morphia in Magendie's Solution.....3⅓ per cent
Morphia in Pulvis Opii.....13 to 15 per cent
Morphia in Tully's Powder.....1.6, or 1 in 60 parts
Morphine in Gum Opium.....9 per cent
Morphine in Tincture Opii.....1.3 to 1.5 per cent
Opium in Acetum Opii.....10 per cent
Opium in Dover's Powder.....10 per cent
Opium in Tincture Opii.....10 per cent
Opium in Tincture Opii Camphorata..⅖ of 1 per cent
Opium in Tincture Opii Deod.....10 per cent
Oxygen in Potassium Chlorate.....39.1 per cent
Oxygen in Water.....88.87 per cent
Quinine in Ferri et Quininæ Citras.....12 per cent
Strychninæ in Ferri et Strychninæ Citras..1 per cent

POISONS AND ANTIDOTES.

There are three classes ot poison, viz.: Irritants, which produce irritation and inflammation in the stomach.

Narcotics, which affect the brain and spinal cord, produce headache, giddiness and insensibility.

Narcotic Irritants, having the double action.

In cases of poisoning by alkalies give vinegar, oil and milk freely and produce vomiting.

For acids, give chalk, soda, lime water and demulcent drinks of flax-seed or slippery elm, then a prompt emetic.

In all ordinary cases of poisoning (unless by strong acids or alkalies), first give an emetic, fifteen grains of Sulphate of Zinc. If not at hand, give a tablespoonful of ground mustard in a glass of water. Repeat this every few minutes until the stomach is emptied. Then follow with white of eggs, milk, or chemical antidote as given below.

Acid, Carbolic—The best antidote is a mixture of olive oil and castor oil, freely administered, or a mixture of slacked lime with about three times its weight of sugar rubbed together with a little water.

Atropia.....Coffee, Tannin

Aconite.....Whisky and prompt Emetics

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bonate of Ammonia internally, small doses of Chloride of Lime or Soda. The chemical antidote is moist Peroxide of Iron.

Paris Green.....See Arsenic

Silver Nitrate.....Common Salt

Strychnine—Chloral Hydrate, 10 grains every 15 minutes; Ether and Opium.

Sugar of Lead.....Epsom Salts, Lemonade

Sulphuric Acid—Carbonate of Soda, Lime and Magnesia. Water must not be given.

INCOMPATIBILITY.

Incompatibility is divided into three classes, viz.: Therapeutical, Chemical, and Pharmaceutical.

Substances are said to be therapeutically incompatible when their actions on the human system are mutually antagonistic. With this class, however, the pharmacist has very little to do.

Chemical incompatibility is where the substances brought into contact react on each other in such a way as to form one or more entirely different compounds. Many prescriptions, however, which are therapeutically correct, would come under this head; for example, lime water and calomel, or sulphate of zinc and acetate of lead. These are prescriptions in which the chemical reaction between the ingredients is understood and intended, but what the pharmacist must guard against are those chemical reactions between the ingredients of prescriptions which form new and poisonous compounds, and have been overlooked by the physician.

Pharmaceutical incompatibility is where two or more substances, when mixed, react on each in such

a way as to throw each other out of solution, causing precipitates or a disagreeable looking or tasting mixture.

The incompatibility of drugs is governed in the majority of cases by a few simple rules, which we will give below.

1st. In mixing any salt with strong acids, decomposition is very apt to take place.

2d. Alkalies should never be mixed with salts of the metals proper. Decomposition takes place, and their bases are precipitated.

3d. Vegetable astringents precipitate albumen, gelatine, vegetable alkalies, and numerous metallic oxides, and with salts of iron produce inky solutions.

4th. Glucosides should not be mixed with free acids.

5th. Double decomposition will not occur between solutions of two salts, unless, by the interchange of the two basylous radicals a substance will be produced which is either insoluble or volatile.

6th. When a solution of a compound is brought in contact with a solution of another compound, and by interchange of radicals, an insoluble compound will be rendered **possible** that compound **will** be precipitated.

Below we give a list of the volatiles, and soluble and insoluble salts. When these are thoroughly learned one can readily see where double decomposition will occur.

Volatiles.—The volatile substances are H_2O—CO_2—H_2S, Hcy—HI—HBr—HCl—HNO_3—NH_3 and HNO_3.

Insoluble Salts.—All Hydrates, Carbonates, Phosphates, Oxides, Sulphides, Arsenates, Arsenites,

Borates, Tanates and Silicates, except those of Sodium, Potassium and Ammonium, are insoluble.

Soluble Salts.—All the compounds of Sodium, Potassium and Ammonium. All Nitrates, Acetates, Chlorates, Permanganates, Lactates and Hypophosphites are soluble.

All Bromides, Chlorides and Iodides, except those of Mercury, Silver and Lead (the $Hg\ Cl_2^{\bullet}$ is, however, soluble). All sulphates, except those of Barium, Calcium and Lead.

Incompatibles.—Comp. infusion of cinchona with comp. infusion gentian.

Essential oils with aqueous liquids in quantities exceeding one drop to one fluid ounce.

Fixed oils and copaiba, with aqueous liquids, except with excipients.

Spirit of nitrous ether with strong mucilages.

Infusion, generally, with metallic salts.

Compound infusion of gentian with infusion of wild cherry.

The salts of most alkaloids with alkaline solutions.

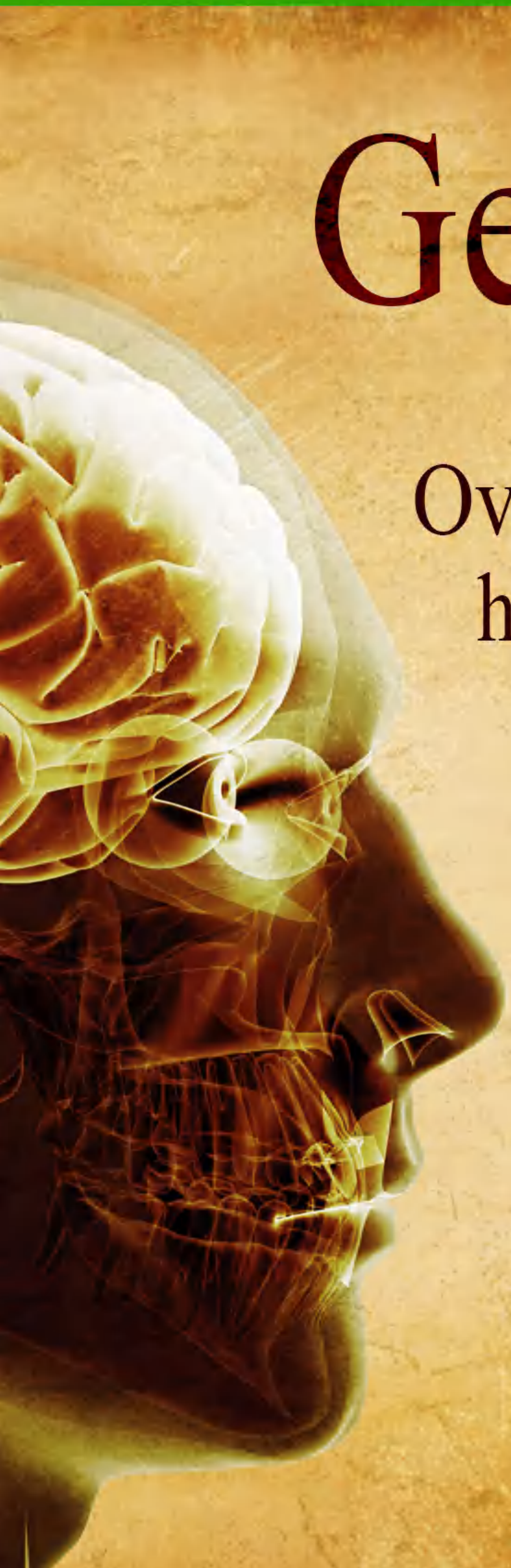
Tinctures made with strong alcohol with those made with weak alcohol.

Tinctures made with strong alcohol, with infusions and aqueous liquids.

Iodides yield precipitates with the alkaloids.

Bromides precipitate morphine and strychnine salts on standing, but the addition of a few drops of dilute hydrochloric acid prevents the change.

Attention is called to the danger of simultaneously prescribing in one and the same mixture potassium iodide and potassium chlorate. When this mixture comes in contact with the acids of the gastric juice, iodine is liberated, which, in its turn, acts upon the



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Lead Acetate	Acacia; Acid Hydrochlor; Acid Sulphuric and Sulphates; Ammon, Chloride; Carbonates; Lime water; Iodine; Potassium Iodide; Tannin.
Mercury Bichloride	Potassium Iodide; Salts; Carbonates; Tannin.
Mild Chloride (Calomel).	Acids; Acid Salts; Alkalies; Carbonates; Ammon. Chloride; Iodine, Potassium Iodide; Iron Chloride; Iodide; Sulphur.
Potassium Chlorate	Calomel; Organic Substances; Sulphur.
Iodide	Lead and Mercury Salts; Potassium Chlorate; Silver Nitrate; Chlorine Water.
Permanganate.	Ammonia Salts; Alcohol, Glycerin; Ethereal Oils, Organic substances.
Bromide	Acids; Minerals; Chlorine Water; Mercury Compounds.
Silver Nitrate	Acids, Acetic, Hydrochloric, Hydrocyanic, Sulphuric, Tartaric, and their Salts; Alkalies; Carbonates, Iodine; Potass. Iodide; Bromide; Sulphur.

Antipyrin, Its Incompatibilities.

Acid carbolic, strong solutions, a precipitate.
Acid hydrocyanic dilute, yellow coloration.
Acid nitric dilute, faint yellow coloration.
Acid tannic, insoluble white precipitate.
Amyl nitrite (acid), green coloration.

Chloral hydrate, strong solution gave a precipitate, with weak solution no apparent change.

Extract (fluid) of cinchona bark, precipitate.

Iron sulphate, brownish yellow coloration, deposit on standing, solution turns red.

Mercury perchloride, white precipitate, soluble in excess of water.

Solution of arsenic and mercury iodides, dense white precipitate.

Solution of iron, perchloride, blood red coloration.

Solution of permanganate of potassium, reduction quickly takes place.

Soda salicylate (solid), becomes liquid.

Spirit nitres ether (acid), green coloration.

Syrup of iodide of iron, reddish brown coloration.

Calomel, a poisonous compound.

Beta-naphthol, forms a moist mixture.

EXPLOSIVE SUBSTANCES.

Below are given most of the substances and compounds which are liable to produce explosions:

Potassium Chlorate, and in fact all other Chlorates, should never be dispensed with organic, combustible or oxidizable bodies.

A mixture of Hypophosphite of Lime, Chlorate of Potassium, and Lactate of Iron exploded, and nearly killed the prescription clerk who was compounding it.

Even the simple trituration of Calcium Hypophosphite is dangerous. Physicians not infrequently order a solution of Chromic Acid in Glycerin. But when the acid is added quickly and all at once to the glycerin, a readily explosive substance like

nitro-glycerin is formed. Chlorate of Potassium when mixed with tannin or muriate of morphia, often explodes. The combination of iodine and preparations of ammonia must be made cautiously, as iodide of nitrogen is formed, which explodes on the slightest touch. Indeed, one ought to be very careful in ordering and compounding mixtures in which easily reducible substances enter, such as the chlorates, the hypophosphites, the nitrates, preparations of iodine or ammonia; chromic acid glycerin, permanganate of potash, etc.

OXIDIZING AGENTS, such as *nitric*, *hydrochloric*, *nitro-hydrochloric*, *picric*, and *chromic acids*, and *potassium bichromate* and *permanganate*, *with readily oxidizable substances*, *such as carbohydrates*, *alcohols*, *ethers*, *sulphur*, *phosphorus*, *sulphides*, *and organic matter in general*, from explosive compounds.

Mixtures that give off gas should not be corked until the evolution of gas is over.

The following substances are liable to explode when triturated alone in a mortar:

Antimony Fulminate,
Copper Fulminate,
Copper Nitrate Dry,
Hydrogen Chloride,
Mercury Fulminate,
Mercury Nitric Oxide,
Nitrogen Chloride,
Potassium Chlorate.

Substances which explode when mixed and triturated with other substances:

℞.

Argenti Oxide,
Morphia Muriate,
Extract Gentian,

M. This mixture has exploded.

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℞.

Potassa Chlorate,
Sodii (or Calcii) Hypophosphite, Aqua.

M. Dissolve the two salts separately or an explosion will occur.

℞..

Potassa Permanganate,
Glycerin.

M. This is almost sure to cause an explosion.

℞.

Acid Nitric,
Acid Muriatic,
Tr. Nux Vomica.

M. Exploded in about two hours.

PRESCRIPTIONS.

A prescription (Latin *præ*, before, and *scribere*, to write) consists of five parts.

The Superscription—Consisting of a single sign, ℞., an abbreviation for recipe, meaning take thou. In French prescriptions the letter P., or the word Prenez, meaning take, is used for the superscription.

The Inscription—Or body of the prescription containing the names and quantities of the drugs.

The Subscription.—Or directions to the dispenser.

The Signature.—Or directions to the patient or nurse, usually headed by Signa or simply S.; and lastly the prescriber's name and the date.

The names of the ingredients themselves are written in the genitive case. Where a liquid preparation is to be made the words Mistura fiat, are used, mean-

ing make a mixture, or simply Misce, "mix thou." When powders or pills are to be made Misce et fiant pulveres, or pilulæ is written, meaning, Mix and let there be made powders or pills. Or for pills may be written, Fiat massa et dividenda (make a mass and divide.)

Upon receiving a prescription always write patient's name upon it at once.

Avoid, as far as possible, telling your customer what ingredients the prescription contains, or discussing its virtues.

Read the entire prescription before beginning to prepare the medicine.

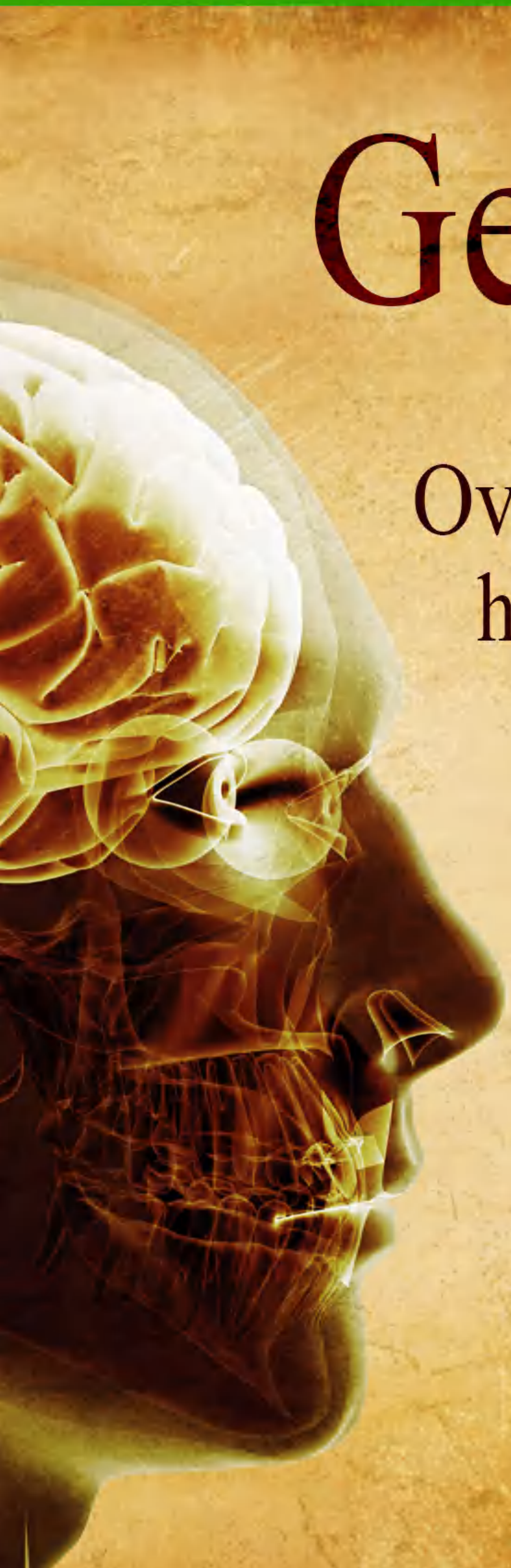
If the name of any ingredient is obscure or doubtful, one is often assisted in determining it by referring to the quantity ordered and the other ingredients.

Where the quantity ordered is in doubt refer to the dose of the drug.

Never alter a physician's prescription at the suggestion of the patient, "to make it a little stronger."

QUANTITIES NOT TO BE EXCEEDED IN PRESCRIPTIONS WITHOUT CAUTION MARK (!) TO INDICATE THAT THE DOSE IS AN UNUSUAL ONE.

ARTICLES.	SINGLE DOSES.	AGGREGATE IN ONE DAY.
Acid, Arsenious	1-6 gr.	½ gr.
Acid, Hydrocyanic, Diluted	10 minims.	30 minims.
Acid, Nitro-muriatic	5 minims.	30 minims.
Aconite Leaf, Extract of	1½ grs.	10 grs.
Aconite Root, Fluid Extract of	5 minims.	15 minims.
Aconite Root, Tincture of	6 minims.	15 minims.
Aconitine and its Salts	1-50 gr.	1-10 gr.
Antimony and Potassium, Tartrate of	2 grs.	
Arseniate of Sodium	⅓ gr.	1 gr.
Arsenic, Solution of Chloride of	6 minims.	15 minims.
Arsenic, Iodide of	1-6 gr.	½ gr.
Arsenic and Mercury, Solution of Iodides of	20 minims.	60 minims.
Arsenite of Potassium, Solution of	15 minims.	45 minims.
Atropine and its Salts	1-60 gr.	1-20 gr.
Belladonna, Extract of	1 gr.	5 grs.
Calabar Bean, Extract of	¼ gr.	1 gr.
Codeine	2 grs.	1-20 gr.
Conium, Extract of	2 grs.	8 grs.
Croton Oil	2 minims.	
Cyanide of Potassium	¼ gr.	1 gr.
Digitalin	1-50 gr.	1-20 gr.
Digitalis, Extract of	⅓ gr.	1 gr.
Hyoscyamus, Extract of	3 grs.	10 grs.
Ignatia, Extract of	3 grs.	10 grs.
Indian Cannabis, Extract of	1 gr.	5 grs.
Mercury, Corrosive Chloride of	¼ gr.	¾ gr.
Mercury, Iodide of, Red	1-6 gr.	1 gr.
Mercury, Iodide of, Yellow	½ gr.	3 grs.
Morphine and its Salts	½ gr.	2 grs.
Nux Vomica, Extract of	2 grs.	8 grs.
Opium	2 grs.	10 grs.
Opium, Extract of	1 gr.	4 grs.
Opium, Tincture of	30 minims.	120 minims.
Phosphorus	1-5 gr.	½ gr.
Stramonium Leaves, Extract of	2 grs.	5 grs.
Strychnine and its Salts	1-12 gr.	¼ gr.



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℞ Potas. chloras ..... ℥ ij.
Acid. tannic ..... ʒ ss.
M. fiat. pulvis. Sig. Use as directed.

Criticise this prescription:

℞ Tr. guaiac ammon..... ℥ j.
Aq. mentha. pip ..... ℥ iij.
M. Sig.: A tablespoonful three times a day.

Copy this prescription and change the weights into grains:

℞ Ext. aloes aq ..... 2.
Hydrarg. chloridi mit ..... 75.
Resin. jalapæ.....125.
Misce. ft. pil. No. XII.

Criticise this prescription: How would you compound it? What would be its appearance when finished?

℞ Strychniæ sulphatis.....grs. xxx.
Ext. glycyrrhiz. fld..... ʒ j.
Acid. sulph. aromat..... ʒ iv.
Syr. prun. virg..... ℥ ij.
Aquæ.....q. s. ft. ℥ vj.
Misce.
Sig.: A teaspoonful thrice daily.

Write a prescription, using metric weights, for 16 pills, each pill to contain about 1 grain of mass. hydrarg., ¼ grain res. podophylli, and 2½ grains of mass. ferri. carb.

Criticise this prescription: What difficulties are likely to occur, and what precautions would you take to avoid them?

℞ Liquor ammonii acetatis ..... ℥ iv.
Acid. aceticum ..... ʒ j.
Tinct. ferri. chloridi..... ℥ ss.
Glycerin..... ℥ ss.
Mucilaginis acaciæ.....ad. ʒ viij.
Misce.

Sig.: A teaspoonful every three hours.

Criticise the following prescription:

℞ Morph. sulph.....grs. ii.
Cocaine mur.....grs. ii.
Acidi tannici.....grs. iv.
Aquæ camph.
Aquæ dest.....*aa* ʒ i

M. S. Use one or two drops in eye every two hours.

Criticise this prescription: Why should it be freshly prepared?

℞ Mistura potass. citrat..... ℥ iv.
Spts. æther. nitros.
Syrupi ..... aa ℥ ss.
Tinct. aconit. rad..... ℥ j.
Misce.

Sig.: Give a tablespoonful three times daily.

Is this prescription proper or improper? Give your reasons in either case.

℞ Hyd. chlor. mite..... ʒ ss.
Pot. iod ..... ʒ j.
Taraxaci ext..... ʒ ss.
Glycyrrh. pulv..... q. s.

M. fiat. pil. no. xl. Sig.: One pill morning and evening.

Construct a formula for an emulsion containing one fluid ounce of turpentine, to be administered internally.

What will this prescription form after being made? Give your process of preparing it.

℞ Cod liver oil..... ℥ viij.
Pulv. gum arabic..... ℥ ij.
Simp. syrup..... ℥ ij.
Oil bitter almonds.....gtt. x.
Aqua destil .....q. s. Oj.

M.

How would you prepare the following prescription?

℞ Gum camphor ..... gr. xx.
Chloral hydrate..... gr. xvi.
Morphia sulphate..... gr. ii.
Oleum theobromæ.....ʒ ii :div. in suppos.
No. x.

Is this prescription incomplete? Describe the result in preparing it.

℞ Carb. ammon.....gr. xxx.
Pulv. ipecac.....gr. xl.
Syr. scillæ..... ℥ ij.
Syr. pruni virg..... ℥ ij.
M. Sig.: Dose, a teaspoonful.

For fac-similes of obscure prescriptions illustrating the difficulties experienced in reading and compounding them, and a general treatise on reading and compounding physicians's prescriptions, see *Gray's Prescriptionist.*

Synonymous Names of Common Drugs.

Acetylphenylamine, Acetanilid, Antifebrin.
Adeps Ovillus, mutton-suet.
Antipyrin, Analgesine, Anodynine, Metosin.
Acid Carbolic, Phenic Acid, Phenol.
Acid Citric, Acid of lemons.
Acid Hydrochloric, Muriatic Acid, Spirit of Salt.
Acid Nitric, Aqua Fortis.
Acid Nitro-Hydrochloric, Acid Nitro-Muriatic, Aqua Regia.
Acid Oxalic, Acid of Sugar.
Acid Sulphuric, Oil of Vitriol, Spirit of Vitriol.
Alcohol, Rectified Spirit, Spirit of Wine.

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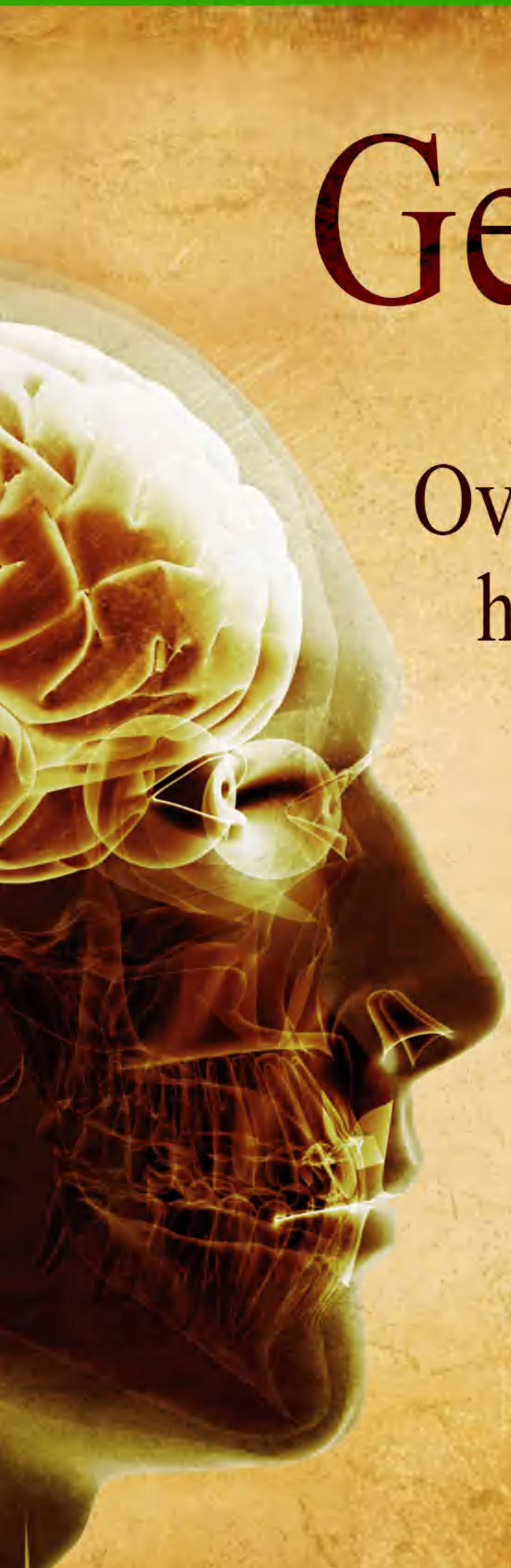
Ergot, Spurred Rye, Smut Rye.
Flowers of Sulphur, Sublimed Sulphur.
Flowers of Zinc, Oxide of Zinc.
Gelatine, Isinglass, Fish Glue.
Glycerin, Oil of Soap.
Graphite, Plumbago, Black Lead.
Gypsum, Plaster of Paris, Calcined Plaster, Dentist's Plaster.
Iron and Ammonium, Sulphrate of, Iron Alum, Flores Martiales.
Iron, Oxide of, Crocus Martis, Rouge, Colcothar.
Iron, Persulphate of, Monsel's Salt.
Iron, Persulphate of, Solution, Monsel's Solution.
Iron, Sulphate of, Copperas, Green Vitriol, Vitriol, Vitriol of Mars, Sal Martis.
Iron by Hydrogen, Reduced Iron, Quevenne's Iron.
Labarraque's Solution, Solution of Chlorinated Soda.
Loofah (Vegetable Sponge), the skeleton of a Gourd.
Lac Sulphur, Precipitated Sulphur.
Lead, Acetate of, Sugar of Lead, Sal Saturni.
Lead, Liquor, Sub Acetate of, Goulard's Extract.
Lead, Semivitrified Oxide of, Litharge.
Lunar Caustic, Nitrate of Silver, in sticks.
Magnesia, Solution, Citrate of, Purging Lemonade.
Magnesia, Sulphate of, Epsom Salts, Bitter Salts, Sal Amarum, Physical Salt.
Mercury, Ammoniated, White Precipitate.
Mercury, Red Oxide of, Red Precipitate.
Mercury, Black Sulphuret of, Black Precipitate, Ethiop's Mineral.
Mercury, Red, Sulphuret of, Cinnabar.
Mercury, Yellow Sulphate of, Turpeth Mineral Queen's Yellow.

Mercury with chalk, Gray Powder.
Mercury Pill Mass, Blue Mass, Blue Pill.
Muriate of Tin, Solution, Madder Compound.
Cochineal Compound, Tin Mordant.
Nux Vomica, Dog Button.
Ointment Nitrate of Mercury, Citrine Ointment, Yellow Ointment.
Opium, Thebaicum.
Opodeldoc, Soap Liniment.
Olibanum, Incense, Frankincense.
Potassium, Binoxalate of, Acetoselle, Salts of Lemon, Salts of Sorrel.
Potassium, Carbonate of, Sal Tartar, Salt of Wormwood.
Potassium, Nitrate of, Saltpetre, Sal Nitre.
Potassium, Nitrate of, Fused, Sal Prunella.
Potassium, Sulphuret of, Liver of Sulphur.
Poke, Garget.
Powder of Aloes and Canella, Hiera Picra.
Powder of Ipecac and Opium, Dover's Powder.
Snakeroot, Canada, Wild Ginger.
Soda, Bi-Carbonate of, Baking Soda.
Soda, Carbonate of, Sal Soda, Washing Soda.
Soda, Sulphate of, Glauber's Salts, Horse Salts.
Syrup Squills, Compound, Hive Syrup.
Syrup of Phosphates Compound, Chemical Food.
Tincture Opium, Tincture Thebaica, Laudanum.
Tincture Opium Camphorated, Tincture Camphor Compound, Paregoric, Elixir Paregoric.
Treacle, Theriaca, Molasses.
Yellow Root, Hydrastis, Golden Seal, Yellow Puccoon.
Zinc, Sulphate of, White Vitriol.
Zinc Flowers, Zinc Oxide.
Zootic Acid, Prussic Acid.

SPECIMENS.

It is customary at examinations in pharmacy to place before the student specimens of different drugs and chemicals to be identified. As the ability to identify drugs and chemicals is an important feature in the education of a pharmacist, we advise you to accustom yourself to recognize at sight the more common articles handled in the stores. Below we give a list of the specimens generally placed before the student for identification.

Acetanilidum,
Acidum Aceticum,
Acidum Benzoicum,
Acidum Boricum,
Acidum Carbolicum,
Acidum Citricum,
Acidum Gallicum,
Acidum Salicylicum,
Acidum Tannicum,
Aloe,
Alumen,
Anisum,
Anthemis,
Arnicæ Flores,
Asafœtida,
Balsamum Tolutanum,
Belladonnæ Folia,
Calumba,
Cambogia,
Camphora,
Cantharis,
Cardamomum,
Carum,
Caryophyllus,
Cascarilla,
Catechu,
Cera Alba,
Cetaceum,
Chloral,
Chondrus,
Cimicifuga,
Cinchona Flava,
Cinchona Rubra,
Coccus,
Crocus,
Cubeba,
Ergota,
Ferri Sulphas,
Ferri Sulphas Exsiccatus,
Ferrum Reductum,
Fœniculum,
Galla,
Gentiana,
Glycerinum,
Guaiaci Resina,
Humulus,
Hydrastis,
Illicium,



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NEW REMEDIES.

The following brief notes may serve as a ready reference:

ACETPARAPHENETTIDIN.—Phenactine.

ACID DI-IODSALICYLIC.—White powder, slightly soluble in water, readily in alcohol. Dose, twenty to sixty grains per day.

AMYLENE HYDRATE.—A clear, colorless liquid, insoluble in water, soluble in alcohol and ether. Its use is as a hypnotic. Dose, one-half to one drachm in gelatine capsules.

AGARICINE.—An acid principle derived from white agaric, used with success for excessive perspiration in phthisis. It is a white, amorphous, or white, silky, crystalline powder, little soluble in cold water; soluble in hot water to a turbid, strongly foaming liquid which reddens litmus. Soluble in 130 parts cold and ten parts hot alcohol, easily in hot acetic acid and caustic alkalies. Best administered with Dover's powder, in powder or pills. Dose, one-tenth to one-sixth grain.

ANTHRAROBINE.—A synthetical product used in place of chysarobine in treatment of psoriasis, herpes and other skin diseases. It is a pale, yellowish powder soluble in ten parts hot glycerin, ten parts cold and five parts hot alcohol, insoluble in water.

Acid, Camphonic.—White needles of sour taste, odorless, soluble in alcohol and ether. Antiseptic and astringent. Dose, two grains.

Antisepsin.—A white powder used as dusting powder or in ointments or lotion.

Antiseptin.—A white powder which forms a clear solution with water, used as dusting powder, lotion and in ointment.

Antipyrine.—Febrifuge, soporific, etc., readily soluble in water and alcohol. Dose, five to thirty grains in pills with tragacanth paste, or in solution.

Aseptol (Sozolic Acid).—A thick fluid of a reddish color, soluble in water, alcohol and glycerin; used externally as an antiseptic. Usually dispensed in aqueous solution, one part to twenty or thirty of water.

Aristol.—A brownish-red odorless powder, slightly soluble in alcohol, soluble in chloroform and ether. Used in treatment of skin diseases.

Bromoform.—Colorless liquid of an agreeable taste and odor, soluble in alcohol, used in whooping-cough. Dose, one-half to two drops in solution.

Betol.—Brilliant crystals, insoluble in water, soluble in alcohol and fixed oils. It is a remedy for rheumatism. Dose, fifteen to thirty grains in powder or pill. Also made into bougies with cacao butter (sixteen grains of the butter and four grains betol).

Bismuth Sub-gallate.—Also called Dermatol.

Bismuth Subiodide.—This salt occurs as a bright red powder of micro-crystalline structure, not soluble in any reagent without decomposition. It was recommended first by Lister, later by Reynold, for its antiseptic virtues as an application to indolent sores, purulent wounds, etc. Suspended in water

(1 per cent.) it forms a valuable injection for gonorrhœa; mixed with sugar and administered in doses of three to five grains, it has proven of incalculable benefit in typhoid fever and gastric ulcer.

BROMETHYL (BROMIDE OF ETHYL).—A colorless fluid, volatile, odor like chloroform. Should have a sup. gr. of 1.390 if pure. It is used as an anæsthetic like chloroform.

CAMPHOR DIBROMATED.—Properties same as those of camphor monobromated.

COCAINE.—Local anæsthetic. Dose one-tenth to one and two grains. Solutions best preserved with glycerin. Added with advantage to solutions of corrosive chloride for hypodermic use to deaden pain. Amyl nitrate is an efficient antidote in poisoning by cocaine.

CHLORALAMIDE.—A new hypnotic, said to be more effectual and cheaper than sulfonal. Given in twenty to forty grain doses. It is best to dissolve it in a little brandy and add water according to liking. Its effect is shown in from fifteen minutes to one hour, if given in solution. Given in solid form may not act for many hours.

CISTENE.—A light amber colored liquid of an aromatic odor and a pleasant pungent taste. Antiseptic, prophylactic, used as an injection, gargle or lotion, and as a dressing for wounds, abscesses and ulcers. Internally, to control fermentation and disinfect the stomach; dose, one teaspoonful three times daily.

COLOCYNTHINE.—The glucoside of colocynth, soluble in water and alcohol. Dose, internally, one to five grains as a purgative, hypodermically, one-sixth to one-third grain dissolved in water.

COTOINE.—The solution in acetic ether used hypo-

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antipyretic. It is given in doses of fifteen grains, repeated every hour until the temperature is reduced to the desired point. Friends to its use state that it produces no disagreeable heart troubles.

HYPNONE (ACETO-PHENONE).—Colorless fluid sparingly soluble in water, more so in alcohol. Used as a hypnotic in doses of from three to eight minims. Because of its somewhat caustic effect upon the mucous membrane, it is best dispensed in gelatine capsules, each containing one minim hypnone dissolved in nine of almond oil.

HYDROXYLAMINE HYDROCHLORATE.—This ammonia derivative occurs in colorless crystals of a saline taste, and is readily soluble in water, also in alcohol and glycerin. It is a very powerful reducing agent, and for this reason was utilized by chemists and photographers long before it was suggested for remedial purposes. It was recommended by Binz as a substitute for pyrogallic acid, chyrsarobin, chrysophanic acid and anthrarobin, over all of which it possesses the advantage of not soiling the patient's clothing. It has been used especially in the treatment of psoriasis. As it is very liable to be absorbed through the cutaneous structure and cause symptoms of toxicity, it is preferable not to apply the remedy to but limited spaces at a time.

ICHTHYOL.—Ammonium sulphichthyolate and sodium sulphichthyolate are both known, according to Dr. Unna, under the name ichthyol. Their action is precisely alike, the latter, owing to its density, being dispensed when pills are prescribed, the former in ointments. They are dark brown, of a fetid odor, soluble in alcohol and ether. Employed internally in doses of 5 to 20 drops against lupus, angina, asthma, diabetes, etc.; externally in unguental form,

IODOFORM BITUMINATE.—This is a preparation of iodoform recently introduced by Dr. Ehrmann, of the Vienna clinic. It occurs in brownish micaceous scales, which can be readily powdered, or as a brown powder, and is destitute of any iodoformic odor, retaining but a slight odor of tar. It may be used in all cases where iodoform is indicated.

IODOL.—A pale yellowish-brown powder, used as a substitute for iodoform. It is insoluble in water, but soluble in alcohol and fixed oils. Also given internally for same purposes as iodide of potassium is given for, in doses of one or two grains.

LORETIN.—Is a newly proposed substitute for iodoform. It has the properties of an acidulous substance, combining with metallic bases. In chemical constitution it is meta iodo-ortho-chinoline sulphonate. In appearance it is very similar to iodoform, but is odorless. It is said to act well as a dusting powder employed mixed with magnesia.

MERCURY CARBOLATE.—This occurs in colorless crystals, very slightly soluble in water and alcohol.

It was introduced against syphilitic affections, being claimed to be safer than other mercurials.

The dose is one-fourth to one-half grain.

MUSIN.—Name given to an aperient medicine recently introduced by Strohschein, of Berlin, said to be made from tamarinds. It is a liquid.

MERCURY SALICYLATE.—First introduced in the medical profession in 1881, it has of late years found a gradually increasing field of application and usefulness. Naturally it has found its greatest field of usefulness in syphilitic cases; internally, as an injection, and as a collyrium. For topical application it is mixed with vaseline, 10 to 30 grains to one ounce of vaseline. Internally it is given in pill form in

doses of 1-5 grain three or four times a day. It has found a wide application in the diseases of the eye.

METHYLAL—An ethereal colorless liquid, readily soluble in water, alcohol and fixed oils. As a hypnotic, fifteen to thirty minims. Externally, as a local anæsthetic in form of ointment or liniment, both of which should be dispensed in tightly-stoppered vessels, owing to the extremely volatile nature of methylal.

MOLLIN—An eleo-saponaceous ointment base, white, of the consistency of lard; does not melt even in the warmest climate. It may be easily washed off the skin, whether in its pure state or mixed with ichthyol, Peruvian balsam and the like.

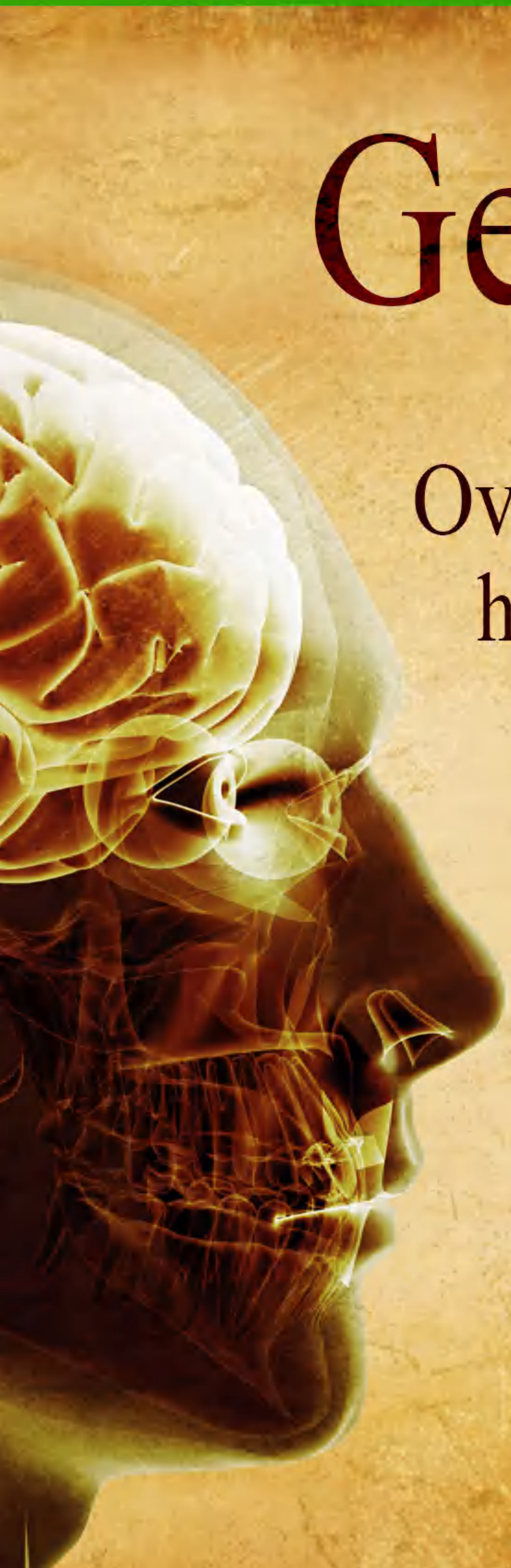
NAPHTHALINE—Colorless crystals possessing odor of coal gas, insoluble in water, sparingly soluble in alcohol and fixed oils, but readily soluble if heated with these solvents. Used internally for typhoid fever, dose two to eight grains, and externally in skin diseases; also used to destroy moths and other small insects.

NAPHTHOLE—Occurs in crystalline scales, insoluble in water, soluble in alcohol and fixed oils.

Used externally as ointment or alcoholic solution in treatment of skin diseases. The ointment is made by dissolving the naphthole in the melted base, one in twenty or one in ten, the stronger being especially beneficial in itch. The solution (one in forty) is used as an antiseptic wash for the skin.

PHENACETINE.—White crystalline powder, nearly insoluble in water, soluble in alcohol, perfectly tasteless antipyretic, from three to twenty grains may be given.

PYOKTANIN.—blue---[Powder.—Sol. in 30 *boiling*, 50 *hot*, 75 *cold* W,; 12 of 90 per cent. A. (forming a



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ternally, as an ointment or solution, in treatment of skin diseases and urethral affections.

SACCHARIN.—To make solution, combine it with an alkali, preferably sodic bicarbonate. Acids throw it out of solution.

SALOL.—A salicylate of phenyl, white crystalline powder of aromatic odor and very little taste, insoluble in water, soluble in ten parts alcohol. Dose, ten to twenty-five grains.

STROPHANTHIN.—Yellowish-white powder extremely bitter, soluble in alcohol and water. Dose, 1-60 to 1-30 grain.

SOZOIDOL.—The substance found in commerce under this name is a soda salt of iodoparaphenol sulphonic acid, and is a white crystalline solid. It is a substitute for iodiform, used externally as ointment, or the powder sprinkled on the affected parts.

SULFONAL.—White crystals, practically insoluble in water, more soluble in alcohol and ether. Dose as hypnotic, five to thirty grains one or two hours before bedtime; best given in capsule or in suspension mixture with acacia or tragacanth.

TEREBENE—.Colorless fluid of an aromatic odor, soluble in alcohol. Dose, five to fifteen drops.

TERPINE HYDRATE.—Colorless crystalline, solid, sparingly soluble in cold, more so in hot water and alcohol. Used in bronchitis and chest troubles. Dose, three to ten grains.

TERPINOL.—A colorless, oily liquid, insoluble in water; soluble in either and alcohol. Used similar to those of terpine hydrate. Dose, two grains, best given in capsule, mixed with olive or almond oil. Also may be given in pill form with licorice and glycerite of tragacanth.

THALLINE SULPHATE. Crystalline, colorless solid,

soluble in water; less so in alcohol. Internally, three to eight grains in pills. Gonorrhœa, an injection four to eight grains to an ounce of water.

URETHANE (ETHYL CAMBAMIDE).—White crystals, soluble in water and alcohol. Used as a hypnotic, in doses of fifteen to forty grains in capsule, or a draught.

VELLOSINE.—An alkaloid of pareira bark, recently isolated by Fauvet. It appears as yellowish crystals, insoluble in water, but soluble in ether, chloroform and hot alcohol.

Miscellaneous Questions

—ON—

Pharmacy, Botany and Chemistry.

What is a Pharmacopœia? A book containing a selection of medical substances, with formulas for their preparation. The official ones are all issued under the authority of their respective governments.

When was the first Pharmacopœia of the United States issued? In 1830.

What is Pharmacy? The science of preparing medicines.

What is Therapeutics? The science of applying medicines.

What is Materia Medica? The science which treats of the substances used as medicine.

What term is used to embrace these three divisions? Pharmacology.

What is Pharmacognosy? That branch of the study of medicines which treats of the natural origin, appearance, structure and other means of identification of organic drugs.

What is Toxicology? The science of poisons.

What is Posology? The science of dosage.

What is meant by Microscopy? The use of the microscope.

What is Physics or Natural Philosophy? The science of inorganic matter and its forces.

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ciples exist in the powdered drug, and the effect of the solvent upon them. The soluble principles in the powdered drug exist in a hard and dry condition, and are generally contained in cells which are more or less disintegrated in grinding. The solvent takes up first the principle liberated by grinding, and afterward permeates the cells.

Why does the Pharmacopœia direct previous maceration of the powder before percolation? Because most drugs are not easily extracted by the menstruum, owing to the toughness of the powder, or nature of the desired principles, and maceration secures contact with the solvent for a longer time.

How should a percolator be packed? It should be packed in layers, each succeeding layer being packed according to the directions, "moderately" or "firmly," as the case may be, care being taken to use the same degree of pressure with each layer.

How can it be determined if the drug is exhausted? Only by knowing beforehand what the active principles of the drug are, and testing the percolate, until they are no longer contained therein.

How may recovered distilled alcohol be purified? By treating it with permanganate of potassium (12 grains to the gallon), letting it stand a few days, then decanting or filtering.

What is a Vacuum Pan? A covered evaporating pan, with an air pump, condenser, etc., for removing the pressure of the atmosphere while conducting the process of evaporation.

From what are volatile oils obtained? From plants and animals?

How many classes are they divided into? Four, viz.:

Terpenes, or hydrocarbons, which consist of carbon and hydrogen.

Oxygenated oils, which are hydrocarbons containing oxygen.

Sulphurated oils, containing sulphur.

Nitrogenated oils, which contain nitrogen.

Volatile oils usually consist of two principles, eleopten, a liquid, and stearopten, a solid crystalline body.

What are fixed oils? They usually consist of two or three proximate principles—Olein, Palmitin or Stearin.

Olein constitutes the liquid principle of fixed oils.

Palmitin occurs in the more liquid fats.

Stearin exists in tallow and other animal fats.

How are volatile oils obtained from plants? By Solution, Expression, Distillation with water and Distillation *per se*.

What is the meaning of *per se?* By itself.

What effect does nitric acid have on volatile oils? Strong nitric acid decomposes them.

What effect has iodine upon them? It reacts on some volatile oils with great violence.

What are the effects of exposing volatile oils to light and air? Ozone is developed and they lose their fragrance.

What is Ozone? O_3 an allotropic form of oxygen.

How would you detect fixed oil as an adulterant of volatile oils? A few drops of the oil dropped on white paper is held near the fire and evaporated; pure volatile oils will leave no stain, while the fixed oil will.

What is Amorphism? A term used in chemistry and mineralogy to denote the absence of regular structure in a body. Glass, rosin, albuminous substances, etc., are amorphous.

Name two natural substances which have in them-

selves the two essential elements of an emulsion. Ammoniacum and Asafœtida.

What is BaO_2 and what is its use in pharmacy? Barium Peroxide is used in making Hydrogen Dioxide.

Why is the Latin language selected for the officinal names? Latin being a dead language is not liable to change and is universally used as the language of science.

What are the sources of alcohol and how is it made? Made from corn or other grain containing starch, by mashing, to convert the starch into sugar, fermenting to convert the sugar into alcohol, and distillation to separate the alcoholic liquor, this is the crude whisky from which alcohol is obtained.

What is the active principle of Spt. nitros æther? What per cent. does it contain? About 4 per cent. Ethyl Nitrite.

What is an Anhydrous Salt? One not containing water.

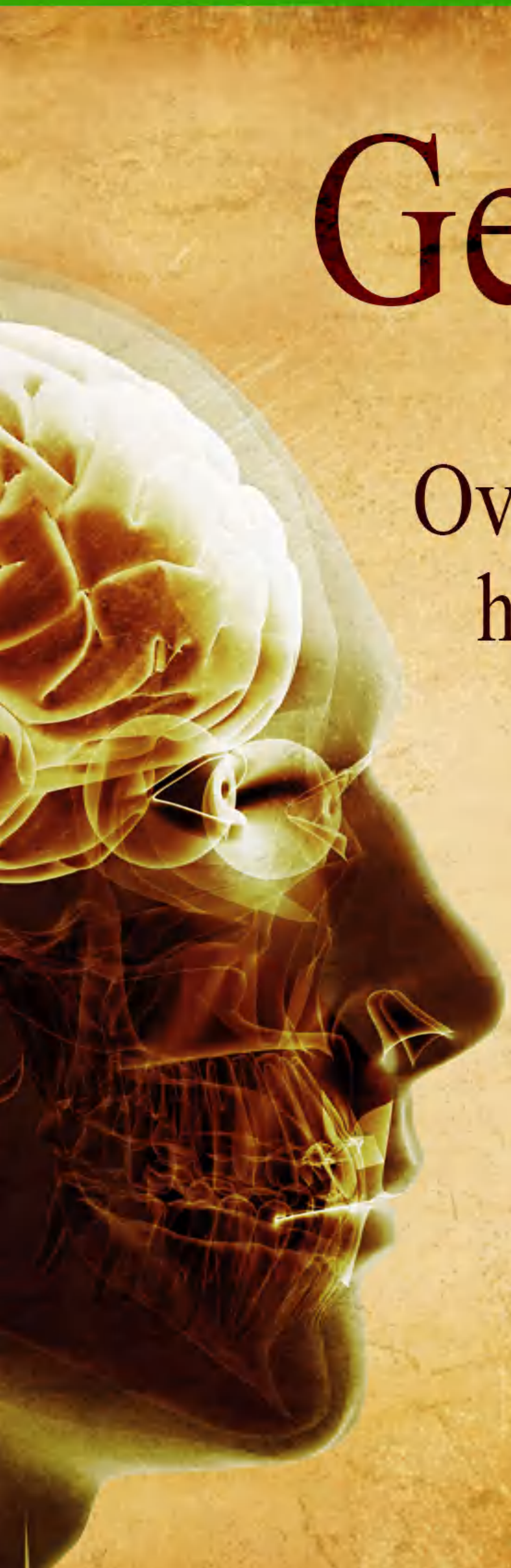
Carbo Lini and Carbo Animalis, How do they differ? Animal charcoal contains a large quantity of calcium salts.

What official preparations are made from Tar, and what official product is obtained by its distillation? Benzol a distillate, also Naphtalin, Naphtol, Carbolic Acid, Resorcin, Salol and Salicylic Acid.

Of what minute organs are all plants composed? Cells.

Define a cell. Its wall is a delicate membrane enclosing a mucilaginous liquid, in which are often some minute grains, and commonly a larger soft mass called its nucleus.

How do cells increase in number? The cell enlarges and divides by a cross partition into two cells, and this process is kept up by the new ones.



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What is Vaporization? The operation of increasing molecular motion by heat until matter assumes the form of vapor or gas.

What is meant by Clarification? The process of separating from liquids, without the use of strainers or filters, solid substances which interfere with their transparency.

Describe the principal methods of Clarification.

By the Application of Heat.—Heat, by diminishing the specific gravity of viscid liquids, permits the precipitation of the heavier particles, the lighter ones rising to the top. Boiling facilitates the separation, as the minute bubbles of steam adhere to the particles, and rise with them to form scum, which may be skimmed off.

Through the use of Albumen.—If albumen be added to the turbid liquid, and heat applied, on coagulating it will envelop the particles, and rise to the top with them. Skimming will remove the scum.

Through the use of Gelatin.—Gelatin will form with tannin an insoluble compound, and where cloudiness is due to the presence of tannin, will clarify the liquid in this way.

Through the use of Milk.—Acids will precipitate the casein of milk. It is used in sour wines, etc., the precipitated casein carrying with it the insoluble particles.

Through the use of Paper Pulp.—Agitate the liquid with the pulp and let it stand till clear; or throw the whole on a muslin strainer—the pulp will form an excellent filtering medium by partially closing the meshes of the linen.

Which of the elementary substances is the most abundant? Oxygen.

What are its physical properties? It is a colorless, odorless and tasteless gas.

What official preparation is made from Barium Dioxide? Aqua Hydrogenii Dioxidi.

Name official waters prepared by distillation. Aqua Aurantii Florum Fortior, Aqua Distillata and Aqua Rosæ Fortior.

Name two official waters made by chemical reaction. Aqua Chlori and Aqua Hydrogenii Dioxidi.

How many minims in an ounce of water? Four hundred and eighty.

What is the weight in grains of one fluid ounce of distilled water at ordinary temperature?

455.7 grains.

What is meant by the maximum and minimum dose?

Minimum—Smallest ordinary dose.

Maximum—Largest dose that can be given with safety.

What is used to adulterate Beeswax? Paraffin, meal, resin, white lead.

Why are the numbers 50, 60, etc., employed to represent the fineness of powders? They represent so many meshes to the linear inch in the sieve through which the powder must pass.

What is meant by the term Magma? It is applied to the moist precipitate as it is collected in a filter before it is dried.

How can the character of precipitates be modified? Hot, dense solutions produce heavy precipitates, cold and dilute solutions produce light precipitates.

How would you test a Glass Graduate? Place it upon a perfectly level surface, then pour into it 455.7 grains distilled water at 15.6° C. (60° F.) This should measure one fluid ounce; or, measure into the graduate 30 c.c. of water (29.57 c.c.) for a fluid ounce.

What is the source and symbol of Zinc? Found in nature as sulphide (blende) or carbonate (calamine) Symbol, Zn.

What is the chemical and physical difference between the red and yellow oxide of mercury? The difference is only physical, the yellow being in a more minute state of division than the red.

Give numbers of the official powders and their meaning.

No. 20—Coarse.
No. 40—Moderately coarse.
No. 50—Moderately fine.
No. 60—Fine.
No. 80—Very fine.

What is meant by an Impalpable Powder? One which is reduced to the utmost fineness.

What is the meaning of Assay? To determine the quantity of a given substance in a compound.

Define Analysis. Analysis is breaking up a compound and separating its constituents.

Define Synthesis. Synthesis is the creation or preparation of compounds by building them up from their constituent elements.

What is a Sulphide? It is a salt formed by the direct union of two elements, one being sulphur.

What is a Sulphite? It is a salt formed by the action of Sulphurous Acid on a base.

What is a Sulphate? It is a salt formed by the action of Sulphuric Acid on a base.

Give three rules governing the formation of Salts.

1st.—The direct union of two elements forms "ide" salts.

2d.—Acids ending in "ous" unite with bases to form "ite" salts.

3d.—Acids ending in "ic" unite with bases to form "ate" salts.

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What is Goulard's Cerate? Ceratum Plumbi Subacetatis.

How are Soluble Salts obtained in Crystals? By slowly evaporating the solvent from a saturated solution.

What other methods are used for obtaining Crystals? Sublimation and fusion.

How is a Crystal bounded? By plain surfaces symmetrically arranged with reference to certain imaginary lines passing through its center; these lines are called axes.

What is meant by Water of Crystallization? In crystallizing many substances combine with water. This is known as water of crystallization. When crystals lose their water of crystallization and form a white powder on their surfaces they are said to *effloresce*, and those crystals which absorb water from the air are said to be hygroscopic. The act of absorbing the water is called *deliquescence*.

What is a Mother Liquor? The liquid remaining after the crystals have formed.

What is Dialysis? The separation of crystallizable from non-crystallizable substances by osmosis.

How are Crystalline Forms systematically arranged? Crystals are arranged in six systems, based upon the number and relation of axes, as follows:

Isometric System.—Three equal axes crossing at right angles (ex., cube).

Tetragonal System.—Two axes equal, third unequal, all crossing at right angles (ex., square prism).

Orthorhombic System.—Three unequal axes, but intersections all at right angles (ex., rectangular prism).

Monoclinic System.—Three unequal axes, one intersection oblique (ex., oblique rectangular prism).

Triclinic System.—Unequal axes, all crossing obliquely (ex., oblique rhomboidal prism).

Hexago al System.—Three equal axes lying in one plane and intersecting at angles of 60°, and a fourth axis crossing each of the others at right angles, and longer or shorter (ex., hexagonal prism).

By the truncation and bevelment of the angles and edges of these fundamental forms a vast variety of secondary forms are produced.

Name the official soaps? Sapo (white castile soap) and Sapo Mollis (green soap).

How is commercial bicarbonate of soda purified? By washing with water until the washings give no precipitate with sulphate of magnesium.

What bromide contains the most bromine? Bromide of Lithium.

What is a test for ammonia salts? Heated with alkalies they evolve NH_3.

From what is Gallic acid obtained? Nutgalls.

From what is Oleic Acid obtained? By-product in the manufacture of candles and glycerin.

How is Glycerin obtained? Obtained from fats and fixed oils as a by-product in the manufacture of soap.

What are confections? Semi-solid saccharine preparations.

From what is Tannic Acid obtained? Nutgalls.

What is Aldehyd? Alcohol from which two atoms of hydrogen have been evtracted, its formula is C_2H_4O. The term is now used to define a class of organic bodies.

How is aldehyd made? By acting on alcohol with oxidizing agents.

What is formed by oxidizing aldehyds? Acids.

What percentage of iodine does iodoform contain? About 96½.

Mention a common impurity in Potassium Bitartrate. Tartrate of Calcium.

What per cent of Ferric Chloride does Liquor Ferri Chloridi contain? 37.8 per cent.

What per cent of Ferric Nitrate does Liquor Ferri Nitratis contain? 6.2 per cent.

What per cent of Subacetate of Lead does Liquor Plumbi Subacetatis contain? 25 per cent.

What official preparation is an antidote for arsenic? Ferri Oxidum Hydratum Cum Magnesia.

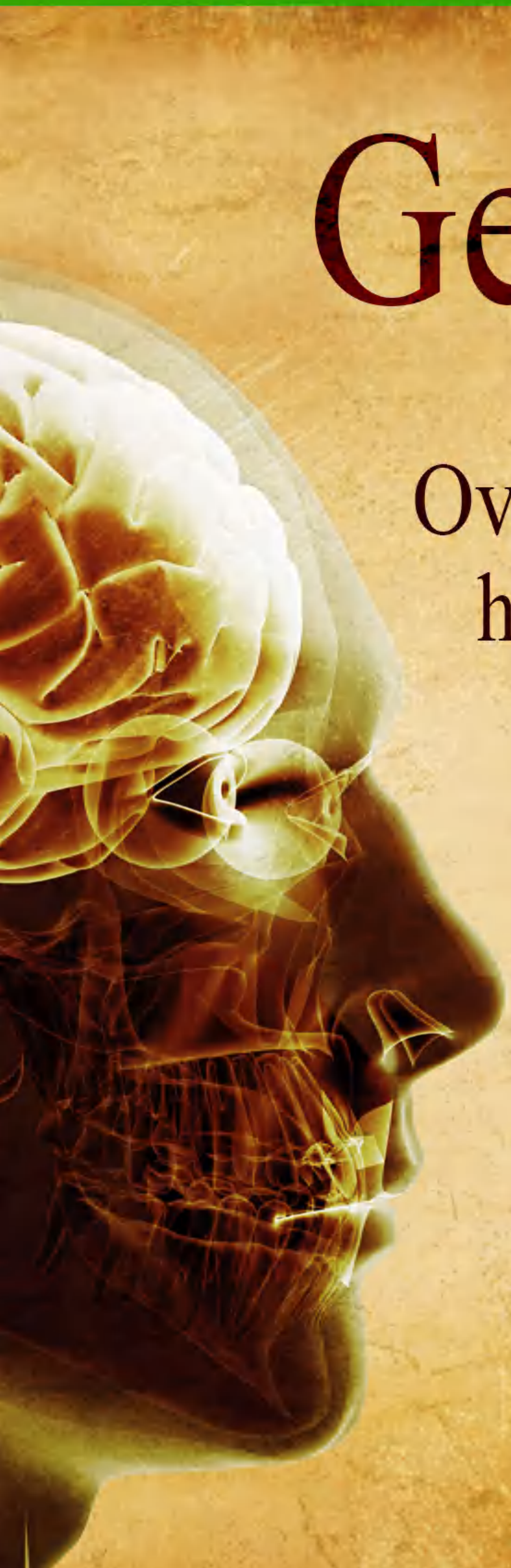
Mention the composition of Gum Arabic. Arabin, lime, potassa and magnesium.

What is a Rhizome? A creeping stem or branch growing beneath the surface of the soil, or partly covered by it.

How may solution of solids be facilitated? By pulverizing the substance the extent of surface exposed to the solvent is increased, and by agitation the frequency of the contact is augmented, thus favoring the rapidity of solution. Heat, by causing convection currents in the liquid, facilitates solution, and as heat works against cohesion, it increases the solubility of the substance.

What is Distillation? The operation of separating one liquid from another, or a liquid from a solid, by *vaporization* and *condensation*, the volatile part being the object sought.

What is meant by Precipitation? "The process of separating solid particles from a solution by the action of heat, light, or chemical substances." The solid particles separated are called the *precipitate*, the *precipitant* produced a *precipitate*, and the liquid remaining *supernatant liquid*. A precipitate may either fall or rise to the top of the supernatant liquid. The physical characteristics of precipitates are described



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classes: Amines, which are liquids, and Amides, which are solids.

What two ointments should not be made with an iron spatula? Citrine Ointment and Iodine Ointment.

From what is Strychnia principally obtained? Nux Vomica.

Name a preparation incompatible with Fowler's Solution. Tinctura Ferri Chloridi.

What is the official strength of Fluid Extracts? One cubic centimeter represents one gramme of the drug.

From what is Citric Acid made? From Lemons and Lime Fruit.

From what is Tartaric Acid obtained? From the Crude Tartar of wine casks.

With what is Glycerin adulterated? Sugars and dextrin.

What are Triturations? What percentage of the active substance should they contain, according to the U. S. Pharmacopœia? They are a class of preparations in which the medicinal substance has been diluted with 9 parts of sugar of milk.

What salt is formed when the fumes of Hydrochloric Acid come in contact with Ammonia Gas? Chloride of Ammonia.

What is the difference between Aqua Ammonia and Spirits of Ammonia?

Spirits of Ammonia—Alcoholic Solution.

Aqua Ammonia—Aqueous Solution.

What is Gum Arabic chemically?

It may be called Calcium, Potassium, or Magnesium Arabate.

What is a good test for Morphine? Nitric Acid turns it red.

Bromine, Chlorine and Iodine; state physical difference between them? Bromine is a liquid; Chlorine a gas, and Iodine a solid.

What ammoniacal salt is contained in spiritus ammoniæ aromaticus? Carbonate.

How would you detect Corrosive Sublimate in Calomel? Boil the Calomel in water, filter and pass Sulphureted Hydrogen through the liquid, or add a few drops of test solution of Potassium Iodide. In either case a precipitate indicates the presence of Corrosive Sublimate in the sample.

What official preparation contains Carbonate of Iron? Massa Ferri Carbonatis.

From what is Pepsin obtained? From the mucous membrane of the stomach of the hog.

What facilitates the solution of lime in water? Sugar.

How many drops of Tincture Opii represent one grain of Opium? Twenty drops or ten minims.

What is Prussian Blue chemically? Ferrocyanide of iron.

What is camphor? A stearopten derived from Cinnamomum Camphora.

What is the official Alum? Sulphate of Aluminum and Potassa.

What kind is usually sold in stores? Sulphate of Aluminum and Ammonia.

How are Iron preparations protected from change? By the addition of Sugar.

What is used in the Licorice preparations? Ammonia.

Why? To dissolve the glycyrrhizin.

What acid is used in the Conium preparations? Acetic acid.

How would you distinguish between a solution of

Sulphate of Zinc and a solution of Alum? A Solution of Carbonate of Sodium when added to a solution of Sulphate of Zinc gives a white precipitate of Carbonate of Zinc.

What is a Petal? A Flower Leaf.

What is the difference between dilute alcohol U. S. Pharmacopœia 1880 and 1890? 1880 equal parts by weight, 1890 equal parts by measure.

How many C.C. in a litre? 1,000.

From what is Carbolic Acid obtained? Coal tar products.

From what is Salicylic Acid made? Carbolic Acid.

From what was Salicylic Acid first obtained? Oil of Wintergreen.

How can camphor, resinous and oily substances be formed into pills? By the use of adhesive pastes, soap and the use of heat.

How would you separate Immiscible Liquids? By the use of a pipette, a glass syringe, a separating funnel, or a Florentine receiver. A funnel with a stop-cock to stop the flow as soon as the heavier liquid has all passed through is called a separating funnel. A Florentine receiver, used in the distillation of volatile oils, differs from an ordinary receiver in having an overflow arranged to permit the escape of the condensed water while retaining the volatile oil.

What is meant by bumping, and how may it be prevented? Certain explosions occurring in a liquid when it is boiled. It may be prevented by placing some pieces of broken glass in the retort.

What is meant by Isomerism? That condition of different bodies which agree in composition, but differ in properties.

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a liquid saturated with one substance is still a solvent for another substance.

What effect has solution upon temperature? Simple solution lowers temperature; chemical solution raises temperature.

Is the tincture of Chloride of Iron a Ferrous or Ferric Solution? Ferric.

To what extent is Camphor soluble in water? Five grains to the pint.

To what class of preparations does Santonin belong? Neutral Principles.

To what class do Quinine and Morphine belong? Alkaloids.

To what class does Saponin belong? Glucosides.

What nomenclature has been adopted for Alkaloids? The last syllable should terminate in *ine*; the Latin termination in *ina*; the names of neutral principles and glucosides end in *in*.

What is meant by the Habitat of a plant? The locality in which it grows in a wild state.

What is the strength of solution of Morphine of the British Pharmacopœia? Four grains to the ounce.

Why is HCl used in making purified animal charcoal? To dissolve out the calcium salts.

What Acid does cream of tartar contain? Acidum Tartaricum.

What is meant by the signa to a prescription? The direction to the nurse or patient.

What Volatile Oil is made by destructive distillation? Oil of Amber.

From what is Balsam Tolu obtained? Toluifera Balsamum.

From what is Balsam Peru obtained? Toluifera Pereiræ.

What is "Phenol"? Carbolic Acid.

From what does Formic Acid derive its name? "Formica Rufa," from which it was first obtained.

What is the chemical reaction of the Arsenious Salts? Acid.

What is Ebullition, or boiling? A violent agitation in a liquid produced when it is heated from the fluid to the gaseous condition. The heat acts first on that portion of the liquid resting against the heated surface, converting a portion into steam, which rises in the form of bubbles that break on the surface of the liquid.

What is meant by the boiling point of a Liquid? The temperature at which it boils. Each liquid has its specific boiling point as well as its specific weight. Liquids evaporate more or less at all temperatures; hence there seems to be no specific *evaporating* points, but there is a specific point where ebullition commences.

What is meant by Spontaneous Evaporation? The evaporation of a liquid at the ordinary temperature of the atmosphere.

What is Vermilion? Composed principally of red sulphide of mercury.

What is the analytical test for Boric Acid? Alcohol flame turns green and turmeric paper brown.

For what purposes are Barium Salts used? The solution of nitrate and chloride are used as test solutions.

What is meant by the subscription to a prescription? The directions to the compounder.

What Acid do Senna Leaves contain? Cathartic Acid.

What is the meaning of "Amaræ" and "Dulcis"? Bitter and Sweet.

What is the action of Sulphuric, Nitric and Hydrochloric Acids on organic substances? Destroys them.

What two Acids are found in Opium combined with the Alkaloids? Meconic and Lactic Acids.

How many Alkaloids does Opium contain? Nineteen, of which the most important is Morphine.

What is the difference between Prepared and Precipitated Chalk? Prepared chalk is merely chalk freed from most of its impurities, and generally molded into conical-shaped lumps. Precipitated chalk is made by precipitating a solution of Chloride of Calcium with a solution of Carbonate of Soda.

What per cent of official Sulphuric Acid in Aromatic Sulphuric? 20 per cent by weight.

What is White Vitriol? Sulphate of Zinc.

What is Blue Vitriol? Sulphate of Copper.

What is Sal Soda? Carbonate of Soda.

What is the action of Litharge on Olive Oil? Forms a lead soap and Glycerin.

Define Stigma, and mention a drug that the Pharmacopœia directs shall be composed alone of Stigmas? The Stigma is the tip or some other portion of the style upon which the Pollen falls. Saffron is the Stigmas of crocus sativus.

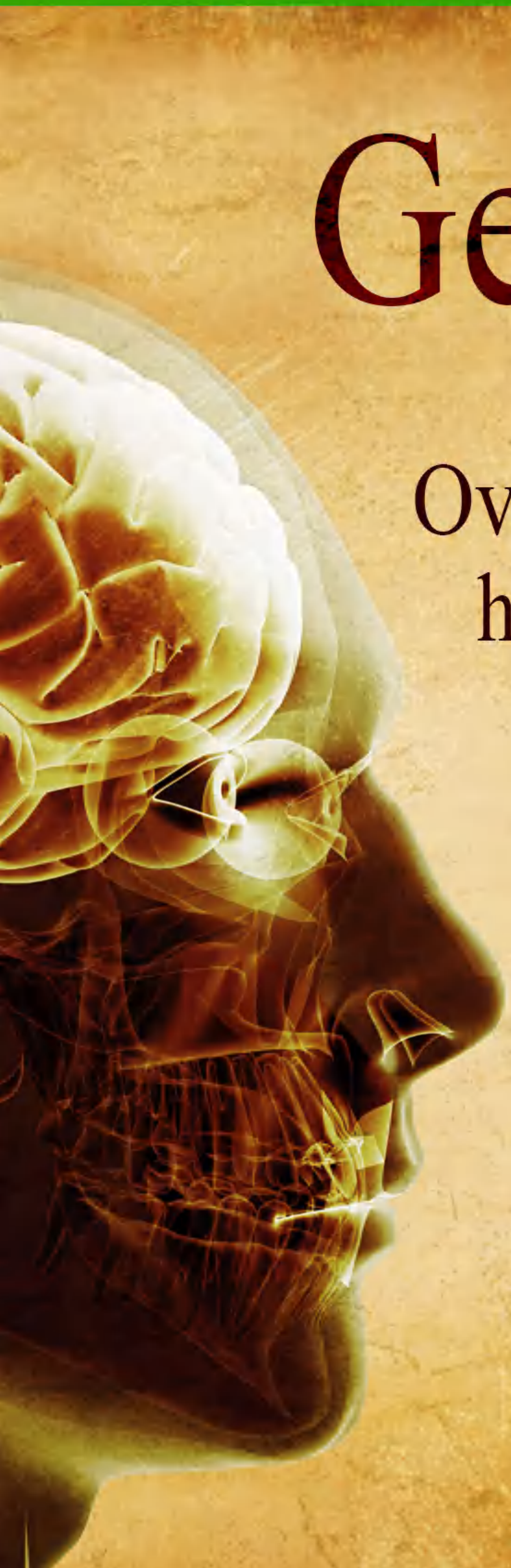
Name two bitter principles found in Colombo Root. Colombin and Berberine.

How was Glycerin first obtained? As a by-product in the manufacture of Lead Plaster.

Which element is used most in the metallic state in pharmacy? Mercury.

How are Glycerin suppositories made? By the addition of Soap or Gelatine.

What change was made in Spirits of Camphor in the U. S. P. of 1890? Water was dropped from its formula.



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The best menstruum for extracting a drug is one that will deprive it of its active and desirable principles and leave in the residue those principles which are either inert or objectionable.

What are Glucosides?

Glucosides are bodies mostly found in plants yielding glucose, $C_6H_{12}O_6$, as one of their products of decomposition when heated in contact with a diluted mineral acid and water. The other product which is formed at the same time differs in character from the original glucoside. Thus, *Salicin*, if boiled with diluted sulphuric acid, yields dextro-glucose and *saligenin*, or *saligenol*.

Glucosides are sometimes the active principles of the plants in which they are found, but they are more frequently associated with resins, oils, alkaloids and bitter principles.

What is Blue Ointment? Unguentum Hydrargyri.

What is used for (the subscription) in French prescriptions? The letter P., meaning prenez (take).

What group of atoms are characteristic of all Carbonates? CO_3.

From what is Iodine obtained? From the ashes of seaweed, and from the mother-liquor obtained from the crystallization of sodium nitrate in South America, in which it occurs in the forms of sodium iodide and iodate.

What foreign substances are occasionally found in urine? Sugar, Albumen, Bile and Pus.

What is Monsell's solution? Liquor Ferri Subsulphatis.

What two strengths of Acetic Acid are found in commerce? The official acid and No. 8 acid. The former has a specific gravity of 1.048, the latter 1.040 and is 20 per cent. weaker.

Why is No. 8 Acetic Acid so called? It is called No. 8 acid because it was formerly used in the proportion of 1 to 8, to make dilute acetic acid or distilled vinegar.

What is Glucose? Glucose is grape sugar prepared by the action of dilute Sulphuric Acid upon Starch.

What is its principal use in Pharmacy? As an excipient for making pills.

Name a Volatile Oil obtained from the animal kingdom. Oil of Ambergris.

What effect has water on Black Mustard? In connection with the Myrosin contained in the Mustard, it converts the Myronate of Potassium (also present) into a volatile oil.

What is salt of Lemon? Oxalate of Potassium.

Describe Oleic Acid. An oily liquid, having a slight smell and pungent taste, soluble in alcohol and ether, lighter than water, in which it is insoluble, and crystallizable in needles at a temperature a little below zero C. (32° F.)

What is Red Oil? Red Oil is crude Oleic Acid.

What is Turlington's Balsam? Tinctura Benzoini Composita.

What is an element? A substance which cannot by any known means be resolved into any simpler form of matter.

What is a Molecule? The smallest particle of matter can exist in a free state.

What is an Atom? A particle of matter so small that it undergoes no further subdivision in chemical transformations.

What salts are formed by the action of Iodine on Potash? Iodide and Iodate of Potassium.

How would you separate the two? By dissolving

out the Iodide with spirit of wine, which leaves the Iodate.

How is Iodate detected in Iodide of Potassium? To a solution of the sample add Tartaric Acid and then Mucilage of Starch; a blue color indicates the presence of Iodate.

What is the difference between Carbonate and Bicarbonate of Soda? The Bicarbonate is formed by replacing one atom of the sodium in the carbonate by hydrogen.

How would you construct a Specific Gravity bottle? A bottle with a long, slim neck is counterpoised by an appropriate weight, and distilled water at the appropriate temperature, 15° C. (60° F.), poured in till it contains 1,000 grains. The height reached by the water in the neck is then scratched thereon with a file, and is ready for use.

Is Tincture of Belladonna made from the root or leaves? Leaves.

How would you make Acid Hydrocyanic Dilute extemporaneously? By the action of Hydrochloric acid on Silver Cyanide.

What is the percentage of Absolute Acid used in most of the dilute acids of the U. S. Pharmacopœia of 1890? Ten per cent.

Name the exceptions to the above rule, Dilute Acetic acid, which contains six per cent. Dilute Hydrocyanic acid, which contains two per cent. and Dilute Nitrohydrochloric, which contains 22 per cent.

What fatty Acids are official? Acidum Oleicum and Acidum Stearicum.

What vegetable Acids are official? Acetic, Benzoic, Citric, Gallic, Salicylic, Tannic and Tartaric.

What official preparations are obtained from the

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olein, is, at ordinary temperatures, liquid; tallow, being largely stearin, is solid at the same temperatures.

What is Olein? The oleate of the triad radical glyceryl, having the chemical composition $C_3H_5(OC_{18}H_{33}O_2)_3$, obtained by treating oils or fats with boiling alcohol, cooling, to deposit the concrete principles, the olein remaining in solution, which is obtained by evaporating off the alcohol, or by compressing one of the solid fats, or a liquid fat concreted by cold, between folds of bibulous paper, which absorb the olein and give it up afterward by compressing under water.

What is Stearin? A glyceride of stearic acid, $C_3H_5(OC_{18}H_{30}O_3)_3$, and has been formed synthetically by heating a mixture of these two materials to 280°–300° C.

What is Stearic Acid? A firm white solid, like wax, with chemical composition, $C_{18}H_{36}O_2$, fusible at 69.2° C. (157° F.), greasy to the touch, pulverizable, soluble in alcohol, very soluble in ether, insoluble in water.

Distinguish between a Chemical Element and a Compound. A Chemical Element is one out of which nothing essentially different from the original substance has been obtained. Compound Elements are made up of two or more elementary substances chemically combined.

Give the botanical name of the Clove Tree. Eugenia Aromatica.

What part of the Clove Tree is official? The unexpanded flowers.

What is meant by the latent heat of water? That heat which water absorbs or discharges on passing from the liquid to the gaseous, or liquid to solid

state, without affecting its own temperature. Thus, the temperature of boiling water never rises above 212° F., because the steam absorbs the excess of heat which is necessary for its gaseous state.

How is Apomorphine prepared? By heating morphine under pressure with Hydrochloric Acid.

How is Codeine obtained? From the mother-liquor after the morphine has been crystallized out.

What preparation of Arsenic is contained in Fowler's solution? Potassium Arsenite.

What are Herbaceous Plants? Those which die down to the ground every year, or after blossoming.

What is an Arborescent plant? One which is tree-like in appearance.

What is a Tuber? A thickened portion of a root-stock.

What is a corm? A very short and thick root-stock.

Why is Lime used as an antidote for poisoning by Oxalic Acid? It forms an insoluble Oxalate of Calcium.

What is produced if Hydrogen is burned in Oxygen? Hydrogen Monoxide, or water.

What is a pome? A pome is a fleshy fruit like a berry, but the principal thickness is calyx; only the papery pods arranged like a star in the core really belong to the pistil itself.

What is meant by Colation? Straining.

From what is the word derived? From *Colare*, to strain.

From what is Lanoline prepared? The oily excretion obtained from the wool of the sheep.

What poisons would cause dilation, and what contraction, of the pupil of the eye? Dilation, Belladonna, Stramonium; Contraction, Opium, Calabar Bean.

From what are Antipyrin and Antifebrin prepared? They are both prepared from Phenol Compounds.

What is the difference between Washed Sulphur, Precipitated Sulphur and Sublimed Sulphur? Washed Sulphur is Sublimed Sulphur with the impurities removed by washing it with water and Water of Ammonia. Precipitated Sulphur is Sublimed Sulphur made into solution by boiling with water and lime, then precipitated with Hydrochloric Acid.

Lac Sulphur is an inferior article, precipitated by Sulphuric Acid, and contains Calcium Sulphate. It is sometimes called Milk of Sulphur.

Sublimed Sulphur is the condensed vapors of Sulphur, also known as Flowers of Sulphur.

How would you effect the solution of a gas in water? Apparatus is so arranged that the gas first passes through a wash bottle, by which it is purified, and then allowed to bubble up through the solvent, which absorbs a portion of it during the passage.

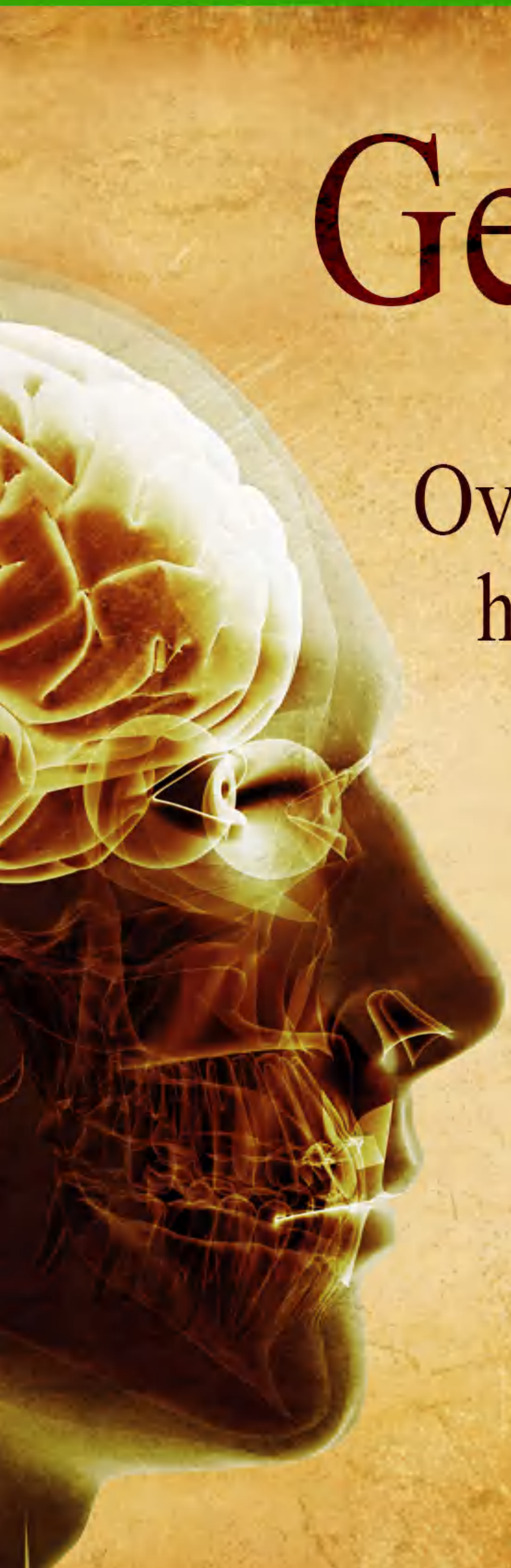
Name some of the most important official products from animal sources. Cantharis, Adeps, Oleum Morrhuæ, Pepsinum.

Name two true gums. Acacia and Tragacantha.

How is Acetic Ether made? By decomposing acetate of sodium by means of sulphuric acid in the presence of alcohol.

What is ment by the terms oxidation and reduction as applied to chemistry? Oxidation is the action of oxidizing a body, that is, combining it with oxygen, a combination from which results an oxide. Reduction is the process of restoring Oxides, Chlorides, Sulphurets, etc., to the metallic state.

Name some vegetable Acids used in Medicine. Acidum Aceticum, Acidum Citricum, Acidum Tannicum.



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What is a Chemical Symbol? A capital or a capital and one small letter, used as a shorthand method of expressing an elementary substance.

What is meant by Circulatory Solution? If the substance be placed in a bag and suspended in the solvent a current will be engendered by the sinking of the dissolved portion from the bag, its place being supplied by fresh portions of the solvent.

What advantages do Tinctures possess over fluid extracts? 1st. In some cases the alcohol menstruum of the tincture is to be desired. 2d. Tinctures may be added in small proportions to aqueous preparations, without serious precipitation.

What great advantage do Fluid Extracts possess over tinctures? They are uniform, definite and concentrated.

How would you test urine for Albumen? By acidulating with nitric acid and boiling, which will coagulate the albumen.

Why is the Acid used? To keep the Phosphates in solution.

What are Organic Compounds? Compounds containing carbon, whether of animal or vegetable origin. Practically all carbon compounds are organic compounds, and all so-called organic compounds are carbon compounds.

How would you detect Sugar in the Urine? By boiling a few drops of the urine in a solution of sulphate of copper and liquid potassa, a yellowish-red precipitate will denote the presence of sugar.

How would you detect Bile in the urine? By dropping nitric acid upon a small quantity of the urine placed on a glass or plate, when a peculiar play of colors will appear—green, yellow and violet.

What is the ordinary normal specific gravity of healthy urine? Between 1.015 and 1.025.

About what quantity is usually passed in 24 hours? From 40 to 45 ounces.

What should be its reaction?. Slighty acid.

How may recovered Alcohol be purified? By distillation.

Is Glycerin heavier or lighter than water? Heavier.

What are Local Remedies? Medicines applied externally.

Name two or three. Tr. Iodine, Tr. Arnica and Ceratum.

What Poison causes dilation of the pupil of the eye? Belladonna.

Name one that causes contraction of the pupil of the eye? Opium.

What is the English name of this chemical compound—$MgSO_4$, $7H_2O$? Magnesium Sulphate.

What is the name of this compound—$Na_2B_4O_7$, $10\ H_2O$? Sodii Boras.

From what salt of Bismuth is the official Citrate prepared? Subnitrate of Bismuth.

What variety of Sugar is found in urine? Grape sugar.

C_2H_5HO—From what and how is this compound obtained? Alcohol is a liquid generated in vegetable juices and infusions by a fermentation, called the vinous or alcoholic, and then distilled off.

$NaHCo_3$—Give the official Latin name. Sodii Bicarbonas.

What is the commercial source of Ammonia? Gas liquor of coal-gas works and Bone-spirit, which is a secondary product in the manufacturing of Bone-black.

What is the composition of Argenti Nitras Dilutus U. S. P.? Nitrate of silver 30 Gm., and Nitrate of Potassium, 60 Gm.

How would you distinguish Carbolic Acid from Creosote? Creosote does not coagulate Albumen or Collodion; Carbolic Acid does.

How is Bichromate prepared from the Chromate of Potassium? By acidulating its solution with Sulphuric Acid.

Describe a Siphon. A siphon is an inverted U tube, with one leg longer than the other. It is first filled with the liquid, and the shorter arm immersed in the liquid contained in the vessel, and a current established in this way: The column of liquid in the shorter arm is overbalanced by the column in the longer arm, thus causing a current to flow from the shorter to the longer arm, the shorter arm drawing a fresh supply from the vessel, which is thus finally emptied.

May saturated solutions be used as solvents? Yes; a liquid saturated with one substance is still a solvent for another substance.

What is the best manner of effecting the solution of a solid? Crush the substance in a mortar with the pestle, then pour on the solvent, continually stirring the mixture.

What is an Acidulous Radical? A group of elementary substances which unite with Hydrogen to form acids and with bases to form salts.

Why are some salts acid in reaction while others are alkaline? Those which are acid, are combinations of a strong acid and a weak base. Those alkaline in reaction, are combinations of a strong alkali with a weak acid.

What is an Acid? An acid is a substance formed by the union of Hydrogen with an acidulous radical, and form salts by having its Hydrogen replaced by a base.

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What are the chief constituents of air? Oxygen 23, Nitrogen 77, by weight.

What per cent of Oxygen does the air contain? 22.99 per cent.

Name some of the processes of separating fluids from solids. Decantation, Colation, Filtration, Clarification, Expression, Percolation, etc.

How many grains are there in a ⅛ ounce bottle of Morphine? 54⅔ grains, or ⅛ Avoirdupois ounce,

What is the difference between Benzin and Benzol? Benzin is a complex body of varying constitution distilled from petroleum; it has never been congealed.

Benzol, C_6H_6, is a definite hydrocarbon distilled from coal tar; it can be frozen. By the action of strong Nitric Acid Benzol yields Nitrobenzole, termed from its odor artificial oil of almonds.

Name the official preparations of Phosphorus? Acidum Phosphoratum, Oleum Phosphoricum, Pilulæ Phosphori, Spiritus Phosphori.

What Emplastrum is made from an Oleoresin? Emplastrum Capsici.

What official Liniment is made from a Fluid Extract? Linimentum Belladonnæ.

What form of Mercury is used in preparing Oleatum Hydrargyri? The yellow Oxide.

In what official preparation is Lard Oil used? Unguentum Hydrargyri Nitratis.

At what temperature does Acidum Aceticum Glaciale become a solid? 50° F.

What Acid is contained in Oil of Bitter Almonds? Hydrocyanic Acid.

How is Acetic Acid obtained from Acetate of Sodium? It is distilled from a solution of acetate of sodium and sulphuric acid.

What poisonous impurity is often found in crude Antimony? Arsenic.

What is a prominent physical property of the Mn. salts? Pinkish in color.

In what preparations are the manganese compounds used? MnO_2, used in making chlorine water, and in permanganate of potassium.

What are Waxes? They are fats having a high fusing point. Wax, however, is a term more properly applied to the compounds of the fatty acids with radicals, such as *cetyl*, $C_{16}H_{33}$ (in spermaceti —cetaecum), ceryl, $C_{27}H_{55}$, (in Chinese wax), and myricil, $C_{30}H_{61}$ (in beeswax).

What is meant by Anhydrous? A body that is entirely free from water in combination.

To what class of vegetable principles does Gamboge belong? Gum resins.

How is Ferrum Reductum made? By passing hydrogen through a tube containing subcarbonate of iron kept at a red heat.

What is Moschus? The dried secretion from the preputial follicles of Moschus moschiferus.

Name a good excipient for making Permanganate of Potash into pills. Kaolin ointment, or resin cerate.

How would you detect Starch as an adulterant in Gamboge? Boiled with water, gamboge which is so adulterated yields a liquid which becomes green when a test solution of Iodine is added.

Give the formula for Carbonic Acid Gas. CO_2.

What effect have large quantities of the above upon animal life? Destroys it.

Where does the natural supply come from? It is exhaled from the lungs of animals.

Give the formula of Carbonic Acid. H_2CO_3.

Give the formula for Carbonic Oxide. CO.

What is Iodine? One of the elementary substances.

What is formed when solution of Nitrate of Silver is added to solution of common Salt? Chloride of Silver and Nitrate of Sodium are formed.

What is Kaolin? Disintegrated Felspar.

What is Felspar? A double silicate of Aluminum and other metals.

What would you do were a patient brought to you suffering from the effect of some unknown poison? Administer a prompt emetic and send for a physician.

What class of drugs requires fine comminution for percolation? Woody materials.

What class should be in coarse powder? Fleshy and easily permeable substances.

What is the chemical difference between Sodii Chloras and Sodii Chloridum? The Sodii Chloras contains three atoms of oxygen.

With what is Lard Oil usually adulterated? Paraffin Oil.

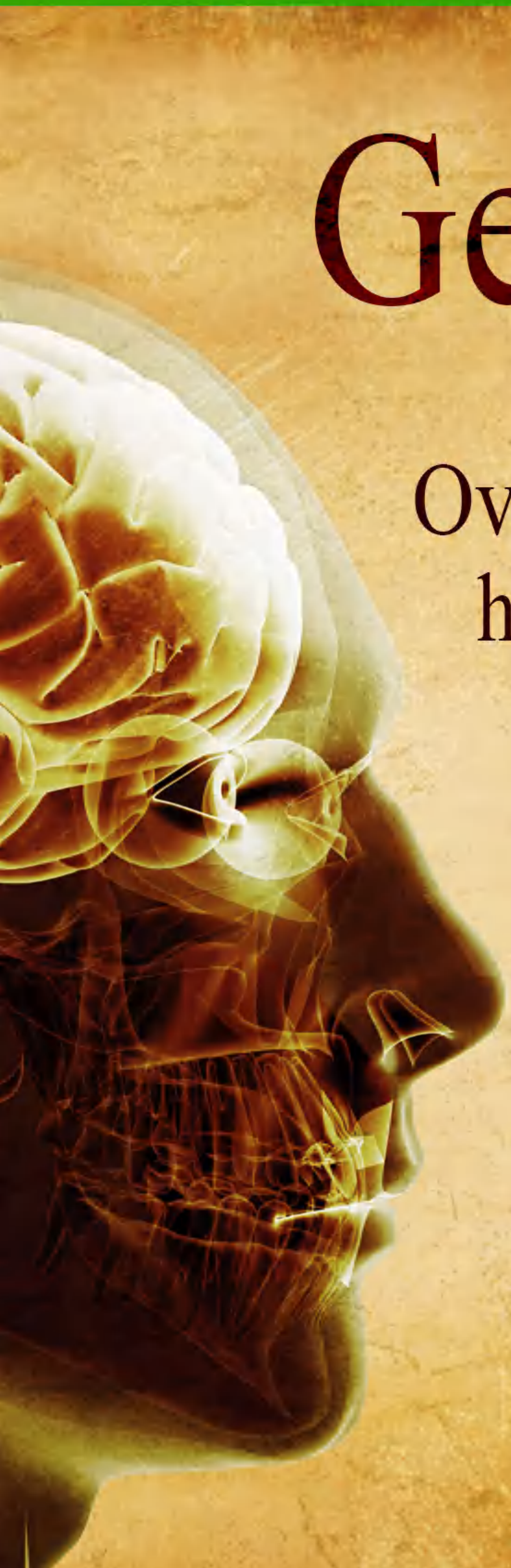
From what is Suet obtained? From the abdomen of Ovis Aries.

What is Glyconin? Glyceritum Vitelli.

What is the general composition of Essential Oils? They are usually mixtures of the liquid hydrocarbons or elæoptens with oxidized hydrocarbons, which are commonly solid bodies termed stearoptens.

Name the official preparation of starch. Glyceritum Amyli.

What is the composition and properties of Cyanogen? Cyanogen (CN) as met with in compounds is a univalent radical, and behaves chemically like the



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How would you separate Gold and Mercury when mixed? By sublimation.

How would you recover the Gold from a mixture of Gold and Silver? Dissolve out the silver with nitric acid, which leaves the gold in the metallic state.

How would you recover Silver in the metallic state from the Nitric Acid solution? By precipitating it with Hydrochloric Acid, and reducing the precipitated chloride by heat.

What is an Amalgum? A mixture of metals, one of which is mercury.

From what is the official Oil of Juniper prepared? From the fruit of Juniperus communis.

Give melting point of Petrolatum Molle. Petrolatum Spissum? P. Molle 104° to 113° F. P. Spissum 113° to 125° F.

What is the poison contained in Paris Green? Arsenic.

What variety of Cinchona is used in making tincture of cinchona and compound tincture of cinchona U. S. P.? Cinchona is used for the former and Cinchona Rubra for the latter.

Give the official Latin title for Lime Water. How should it be perserved? Why should it be so preserved, or what change is likely to occur if it is not so preserved? What salt of lime does it contain? Liquor Calcis should be kept in a glass-stoppered bottle, containing also some undissolved lime. It absorbs carbon dioxide from the air if not protected. It contains about .17 per cent of Calcium Hydrate.

What is the heaviest metal? Mercury.

What is the lightest metal? Lithium.

The Alcoholic Lamp is used for heat. Why not for light, as well? Because it produces a blue flame and very little light.

What significance have the endings "ous" and "ic" in the names of Acids? The suffixes "ous" and "ic" are used as terminations to the names of acids containing O; the former denoting a lower proportion of O, the latter a higher amount. Ex., Sulphur*ous* acid, H_2SO_3, contains less O than Sulphur*ic* acid, H_2SO_4.

Name the oxides of Hydrogen? Hydrogen Oxide H_2O and Hydrogen Peroxide H_2O_2.

How would you test Pepsin? See U. S. P., page 295.

What is Organic Chemistry? The science of the carbon compounds.

What is Cellullin, or Cellulose? The woody fibre of plants, forming the skeleton for the vegetable tissues.

What is Lignin? "The substances which are found adhering to the cellulin skeleton of plants and vegetable tissues."

What important principle in pharmacy is owing to the insolubility of Cellulin in ordinary solvents? As cellulin forms the bulk of inert matter in plants, and is insoluble in ordinary solvents, active principles solvent in such solvents can be readily separated from it.

What is the chemical composition of starch? It has the same chemical composition as cellulin, $C_6H_{10}O_5$, and is closely allied to it and its properties.

What is the office of Starch in the vegetable kingdom? It is stored up in plants as a food, in anticipation of future usefulness in the formation of plant tissues.

What is the difference between Fermentation and Putrefaction? Decomposition occurring in organic

bodies on exposure to the action of moisture, air, and a warm temperature, resulting in the formation of new products. When the products are worthless or offensive, the process is called Putrefaction; when useful, it is called Fermentation.

What is the cause of Fermentation? The theory is, that fermentation is caused by the presence of certain micro-organisms, called bacteria.

Into what two classes are Ferments divided? Ferments are divided into two classes—organized, or physiological ferments, as yeast, mycoderms, torulas, etc., and unorganized, or chemical ferments, like diastase, synaptase, myrosin, etc.

What is Vinous Fermentation? The decomposition of cane sugar into alcohol and carbon dioxide, which occurs when sugar is exposed to the action of water, air, and a warm temperature, and seems to be caused by a microscopic plant, which has been named Torula cerevisiæ.

What are Chemical Reactions? Any change which takes place within a molecule.

What is Chemical Decomposition? The separation of the constituent radicals or atoms of a molecule.

What is Double Decomposition? This takes place when two compound molecules are brought together which mutually decompose each other, giving rise to two or more new compounds.

What is Electrolysis? Decomposing compounds by electricity.

What occurs when any metal is dissolved in Hydrochloric Acid? Hydrogen is liberated and the metal is turned into a chloride.

What are Nitrates? Salts containing the monad radical NO_3.

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contains the embryo. It generally consists of coats and a kernel.

What do plants absorb from the air? Carbonic Acid gas.

What do plants give off into the air? Oxygen.

What is meant by the Nascent state of an element? It is the extraordinary combining power which it possesses on being liberated from a compound.

Thus, colored cloth, when wet and exposed to Chlorine gas, loses its color by the Chlorine combining with the hydrogen of the water and liberating the oxygen, which in turn unites with the coloring matter of the cloth and forms colorless compounds. Oxygen possesses this power only when being liberated from a compound; hence this state is called the Nascent state of Oxygen.

What is the best test for Arsenic? By the evolution of Arseniureted Hydrogen, on adding zinc and Sulphuric Acid to the solution to be tested. On burning the gas, Arsenic is deposited in the metallic state upon a piece of cold porcelain held in the flame.

What are Acrid principles? Extractive substances, frequently amorphous, of various composition; they are usually neutral principles, sometimes resinous, whose names end in *in;* some, however, have acid character.

What is the difference between liquor ferri subsulphatis and liquor ferri tersulphatis? The latter contains a larger proportion of Sulphuric Acid.

What effect has heat upon Gallic Acid? When heated at 210° C., it forms pyrogallic acid and carbon dioxide.

Aurum. What is the official Salt? Auri et Sodii Chloridum.

Give the official Salts of Silver. Argenti Cyanidum, Argenti Iodidum, Argenti Nitras, Argenti Nitras Dilutus, Argenti Nitras Fusus, Argenti Oxidum.

What are Receivers? Glass vessels, usually globular in shape, for receiving distillates. Three kinds are used; plain, *tubulated* and *quilled*. The tubulure is to prevent explosions, and the quill to allow the distillate to escape, for the purpose of measuring it as it condenses.

How is Potassium Chlorate prepared? By passing an excess of Chlorine into a warm concentrated solution of Caustic Potash.

How would you convert Litres into Quarts? Add 6 per cent.

How is Sulphureted Hydrogen prepared? By the action of dilute Sulphuric Acid upon Iron Sulphide.

Give the Ingredients of A. C. E. Mixture.

Alcohol	1 part	By volume.
Chloroform	2 parts	
Ether	3 "	

Give the Ingredients of Billrott's Mixture.

Chloroform	100 parts	By volume.
Alcohol	30 "	
Ether	30 "	

How would you make an emulsion of salol? By warming the salol with a small quantity of olive or sweet almond oil, and emulsionizing the oil with acacia in the usual manner.

What per cent of alkaloids should Tinc. Nux Vomica contain? 0.3 per cent.

What amount of crystallized morphine should Acetum Opii, Tinctura Opii, Tr. Opii Deodorati and Vinum Opii yield on being assayed? 1.3 to 1.5 per cent.

What is Carbon Dioxide? CO_2, a colorless, odorless gas, with slightly acid taste, heavier than the air, incombustible and a non-supporter of combustion. Water absorbs its own volume of it at ordinary temperature and pressure, and many times its volume under cold and pressure.

How would you test a salt supposed to be a bromide? If concentrated sulphuric acid be added to a bromide reddish vapors of bromine are evolved.

What is the official name of Liniment of soft soap? Linimentum Saponis Mollis.

What official infusions are made by percolation? Infusion of cinchona and Infusion of wild cherry.

Should the deposit which occurs in oleoresin of aspidium on standing be used or rejected? It should be thoroughly mixed with the liquid portion before use. The deposit in oleoresin of cubeb however should be rejected, only the liquid portion being used.

What are Abstracts? Solid powdered preparations twice the strength of the drug or fluid extract from which it is prepared.

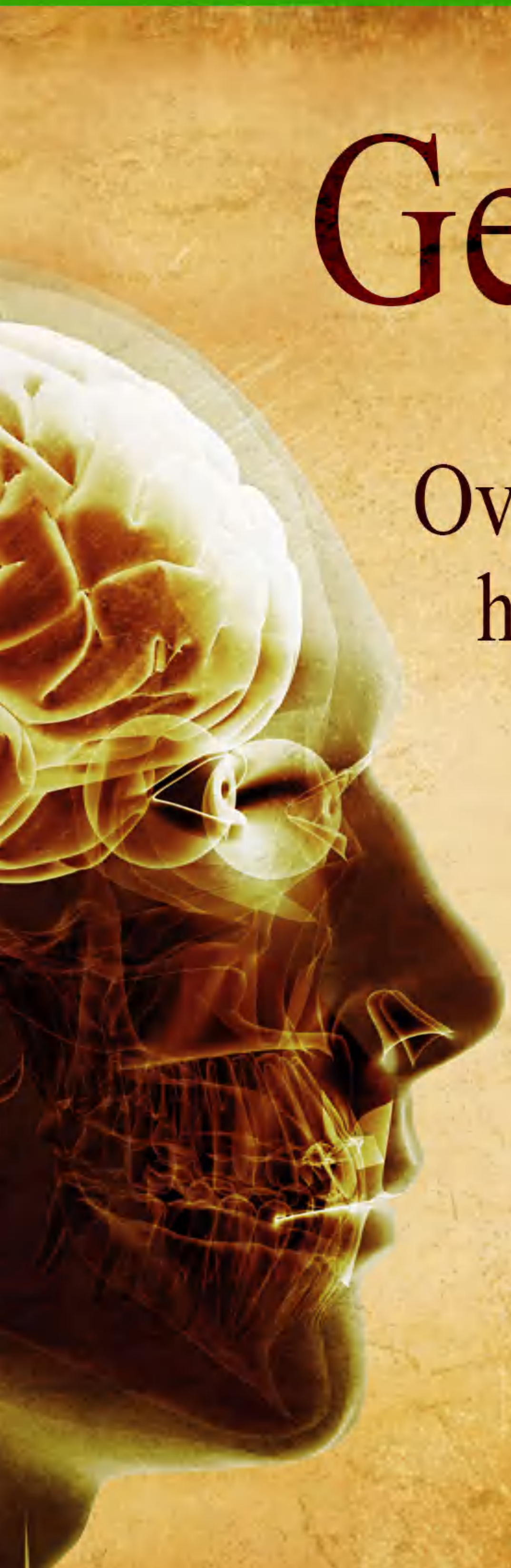
How are Abstracts made? A concentrated fluid extract of the drug is mixed with sugar of milk, evaporated to dryness, and powdered.

How is Chlorine Water prepared? By heating hydrochloric acid with manganese dioxide and passing the generated chlorine through distilled water until a saturated solution is produced.

Show the reaction that occurs in generating chlorine? $Mn\ O_2 + 4HCl = Mn\ Cl_2 + Cl_2 + 2H_2O$.

What is meant by the term "Halogen?" Salt producer.

Give test for Chlorides. Chlorides in solution may be recognized by adding a solution of silver nitrate,



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Miscellaneous Questions Without Answers.

We give below a few questions, the answers to which are omitted for several reasons, viz.: The answer to certain questions would vary according to the state in which they were asked. Other questions are asked merely to test the student's general knowledge of a given subject, so an answer given by *us* would count for nothing, but the subject itself should be thoroughly studied by the student.

Again, many of these questions are repetitions of those found among the preceding list, but couched in different language in order to drill the student in formulating his own answer from the knowledge he has of the subject.

We, therefore, recommend that you give this list due consideration, and learn to answer these questions by familiarizing yourself with the general subjects to which they pertain.

Do you keep a liquor register?

Give an outline of the pharmacy law of your state.

What poisons are you in the habit of registering when sold?

What do you dispense when Aqua Menthæ is prescribed?

Name several narcotic medicines.

Name several drugs belonging to each of the following classes: Antiseptic, Anæsthetic, Astringent, Alterative, Cholagogue, Diaphoretic, Diuretic, De-

mulcent, Emetic, Emollient, Emmenagogue, Tonic.

What do you understand by organic chemistry? Name some organic elements.

Name three alkaloids with dose and antidotes.

Name the poisonous liquors of U. S. P. with percentage of drug contained.

What is meant by the combining weight of an Element? Give an example.

What is atomic weight? Explain briefly how the atomic weight of an element may be obtained.

Is it necessary, according to the laws of your state, to keep a poison register?

What kind of ginger should be used in pharmaceutical preparations? And why?

What is galenical pharmacy?

From their physical appearance, how would you distinguish between Sul. Morphine and Sul. Quinine? Between Epsom Salts and Oxalic Acid? Between Elaterium and Codeia? Between Chlorate of Potash and Nitrate of Silver Crystals?

Which of the following are simple and which chemical solutions: Donovan's Solution, Liq. Ferri Citratis, Liq. Ferri et Quiniæ Citratis, Liq. Plumbi Subacetatis, Liq. Sodii Arsenitis, Liq. Zinci Chloridi?

There are thirty-two official syrups; name six of them. State in each case whether they are made with heat, by simple addition, or by agitation without heat.

How many ounces Imperial measure are there in 400 c. c.? Convert 400 c. c. into fluid ounces (wine measure).

What test is recommended in the U. S. Pharmacopœia, for determining the amount of arsenic contained in Fowler's solution?

What poison is derived from one of the official substances of animal origin?

What would be the result of combining in solution sulphate of morphia and bicarbonate of potash?

Give outline of the official Assay of Opium.

Name some drugs or preparations which are liable to explode upon mixing.

Give outline of the official Assay of Cinchona Bark.

Name some deliquescent salts.

Name some efflorescent salts.

What is the difference between Putrefaction and Fermentation?

Name three solid, three gaseous and two liquid elements.

Name three solid, three liquid and two gaseous compounds.

How can the alcoholic strength of whisky, brandy and wine be determined?

Name two articles that make explosive mixtures with chlorate of potassium.

Evaporation: Define and name some product you have produced by the above method.

Oleum Theobromæ: Give common name. Describe from what and from where obtained. What is its principal use in pharmacy?

What active principles are obtained from spunk wood, helleborc, golden seal?

Name a few of the preparations of ether, their uses and doses.

What is the composition of Donovan's solution? Give the percentage of each of the active ingredients.

What do you understand by the term solvent?

Name the most universal one. Is carbonate of iron soluble in it?

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When "Solution of Morphine" is prescribed, what strength would you dispense?

How do Ointments, Oleates, and Cerates differ from each other? Give the chief characteristics of each.

Complete the following chemical equations:

$Ag + HNO_3 =$

$FeSO_4 + NaHCO_3 =$

$KOH + I =$

What is the percentage of bromine and how many grains of bromine are there in one ounce of potassium bromide?

Oleum Morrhuæ—where and from what obtained? State mode of preparation. Give medicinal properties and dose.

Under the influence of water, what will some oils deposit?

Name a drug that is incompatible with Iodide of Potash?

Give an outline of the process you would go through, were you called upon by the physician to make an analysis of a sample of urine.

What do you understand by the terms acids, bases and salts?

Define theoretical pharmacy and show in what respect it differs from practical pharmacy.

Define metrology, and give number of grains in the unit of weight of one gram as known in the metric system.

Write in full the table for apothecaries' weight, also avoirdupois.

What is the equivalent of each degree Centigrade, between 0 and 100 in degrees according to Fahrenheit's scale? How would you convert degrees Centigrade into degrees Fahrenheit and vice versa?

What do you understand by specific gravity?

What is amylic alcohol? Methylic alcohol? Ethereal oil?

Give approximate measure of a teaspoonful, tablespoonful, dessertspoonful, wineglassful and gill.

What is a sacchrometer, and how is the scale graduated?

Give mode of preparation of the following: Chloroform, ether, carbon dioxide, sulphurous acid, ammonia, phosphoric acid.

Name any two official preparations you have made, and state how you prepared them, naming all the articles used in each.

Write the chemical formula for three compounds of iron used in medicine.

Give the percentage of HCN and the maximum dose of the official preparation.

Name several drugs yielding official volatile oils.

What percentage of total alkaloids, and what percentage of quinine is required by the U. S. P. to be contained in cinchona barks?

Give an outline of the process of percolation.

Give the process you follow to make 100 pills, each containg $\frac{1}{100}$ grain of phosphorus.

What cryptogamous plants or their products are official?

Give the percentage of Hg. in Massa Hydrargyri, Unguentum Hydrargyri, Hydrargyri cum Creta.

Give a process for making glycerin suppositories.

Name a solvent for Gold; for Platinum.

State what precaution is necessary in mixing Turpentine and Sulphuric Acid.

What is the result when Camphor and Hydrate of Chloral are rubbed together?

Why is it that certain solids produce this result when triturated together?

Name some other solids which produce a like result.

Name some drug that you would not dispense in connection with Antipyrin.

What is meant by therapeutical incompatibility?

What is meant by chemical incompatibility?

What are terpens?

CHEMISTRY.

What is the meaning of the term Chemistry?

What is the difference in the properties of an Acid and an Alkali?

What purpose does Nitric Acid serve in making liq. Ferri Chloridi?

Describe any method known to you for the detection of Arsenic.

What chemical test would you apply to determine whether an unknown salt was Zinc Sulphate or Magnesium Sulphate?

What is the difference in the chemical compostion of Sulphuric and Sulphurous Acid?

Describe what chemical test you would apply to a sample of Mercurous Chloride suspected of being contaminated with Mercuric Chloride.

What is the difference between Carbonates and Bicarbonates?

What is the chemical formula of Ammonia?

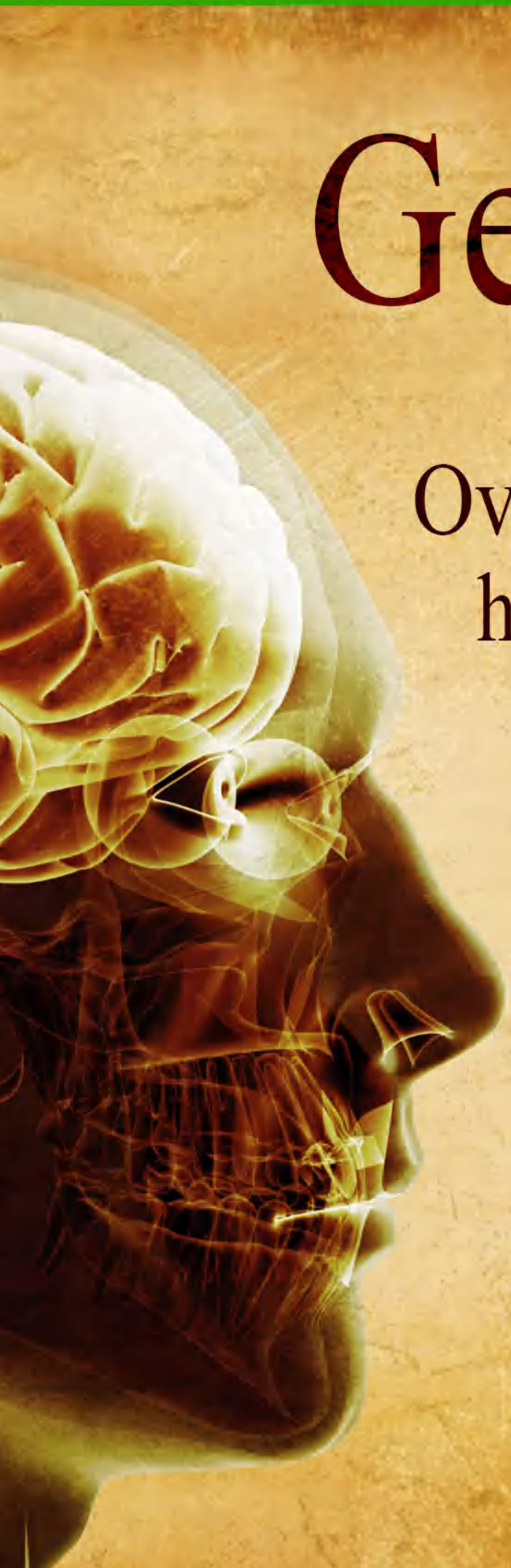
Describe the difference between sulphates, sulphites and sulphides.

How is chlorine found in nature, and why does it not occur in a free state?

Read the following: H_3PO_4; KI; CHO.

How could you make sulphate of lime?

What is the difference between molecular and atomic weights? Give an example of each.



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Glycerin+nitric acid=nitro-glycerin.
Benzol+nitric acid=nitro-benzol.
Alcohol+chlorine=aldehyde.
Aldehyde+chlorine=chloral.
What is the formula for: Orthodi-nitro benzol? Anilin? Benzaldehyde? Benzoic acid? Salicylic acid?

Pharmacy.

How many minims of tincture of opium, U. S. P., correspond to one grain of powdered opium? XX
Explain the difference between sublimed, washed and precipitated sulphur.
What is the most unstable official salt of morphine?
The specific gravity of a certain liquid is 0.820, of another 1.220; how much would four fluid ounces of each weigh?
From what is alcohol derived and how; what different strengths of alcohol are recognized in the U. S. P.?
Give full Latin name of Hoffman's anodyne, and state how prepared?
Give full Latin official name of what is commonly called blistering ointment and state the ingredients.
How can you detect Glucose as an adulterant of honey?
Give the maximum dose of creosote, tincture of aconite and nitrate of silver.
What is Glonoin?
What is Gloconin?
Give a test for identity of chloral, U.S. P.
What is Donovan's solution?
Name several incompatibles of salicylate of sodium.

Name the official preparations into which tartar emetic enters.

Name two official volatile oils prepared by fermentation.

Crystals are often seen in samples of oil of bitter Almond; of what do they consist?

How would you ascertain whether Menthol is present or absent in a sample of oil of peppermint?

Why is acetum opii less nauseating than the tinctura opii?

Name the three common adulterants of the volatile oils and state briefly how each may be detected.

Name five substances which are incompatible with solutions containining alkaloids.

Name the conditions which influence the rapidity of evaporation.

How much of each ingredient would be required to make two troy ounces of Dover's powder?

How may the salts of alkaloids be prepared extemporaneously, giving example?

Give the test of identity of quinine, atropine, and morphine.

Illustrate by example what is meant by the terms, pharmaceutical and therapeutical incompatibility.

Name five official liquid preparations containing opium, stating the percentage of opium contained in each.

An apothecary has two kinds of opium, one containing 13½ per cent., the other 16 per cent. of morphine; he desires to make eight troy ounces, containing 14 per cent. of morphine; how much of the weaker kind must he use?

Give three methods for obtaining volatile oils.

What is barley sugar?

Name two substances which are incompatible with sweet spirit of nitre.

What is apomorphine? State the dose.

What is the cost of one pint of glycerin, U. S. P., at 75 cents per kilo?

What would you recommend as prompt emetics to evacuate the stomach? For what poison is common salt a specific antidote?

(*a*) Give the percentage of absolute acid contained in hydrocyanic and phosphoric acids. (*b*) Give properties and doses of each.

(*a*) Give the antidotes for Phosphorus and Prussic acid. (*b*) State the manner in which death is produced by these poisons.

(*a*) State the properties and dose of iodoform. (*b*) What percentage of iodine should it contain? (*c*) What would you use as a deodorizer for it?

(*a*) State how you would prepare an infusion of salts, senna and manna. (*b*) How much would you give a child six years old? (*c*) What benefit is derived by adding the manna?

Give the antidotes for (*a*) aconite, (*b*) colchicum, (*c*) iodine, (*d*) belladonna, (*e*) lead salts, (*f*) zinc salts.

(*a*) Give the meaning, with one example and dose, of each of the following: Anthelmintic, parturient, febrifuge, astringent, anæsthetic, antiseptic, alterative and diuretic. (*b*) State the difference between rubefacient and vesicant, hydragogue cathartic and cathartic.

(*a*) Give official name, properties and dose of Fowler's solution and Donovan's solution. (*b*) What percentage of arsenic should they contain?

What is the chemical antidote for carbolic acid?

MATERIA MEDICA.

State the general appearance and medicinal properties of each of the following drugs:

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The above questions on cantharides are fair specimens of those asked at all examinations. They show plainly what the applicant is expected to know of each article of the materia medica which is in common use. For this knowledge we refer you to the U. S. Dispensatory, as it would be entirely out of the scope of a work of this kind to cover the field.

DOSES.

The hypodermic dose is one-half the dose by mouth.

Dose per rectum or vagina is from two to three times the dose by mouth.

To proportion the dose of medicine for children, divide the age at the next birthday by 24, and multiply the adult dose by the quotient.

The action of medicines is modified by *sex*, *age*, *temperament and diathesis*, *idiosyncrasies*, *habits of life*, *race and mental impressions*.

Women, as possessed of more delicate organization than men, rarely require the same doses. Avoid aloes during *pregnancy;* sulphuric acid during *lactation*.

Old age and children do not bear doses proportionately to manhood and youth. *Excepting under urgent circumstances, an opiate should never be administered to an infant.* Blisters and leeches make more decided impressions on children than adults, and the former are especially apt to induce ulceration and gangrene in the youth. *Per contra*, mercury is better borne proportionately in childhood (and old age) than in middle life. The following is the scale

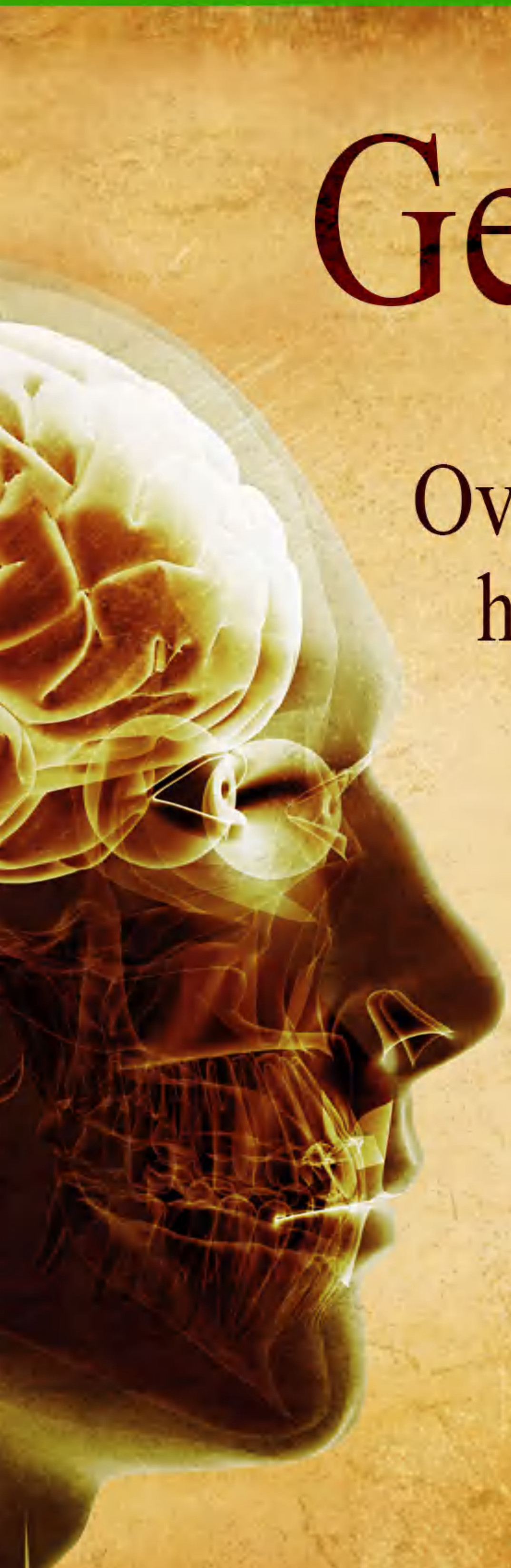
of doses employed at Guy's Hospital, London, *one* being the unit or adult dose.

AGE.	DOSE.	AGE.	DOSE.
1 month	1–20	7 and 8 years	1–2
3 months	1–15	10 to 12 years	2–3
6 months	1–10	13 to 15 years	3–4
9 month	1–9	18 to 20 years	5–6
1 year	1–7	21 to 45 years	1
2 years	1–6	50 years	5–6
3 years	1–5	60 to 70 years	3–4
4 years	1–4	80 to 90 years	2–3
5 and 6 years	1–3		

For other doses see new remedies.

Acid Arsenious	$\frac{1}{60}$	to $\frac{1}{12}$	gr
Acid Boric	5	to 10	grs
Acid Tannic	2	to 10	grs
Aconitia	$\frac{1}{400}$	to $\frac{1}{50}$	gr
Antimonii et Potassi Tartras	1	to 2	grs
Argenti Nitras	$\frac{1}{6}$	to ½	gr
Argenti Oxide	½	to 2	grs
Atropia Sulphate	$\frac{1}{100}$	to $\frac{1}{32}$	gr
Aspidosperma	15	to 30	grs
Auri et Sodii Chlorid	$\frac{1}{32}$	to $\frac{1}{16}$	gr
Bellad. fol	3	to 5	grs
Bellad. Rad	1	to 3	grs
Codeine	¼	to ½	gr
Creasotum	1	to 3	Gtt
Digitalinum	$\frac{1}{60}$	to $\frac{1}{30}$	gr
Digitalis	½	to 2	grs
Donovan's Solution	3	to 5	Gtt
Dover's Powder	3	to 10	grs
Elaterinum	$\frac{1}{16}$	to ½	gr
Emetine	⅛	to ½	gr
Ergota	20	to 30	grs
Ergotine	1	to 5	grs
Flower's Solution	3	to 5	Gtt

Gelsemium	2 to 8 grs
Gelsemium Ext	⅓ to 1 gr
Gelsemium Tinc.	8 to 20 min
Guaiacol	1 min
Hydrate Chloral	5 to 30 grs
Hydrarg. Chlorid. Corros	1/10 to ⅙ gr
Hydrarg. Chlorid. Mite	½ to 10 gr
Hydrarg. Iodid. Rubr	1/16 to ⅙ gr
Hydrarg. Iodid. Viride	1 to 3 grs
Hydrarg. Cum Creta	3 to 8 grs
Hydrastin	3 to 5 grs
Hyoscyamine	1/200 to 1/50 gr
Ingluvin	10 to 20 grs
Iodoform	1 to 3 grs
Ipecac—Expectorant ½ to 2. Emetic.	15 to 30 grs
Jalap	15 to 20 grs
Kino	10 to 30 grs
Lactucarium	10 to 20 grs
Leptandra	15 to 30 grs
Leptandrin	2 to 3 grs
Magnesia Sul	¼ to 1 oz
Manna	½ to 1 oz
Morphia Sulphate	⅛ to ¼ gr
Oil Cubebs	10 to 12 Gtt
Oil Pennyroyal	1 to 4 Gtt
Oil Savin	1 to 4 Gtt
Oil Tiglii	½ to 1 Gtt
Oil Wormseed	3 to 6 Gtt
Opium	½ to 1 gr
Pancreatin	2 to 5 grs
Paraldehyd	30 to 60 Gtt
Pepsin pure	½ to 2 grs
Pilocarpinum	⅛ to ¼ gr
Podophyllin	⅛ to ¼ gr
Potassa Bromide	10 to 30 grs



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POWDERED EXTRACTS.

Aconite Leaves	¼ to	1	gr
Aconite Root	1/20 to	⅕	gr
Aloes	1 to	5	grs
Belladonna Leaves, assayed	⅛ to	½	gr
Black Cohosh	3 to	10	grs
Black Haw	3 to	10	grs
Black Hellebore	1 to	4	grs
Calabar Bean, assayed		⅛	gr
Canadian Hemp	1 to	4	grs
Cannabis Indica	½ to	2	grs
Cascara Amarga	5 to	15	grs
Cascara Sagrada, laxative	1 to	3	grs
Cascara Sagrada, cathartic	3 to	8	grs
Cinchona, Calisaya, U. S. P., assayed	5 to	25	grs
Coca Leaves	10 to	25	grs
Colchicum Root, acetic, assayed	⅓ to	1½	grs
Colocynth Apple, U. S. P	1 to	2	grs
Colocynth Compound, U. S. P	5 to	20	grs
Condurango	3 to	8	grs
Conium Leaves	2 to	5	grs
Damiana	5 to	15	grs
Eucalyptus	3 to	10	grs
Foxglove	¼ to	½	gr
Gentian	5 to	10	grs
Golden Seal	2 to	10	grs
Guaiac	2 to	10	grs
Guarana, assayed	3 to	10	grs
Henbane	½ to	2	grs
Ignatia Bean, assayed	1/6 to	1	gr
Ipecac, assayed	1/20 to	½	gr
Jaborandi	3 to	10	grs

Jalap	1 to 5 grs
Jamaica Dogwood	2 to 10 grs
Lettuce, wild	4 to 12 grs
Lobelia	½ to 2 grs
Mandrake	2 to 4 grs
Nux Vomica, assayed	1/10 to 1 gr
Poison Oak	½ to 5 grs
Poke Root	1 to 5 grs
Pulsatilla	¼ to 1 gr
Rhubarb	2 to 20 grs
Sarsaparilla	4 to 10 grs
Senna, Alex	10 to 25 grs
Stramonium Leaves, assayed	¼ to 1 gr
Tonga	2 to 6 grs
Valerian	5 to 10 grs
Witch Hazel	1 to 10 grs

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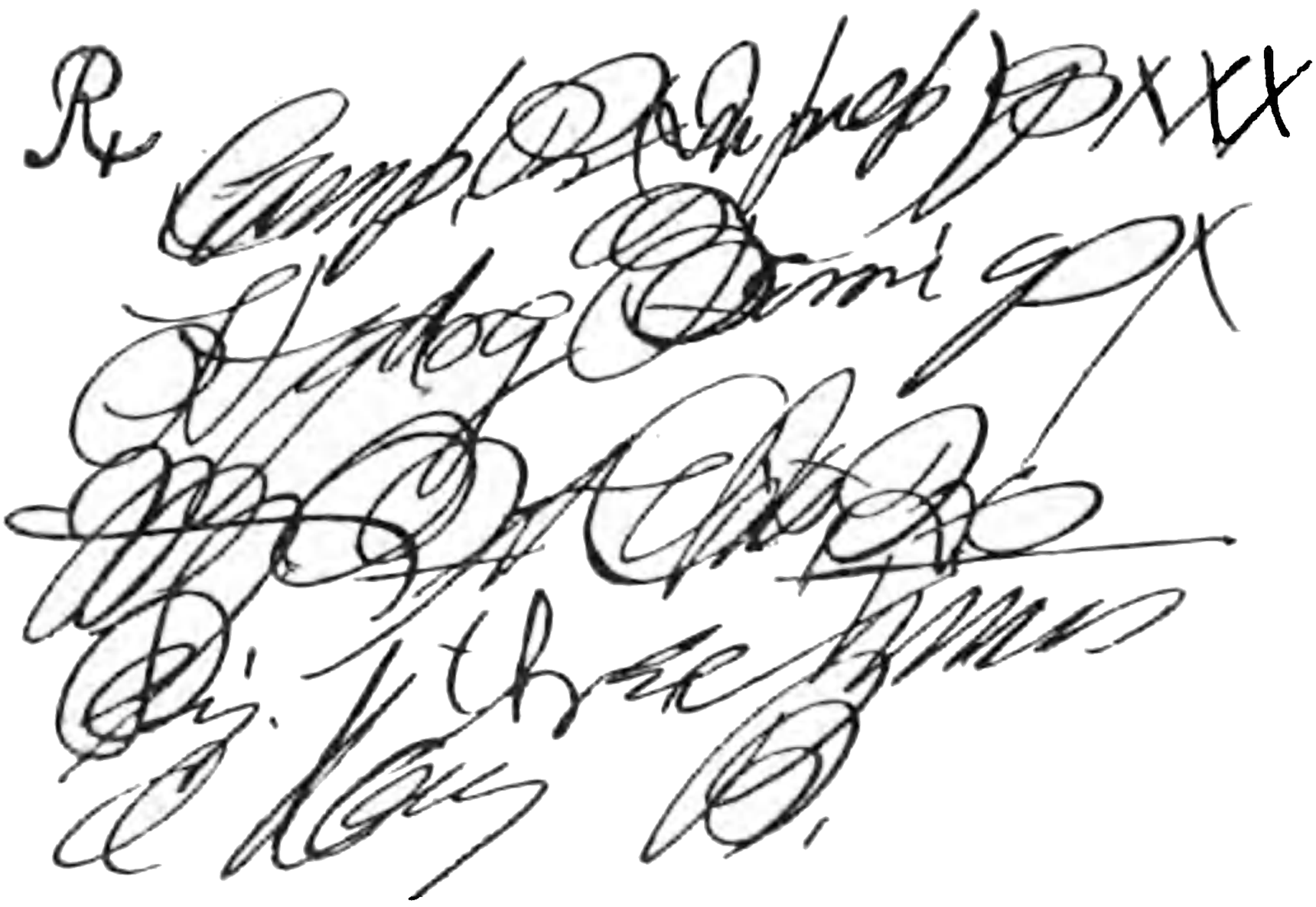

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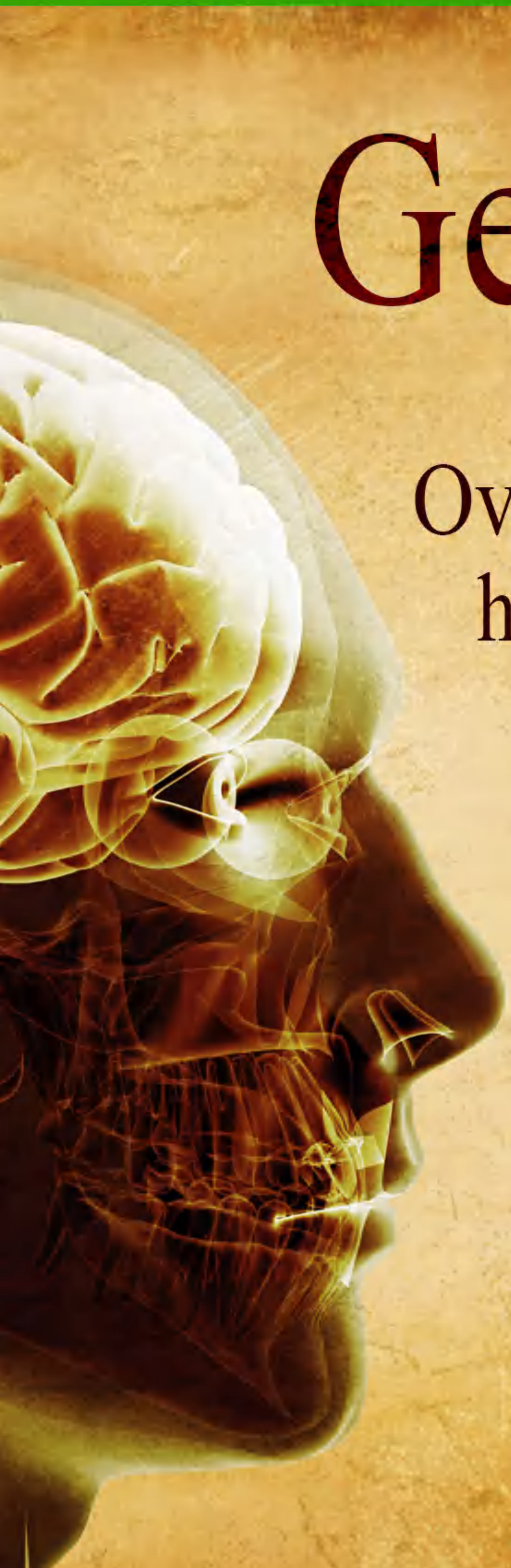

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