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THE VETERINARY PHARMACOPŒIA

GRESSWELL

SECOND EDITION

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THE VETERINARY PHARMACOPŒIA AND MANUAL OF COMPARATIVE THERAPY

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THE VETERINARY PHARMACOPŒIA,

AND

MANUAL OF COMPARATIVE THERAPY

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SECOND EDITION, REVISED AND ENLARGED

LONDON
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8, HENRIETTA STREET, COVENT GARDEN
1903

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TO HIS GRACE

THE DUKE OF PORTLAND, K.G., P.C.,

Master of the Horse,

This Work

IS,

IN ACCORDANCE WITH KIND PERMISSION,

RESPECTFULLY DEDICATED.

PREFACE TO THE SECOND EDITION.

This book is an advance on our first edition, the subjects with which it deals having progressed very rapidly in the meantime, and though we must expect further steps onward to be continually going on, we trust that the volume is now brought up to the present standard of knowledge, and that it will be helpful as a guide to practitioners and students of comparative therapeutics.

In the preparation of this second edition, we have made it our endeavour to work, so far as possible, on the lines of the British Pharmacopœia of 1898, from which we have therefore somewhat extensively borrowed; but we have also largely referred to, and gained information from, the Pharmacopœia of the United States of 1890. Other sources of inspiration were:—'Veterinary Medicines,' by Finlay Dun, F.R.C.V.S.; Sir T. Lauder Brunton's 'Pharmacology, Therapeutics, and Materia Medica,' 1893; Dr. J. Mitchell Bruce's 'Materia Medica and Therapeutics,' 1900; Dr. Hare's 'Therapeutics,' 1899; Dr. W. Murrell's admirable review of Therapeutics in the *Medical Annual* for 1902; Dr. Winslow's 'Veterinary Materia Medica and Therapeutics,' 1901; 'Veterinary Posology,' by W. G. A. Banham, F.R.C.V.S., 1901; Notes, etc., of the late Mr. D. Gresswell, F.R.C.V.S.; and the 'Equine Medicine,' by Professor J. B. and Dr. A. Gresswell.

The therapeutics of the first edition was mainly written by Dr. Albert Gresswell, who also added valuable notes in both the preceding and this issue, and looked over the proofs in each case.

Much has been derived from the long-continued extensive experience of the late Mr. D. Gresswell, F.R.C.V.S., also from that of Mr. Charles Gresswell, M.R.C.V.S., late State Veterinarian for Colorado, and also from facts recorded by Professor James Brodie Gresswell, F.R.C.V.S. For some of the modes of preparation we are indebted to Mr. Edmund Gresswell, L.R.C.V.S.,

who has had a lifelong practical acquaintance with pharmaceutical preparations.

The alterations and additions are numerous. Having regard to the fact that the science of comparative posology is in its initial stages, we decided upon introducing into the tables of doses those for human beings. The object of including them is twofold. Special attention is thereby meant to be drawn to the interdependence of, and connections between, the actions of drugs on mankind and animals respectively. In addition, they are given so as to form a guide, if possible, to the doses for animals, more particularly, of course, in regard to drugs which have not as yet been much used in veterinary practice.

As a rule, the British Pharmacopœia doses for man are given, although perhaps in certain cases the quantities therein mentioned may be thought too large or too small. Indeed, no scale of dosage can be considered as more than roughly approximate, and it is always best to err, if at all, on the safer side. So many difficult and intricate questions should be considered in estimating doses, and in any one given animal both high and low limits vary extremely. Besides the estimation of the various factors—age, sex, weight, quality of substance, species, race, climate, idiosyncrasy, constitutional state, both as regards health, and in reference to the various abnormal conditions produced by diseases and disorders, mode of life, object for which the drug is given, tolerance, or the reverse quality—we should not forget that the amount which ought to be given depends on the number of doses proposed, on the intervals betwixt the separate times of exhibition, and the hour in relation to meals, and other recurring conditions.

In directions for pharmaceutical operations we have used the metric system for the most part, but inasmuch as many have learnt doses by rote in the ordinary measures used in this country, we thought it would be too great a change to introduce the metric system into the posological tables, and might, moreover, lead to mistakes.

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December, 1902.

AN INTRODUCTORY NOTE ON COMPARATIVE THERAPY.

The actions of drugs on man differ from those on the lower animals in conformity with the much higher development of the brain in human beings. In cases where the structure of an organ or tissue is nearly the same or similar, the action of a drug is likewise similar. For example, carbonic oxide and nitrites cause similar changes in the blood of frogs, dogs, and man, curare paralyzes the motor nerves in all, and veratrine stimulates and paralyzes the muscles.

Again, ipecacuanha and tartar emetic cause vomiting in dogs and men, but not in rabbits, simply because the position of the stomach prevents vomiting in them. It is also a very rare occurrence for either horses or cattle to vomit.

In frogs morphine causes convulsions, whilst in pigeons it only lowers the temperature many degrees. In frogs the cerebral hemispheres are very slightly developed, in man very largely. Hence, in man the convulsant action is almost masked, whereas its narcotic effect is great. Yet in children and races of mankind in which the cerebrum is less markedly developed the convulsant action of morphine is seen.

Some persons can take large doses of morphine without much visible effect; and others can take arsenic, others tobacco, others alcohol, in much larger quantities than can the majority of human beings.

Whilst the muscles of the *Rana esculenta* are but slightly affected by caffeine, those of the *Rana temporaria* are made rigid. This difference between two species of frog shows how careful one should be in drawing therapeutic inferences. It is possible that

the ancestors of the *Rana esculenta* had been associated with human beings, and hence indirectly with coffee, thereby acquiring tolerance.

The following rules of posology are merely to be considered as furnishing rough guides:

1. If a *human being* 6 months old takes x, a human being 1 year old takes $2x$; 2 years, $3x$; 11 years, $12x$; 24 and more years, $25x$.

2. *Cat*,[1] full-grown, takes $\frac{25x}{2}$.

3. *Dog* $\frac{1}{2}$ to 1 year old takes $25x$; 3 to 6 months, $\frac{25x}{2}$; $1\frac{1}{4}$ to 3 months, $\frac{25x}{4}$; 20 to 45 days, $\frac{25x}{8}$; 10 to 20 days, $\frac{25x}{16}$.

4. *Pig* $1\frac{1}{2}$ years old takes $50x$; 9 to 18 months, $25x$; $4\frac{1}{2}$ to 9 months, $\frac{25x}{2}$; $2\frac{1}{4}$ to $4\frac{1}{2}$ months, $\frac{25x}{5}$; 1 to $2\frac{1}{4}$ months, $\frac{25x}{10}$.

5. *Sheep* or *goat* 2 years old takes $100x$; 1 to 2 years, $\frac{100x}{2}$; $\frac{1}{2}$ to 1 year, $\frac{100x}{4}$; 3 to 6 months, $\frac{100x}{8}$; 1 to 3 months, $\frac{100x}{16}$.

6. *Horse* 3 years old (with average weight of 1,000 pounds) takes $25x \times 16$ ($=400x$); $1\frac{1}{2}$ to 3 years, $25x \times 8$; 9 to 18 months, $25x \times 4$; $4\frac{1}{2}$ to 9 months, $25x \times 2$; 1 to $4\frac{1}{2}$ months, $25x$.

7. *Ox* 2 years old takes half as much again as for horse—viz., $600x$; 1 to 2 years, $300x$; $\frac{1}{2}$ to 1 year, $150x$; 3 to 6 months, $75x$; 1 to 3 months, $\frac{75x}{2} = 37\frac{1}{2}x$; or perhaps a better rule is that an ox of 2 years takes $25 \times 25x = 625x$ (25 times an adult man's dose).

8. If a human being 6 months old takes x; a human being of about 11 years takes $12x$; cat of ordinary size and full-grown $12\frac{1}{2}x$; dog 3 to 6 months $12\frac{1}{2}x$; pig $4\frac{1}{2}$ to 9 months $12\frac{1}{2}x$; sheep or goat 3 to 6 months $12\frac{1}{2}x$; horse 1 to $4\frac{1}{2}$ months $25x$; ox 1 to 3 months $37\frac{1}{2}x$ or $39\frac{1}{16}x$.

9. Again, if a human being of average size and full weight takes $25x$,

[1] Some authors give a cat's dose nearly the same as a dog's, and in some cases a dog takes more than a man, nearly a quarter as much again. In the case of some drugs, however—*e.g.*, strychnine—a dog takes much less than a man. Also some say a sheep's should be about one-quarter or one-fifth of an ox's=six or five times a man's; but we usually say about four times.

Cat, being of average size and full weight, takes $12\frac{1}{2}x$.
Dog ,, ,, ,, $25x$.
Pig ,, ,, ,, $50x$.
Sheep or goat ,, ,, ,, $100x$.
Horse ,, ,, ,, $400x$.
Ox ,, ,, ,, $600x$,
or perhaps $25 \times 25x = 625x$.

10. Some will prefer this simple, but somewhat rough, guide:

Man and dog	1
Cat	$\frac{1}{2}$
Pig	2
Sheep	4 or 5
Horse	16
Ox	24 or 25

Some salient points are to be noticed—viz., *e.g.*, that cats and dogs have a special tendency to be poisoned by strychnine and chloroform, and pigs by common salt.

Rabbits can take belladonna with comparative safety, because in them the vagus nerve exercises but little of that restraining power over the heart which it exerts in dogs and men, so that the paralysis of that nerve in rabbits which the drug causes in all three animals is not of so much importance as it is in men and dogs.

Generally, animals which live on flesh or on all kinds of diet have a special aversion to narcotics, especially to vegetable ones, thus differing from the herbivora, which no doubt have in the course of ages acquired a certain amount of tolerance to those drugs, or others allied to them.

Again, ruminants have such a complex digestive apparatus that they can take enormous quantities of cathartic medicines given by the mouth; but their greater tolerance rests to a large extent on the mechanical basis, because if the cathartics be administered hypodermically, or intravenously, they cannot take very much more than horses can. For instance, we say that the dose for an average ox is twenty-five times that of a human being. Hence, 15 grains of bicarbonate of potassium being correct for a man, about 375 grains will be the right amount for an ox = 6 drachms 15 grains, and this would be a small dose; but if we say a single large dose of Epsom salts for a man is about 3 drachms, that for an ox would be only 75 drachms, or 9 ounces

3 drachms, which would be a very small dose, an ox generally taking about 16 ounces or more, even fifty times as much as a man.

Females take more turpentine and less ergot than males, and sometimes probably more narcotics; and no doubt these rules, gained by experience, are usually founded upon mechanical or easily understood reasons.

It is most important that one should, if at all, err on what is very generally the safer side, and give too little rather than too much of any drug. This precaution is obviously most necessary when one is using the more poisonous agents, and, indeed, it may often be best to abstain from employment of these altogether in many cases. There are very many valuable drugs which are quite safe. The late Mr. D. Gresswell, and many of the older veterinarians used, for example, gentian very largely as an ingredient in tonic mixtures. Some years ago one felt disinclined to believe in the great efficacy of such remedies as gentian, calumba, chirata, etc.; but the wheel of thought and opinion turns round as the world revolves, and now we counsel a return to the best of some of the seemingly antiquated remedies. On the other hand, we do not now speak in such decisive tones of the wonderful value of some of the remedies so much in vogue about a decade ago; and perhaps even some harm may have been occasionally done by the too free use of—*e.g.*, the salicylates and the various antipyretics, although, when required and carefully given, they produce good results. In such matters as these everything depends on the personal acumen and keen observation of the individual practitioner.

Although we have above attempted to indicate rules for calculating doses, it should always be borne in mind that circumstances alter cases. In prescribing, for any given patient, all the conditions should be considered, and this rule being followed, and always being careful to be on the safe side, we may always hope to do good and not harm, to the suffering creatures, who cannot speak and tell us how the medicine agrees with them, a point as to which one makes constant inquiry of human patients. Often, too, one makes changes in the prescriptions for the latter, in obedience to their request, and palatability is a great point, which cannot be lost sight of, when dealing with mankind. Besides, one frequently meets with astonishing idiosyncrasies, and even if some of these be mere questions of fancy, they have still considerable weight, and need persistent watchfulness and care. The fact that animals

can make no verbal complaint, albeit that their gestures and actions are often highly significant, should not be regarded as by any means lessening one's responsibility, although it certainly increases the difficulty to a very large extent. Facility and success in prescribing, either for human beings or animals, need continual perseverance, industry, and caution. One of the chief points to bear in mind is never to do any harm, and as a rule to give small doses rather than large ones, especially when using the stronger medicines. Another great difficulty is: when, and to what extent it is wise to use the newer remedies in preference to older ones, and it is well to bear in mind that frequently the former do not stand the test of experience, and ultimately some may be put aside, whilst those which they have for a time displaced, come to the front again, confidence in their value having been gradually re-established. Hence, conservative and progressive therapeutics should, so far as possible, go hand-in-hand, and we should not allow the new ideas and drugs to make us reject well-established remedies and measures.

In the next few years serum-therapy, which, however, does not enter into the scope of this work, may not improbably rest on a chemical basis, and as the sciences of physics and chemistry are pushed forward in this respect, we may hope for a wonderful advance in our powers of healing, and averting death. Much has already been done, and most splendid researches are now being carried out.

The Veterinary Pharmacopœia and Manual of Comparative Therapy.

ABSINTHIUM (A.).[1]

Synonym.—Wormwood.

Description.—The leaves and tops of the plant called *Artemisia Absinthium*, which is a member of the Compositæ. The leaves are about 5 centimetres in length, petiolate, silky, and roundish-triangular. The heads are about 3 millimetres in length, and have numerous small yellow tubular florets. The smell is aromatic and the taste bitter.

Action.—Absinthe is a spinal stimulant, and, like atropine, it augments the tendency to epileptic convulsions in dogs.

Dose.—

Cat	- - -	2 to 6 grains.
Dog	- - -	4 to 10 ,,
Swine	- - -	10 to 30 ,,
Horse	- - -	2 to 4 drachms.
Ox	- - -	3 to 6 ,,

ACACIA (A. and B.).[1]

Synonyms.—Gum Acacia, or Gum Arabic.

Natural Order.—The acacia-tree belongs to the Leguminosæ (Mimoseæ).

[1] The letters (A. and B.) denote that the drug after which either is placed is included in the United States Pharmacopœia or the British Pharmacopœia, as the case may be, and usually that the description in the text is partly taken from one or other of those sources respectively. If both letters are inserted it means that the drugs are in both Pharmacopœias, and in this case the description is based almost exclusively on that of the British Pharmacopœia; but any important difference is as a rule stated. If neither letter appears after the name of the drug, the inference to be drawn is that the preparation does not appear in either Pharmacopœia at the date of writing.

Chemical Composition.—Gum acacia consists of *arabin* or *arabic acid*, or *gummic acid*, whose formula is $C_6H_{10}O_5$, combined with calcium, and in smaller amounts with potassium and magnesium, and 17 per cent. of water.

Characters.—Gum acacia is a gummy exudation from the stem and branches of *Acacia Senegal*, and other species of acacia. It occurs in roundish, ovoid, or vermicular tears or masses varying in size from about half an inch to about an inch in length, or in angular fragments with shining surfaces. The separate pieces or tears glisten, and may be colourless, yellowish, brownish, or reddish. They may be either more or less transparent, compact, and not easily broken; or opaque, owing to the existence of numerous minute cracks, which also render them very brittle. The fractured surfaces of the spheroidal fragments in which gum acacia occurs especially possess a vitreous appearance. The taste is bland and mucilaginous, and there is no odour. The gum is insoluble in alcohol, but entirely soluble in water, forming a clear mucilaginous solution, very well suited for adhesive purposes.

Tests:

Positive.—An aqueous solution forms, with solution of subacetate of lead, an opaque, white, gelatinous precipitate.[1]

Negative.—If a solution of iodine is added to the powder or to a cold solution, no violet or blue colour is produced, unless the specimen has been adulterated with starch.

Preparation.—Mucilago acaciæ. Gum, 4; water, 6.

Uses.—The aqueous solution is used for adhesive purposes, while the mucilage is employed to suspend powders.

Therapeutics.—Mucilage of gum acacia is useful as a demulcent and emollient in coughs, sore-throat, and also in cases of irritation of the stomach and intestines, due to inflammation or the ingestion of poisons. It is also useful as a matrix for preparing fluids to be injected into the bowels and bladder in cases of inflammation of these organs, for which purposes starch or linseed gruel is equally suitable.

Dose.—The dose of gum acacia is immaterial:

Horses and Cattle	2 ounces or more.
Sheep	1 ounce ,,
Dogs	30 grains ,,

[1] Borax and ferric salts also render acacia solution gelatinous.

ACETANILIDUM (A. and B.).

Acetanilide.

Synonyms.—Phenyl-acetamide; Antifebrin.

Formula and Composition.—The formula is

$$CH_3 \cdot CO \cdot NH \cdot C_6H_5,$$

and the substance is obtained by acting upon aniline with glacial acetic acid.

Characteristics. — It has the form of glistening lamellar crystals, which are devoid both of colour and odour, but possess a feebly pungent taste. When dry it melts at 113·5° C. It is freely soluble in ether, benzol, or chloroform, in 4 parts of alcohol (90 per cent.), in 18 parts of boiling water, or in 200 parts of cold water. If it be boiled with solution of perchloride of iron, a red colour is produced, and this redness almost disappears on the addition of hydrochloric acid. Again, if to the drug solution of hydroxide of potassium be added, and the mixture be heated until the smell of aniline can be detected, and a few drops of chloroform be then added, gentle heat being still applied, the powerful odour of phenyl-isonitrile (isocyanide) is produced. Also, if to a cold saturated aqueous solution a solution of bromine be added, a yellowish-white precipitate is produced. These two last tests distinguish acetanilide from phenacetin. If heated in air it burns, and no residue is left. Also with sulphuric acid, or with cold nitric acid, it yields a solution devoid of colour. The absence of free acid should be proved by the fact that a cold saturated solution in water does not affect a solution of litmus, and that it is not affected by solution of perchloride of iron proves that acetone, phenazone, and salts of aniline are not present.

Therapeutics.—Acetanilide is a strong, safe, and useful antipyretic, and is preferable to phenazone, because it is as efficacious in one-quarter the dose, and has a steadier action, with less danger of causing collapse, although it must be given cautiously, owing to a liability of this untoward result, if the drug be freely or unsuitably used. In febrile conditions it quickly reduces the temperature, the effect of an average dose probably persisting for about five hours. It also retards the pulse, and in human beings causes frequently a quiet sleep. In a case of erysipelas 2 grains every two hours lessened the temperature slowly and steadily without collapse (Brunton). It also acts as a nervous sedative, has also some analgesic effect, and is sometimes useful in cases

of neuralgia, megrim, tabes dorsalis, and similar complaints of human beings.

For lowering the temperature in cases of influenza and of acute rheumatism in the horse, it may be advantageously given together with salicylate of sodium, and with or without spirit of ammonia, according to the state of the animal. For acute bronchitis and pneumonia of horses, as also in scarlet fever, purpura, pyæmia, and septicæmia, and other conditions associated with pyrexia, it is useful. Guinea-pigs and dogs take relatively large doses without poisonous effect. It is usually given as a powder, and may be mixed with a bran mash or other food for horses.

The drug may be given in suspension in fluid with a mucilage, or dissolved in wine or diluted spirit; also compressed as a tablet, with or without other substance, or merely mixed with a powder such as Pulvis Trag. Co.

Dose.—*Man* - - - 1 to 4 grains.
Dog - - - 2 to 8 ,,
Pig - - - 5 to 20 ,,
Horse - - - 1 to 2 drachms.

ACETUM.

Vinegar.

Chemical Composition.—An acid liquid which contains 5·41 per cent. of real acetic acid, $H_2CH_3O_2$, or $CH_3 \cdot COOH$.

Mode of Preparation.—From malt and unmalted grain by the acetous fermentation, and also by subjecting wine to the action of atmospheric oxygen. The wine is made to trickle downwards in a thin stream through a large oaken tube filled with beech chips, a current of air being forced upwards through the chips. *Wood vinegar* is prepared from the lighter parts of the crude distillate, obtained by heating wood in closed vessels.

Characters.—Vinegar is a brown liquid, possessing a characteristic odour, and an average specific gravity of 1·018.

Impurities.—*Sulphuric Acid*, a little of which is, however, said to make it keep better. The presence of 1 part of sulphuric acid in 1,000 of vinegar is legal. *Lead*, from the vessels in which it is kept.

Tests:

Negative.—The absence of lead or certain other metallic impurities may be proved by the fact that the gas, sulphide of hydrogen, when added to it in excess, either as a gas or in aqueous solution, produces no change of colour.

If 10 minims of an aqueous solution of chloride of barium be added to a fluid ounce of the vinegar, and the precipitate, if any, be separated, a further addition of the reagent should give no further precipitate of sulphate of barium.

Therapeutics.—Internally vinegar is seldom given, but it is sometimes

administered with the object of allaying heat. It is styptic, astringent, and diuretic. It is sometimes also employed as a lithontriptic for calculi and urinary deposits, which consist of phosphates or carbonates of calcium or magnesium. It is also antidotic to the alkalies and their carbonates in cases of poisoning by them. Externally, vinegar diluted with water is useful as a local application for bruises and sprains, and may also be employed for sponging the skin where the internal temperature is very high.

Dose.—*Dog* - - - - - - ½ to 1½ fluid drachms.
Pig - - - - - - 1 to 2½ ,, ,,
Horse - - - - - - 1 to 2 ,, ounces.
Ox - - - - - - 1 to 3 ,, ,,
Man - - - - - - 1 fluid drachm to 1 fluid ounce.

ACETUM CANTHARIDUM (B.).[1]

Vinegar of Cantharides.

Synonym.—Acetum Cantharidis.

Natural Order.—The Spanish Fly, *Cantharis vesicatoria*, is a member of the Coleoptera.

Chemical Composition.—Vinegar of Cantharides is an impure solution of cantharidin[2]—$C_{10}H_{12}O_4$, in acetic acid.

Mode of Preparation.—Take of

Bruised Cantharides, 100 grammes.
Glacial Acetic Acid } equal volumes of each in
Distilled Water } a sufficient amount.

Mix 100 grammes of Cantharides in a mixture of 450 c.c. Glacial Acetic Acid and an equal volume of Distilled Water for one day, place in a percolator, and, when the liquid ceases to flow through, add more of the same fluid mixture to the percolator, so as to produce 1,000 c.c. in all.

ACETUM IPECACUANHÆ (B.).

Vinegar of Ipecacuanha.

Mode of Preparation.—Mix together 1 fluid part of Liquid Extract of Ipecacuanha, 2 fluid parts of Alcohol (90 per cent.), and 17 fluid parts of Diluted Acetic Acid, filter, and add sufficient of the last ingredient to make 1 pint in all.

Dose.—*Man and Dog* - - 10 to 30 minims.

[1] The British Pharmacopœia name is Acetum Cantharidis, Vinegar of Cantharides; but a more literal rendering would be Vinegar of Cantharis.

[2] Cantharidin, possibly an acid, has the form of shining colourless plates, is volatile, soluble in ether, acetic ether, glacial acetic acid, chloroform, alcohol and oils, and is a highly irritant body.

ACETUM SCILLÆ (A. and B.).

Vinegar of Squill.

Natural Order.—The *Urginea Scilla*, from the Mediterranean coasts, belongs to the Liliaceæ.

Mode of Preparation.—Take of

Squill,[1] bruised, 1 part;
Diluted Acetic Acid, 8 fluid parts.

Macerate the squill in the acetic acid, as directed in the case of Tinctures, for seven days; then strain with expression, and filter.[2]

Character.—The specific gravity is about 1·038.

Preparation.—Oxymel Scillæ.

Therapeutics.—Squill acts as a stimulating expectorant. It is sometimes given to the dog, with the object of aiding the expectoration of mucus. For this purpose it may be combined with Wine of Ipecacuanha. This preparation proves valuable in cases of bronchitis after the acute stage is past.

Dose.—*Man and Dog* - - 10 to 30 minims.
Pig - - - ½ to 1 fluid drachm.
Horse - - - ½ to 1 „ ounce.

ACIDA.

Acids.

General Characters.—Most acids have a sour taste,[3] and redden blue litmus.[4] They combine with alkalies, and so form compounds, which do not turn red litmus-paper blue. They may be looked upon as compounds of hydrogen with certain different radicals. Hydrogen is an element which is readily displaced by other bases.

Mode of Preparation.—Acids are very generally prepared by liberating them from their alkaline salts by means of sulphuric acid. If volatile, they are separated by distillation; if non-volatile, by crystallization. Hydrocyanic acid is obtained from ferrocyanide of potassium, not from the cyanide. Citric and tartaric acids are prepared from the citrate and the tartrate of calcium respectively. When sulphuric acid is added to them, sulphate of calcium is

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[1] Squill is obtained by slicing the bulb and drying the slices.

[2] The United States Pharmacopœia directs 100 grammes of Squill in No. 30 powder to be macerated with 900 c.c. Diluted Acetic Acid for a week, with frequent stirring, the mixture to be strained through muslin, and the mass to be washed on the strainer with a further sufficient amount of the same acid to make 1,000 c.c., and then the 10 per cent. product to be filtered.

[3] Boric acid and phenol do not give a sour taste.

[4] Phenol does not redden blue litmus. It is really an alcohol, though in chemical combinations it acts like an acid.

formed, and is removed from the acids by decantation or filtration. In order to prepare citrate of calcium, chalk is added to boiling lemon-juice, and the colouring matter is washed away from the precipitate by hot water in preference to cold, because citrate of calcium is less soluble in hot than in cold water. The following are exceptions to the rule that acids are prepared from salts by means of the action of sulphuric acid upon them : Arsenious, Benzoic, Carbolic, Gallic, Hydrobromic, Oleic, Oxalic, Phosphoric, Sulphuric, Sulphurous, Salicylic, and Tannic Acids.

General Action of Acids.—The acids combine with electro-positive or basic substances when in contact with them. All the tissues of the body are alkaline. The acids primarily neutralize these alkalies, and if albumin is dissolved in them it will be precipitated, and then, if the acid is in sufficient quantity, it will redissolve the precipitated albumin, forming acid-albumin. When added to blood, they precipitate albuminous substances and decompose the hæmoglobin, forming a substance which holds oxygen with greater tenacity than hæmoglobin does. They coagulate myosin and produce rigidity in muscles.[1] Sulphuric and phosphoric acids take up water readily, and completely decompose the tissues if applied to them. Nitric acid does not in great measure redissolve the albumin precipitated by it, and hence a cloak to its further action is produced, so that it does not penetrate so deeply as sulphuric acid. Round the tissue killed by the acids inflammation ensues, and an *eschar* is produced. When the action is milder, inflammation of the surface of the dermis and *vesication* are produced. In still milder actions they precipitate albumin, act as *irritants*, and cause contraction of the bloodvessels. Sometimes merely a temporary congestion subsequent to the contraction is produced. Then they are said to act as *rubefacients*.

ACIDUM ACETICUM (A. and B.).

Acetic Acid.

Chemical Composition.—One hundred parts by weight contain 33 parts by weight of real acetic acid, or hydrogen acetate, $CH_3 \cdot COOH$, or $HC_2H_3O_2$, and 67 parts of water.[2]

Mode of Preparation.—It is an acid liquid obtained from wood by destructive distillation, and subsequently purified; also by the oxidation of ethylic alcohol.

Characters.—Acetic Acid is a colourless liquid which possesses a strongly acid reaction, and a pungent and very characteristic odour. Its specific gravity is 1·044. Each gramme requires for

[1] On the whole, it may be said that acids cannot be given internally with much benefit. Experience would rather seem to show that they are of but little use therapeutically, and may do very great mischief, unless used with a considerable amount of caution, in small doses, freely diluted, and only seldom repeated.

[2] United States Pharmacopœia Acetic Acid contains 36 per cent. by weight of hydrogen acetate and 64 of water.

neutralization 5·5 c.c. of the volumetric solution of sodium hydroxide.

Tests:

Positive.—It gives a cherry-red colour with perchloride of iron.

Negative.—When evaporated, acetic acid leaves no residue.

It gives no precipitate with hydrogen sulphide, nor with barium chloride, nor with silver nitrate.

If acetic acid is mixed with water and hydrochloric acid and put into a small flask, and then a few pieces of granulated zinc are added, effervescence results, owing to the evolution of hydrogen. The absence of hydrogen sulphide may be made evident by the fact that a slip of bibulous paper, moistened with a solution of subacetate of lead, does not become discoloured when held for about five minutes over the mouth of the flask. Should it, however, show a deposit of glistening sulphide of lead, the presence of impurities in some one of the materials present is proved thereby.

Therapeutics.—Stimulant, astringent, corrosive, and vesicant. It is not administered internally. Externally, strong acetic acid has been employed as a corrosive for warts and corns.

ACIDUM ACETICUM DILUTUM (A. and B.).

Diluted Acetic Acid.

Mode of Preparation.—Mix 124·7 c.c. of Acetic Acid with enough Distilled Water to make 1000 c.c. in all.

Characters.—The specific gravity is 1·006.

One gramme requires for neutralization 7·1 c.c. of a decinormal volumetric solution of sodium hydroxide. It contains 4·27 per cent. by weight of real acetic acid, or hydrogen acetate, $CH_3 \cdot COOH$, or $HC_2H_3O_2$.[1] One fluid ounce, therefore, contains 20·596 grains of real acetic acid.

Preparations:

Acetum Scillæ.
Liquor Morphinæ Acetatis.

Therapeutics. — Diluted acetic acid is used for the same purposes as vinegar.

[1] United States Pharmacopœia Diluted Acetic Acid contains 6 per cent. by weight of hydrogen acetate, and has specific gravity 1·008.

Dose.—*Man-* - ½ to 2 fluid drachms.
Dog - - ½ to 1½ ,, ,,
Pig - - ½ to 3 ,, ,,
Horse - - ½ to 2 ,, ounces.

The doses of the preceding stronger acid are $\frac{1}{10}$ of the above.

ACIDUM ACETICUM GLACIALE (A. and B.).

Glacial Acetic Acid.

Chemical Composition.—Glacial Acetic Acid is simply a concentrated form of ordinary acetic acid. It contains 99 per cent. of real acid, or hydrogen acetate, $CH_3 \cdot COOH$, or $HC_2H_3O_2$.

Mode of Preparation.—Distil acetate of sodium, from which the water has been expelled by heat, with sulphuric acid, by which means sulphate of sodium is formed, and acid distils over. If the product shows any sulphurous acid, when tried by the subacetate of lead and hydrochloric acid test, it should be shaken with dioxide of manganese, and redistilled. Any sulphurous acid which may be present is thus converted into sulphuric acid, and remains as sulphate of manganese in the retort.

Characters.—Being very nearly three times as strong as acetic acid, it possesses an especially pungent and very characteristic odour.

When cooled to about 1·1° C. it crystallizes, and remains crystalline until the temperature is raised to 15·5° C. Below the ordinary temperature of the air, then, it is a crystalline solid, while above it it is a colourless liquid.

The specific gravity varies, that of the solid form being about 1·0655; while when liquefied, and at 15° C., it is about 1·058, increased by adding 10 per cent. of water, thus differing from a diluted acid of 46 per cent., which has the same specific gravity.

Tests:

Quantitative.—A quantity weighing 1 gramme, if mixed with 50 c.c. of distilled water, requires for neutralization 16·6 c.c. of the volumetric solution of hydroxide of sodium.

Negative.—To prove the absence of sulphurous acid, see Acetic Acid.

Therapeutics.—Glacial Acetic Acid is rubefacient, vesicant, and caustic. It is not administered internally.

ACIDUM ARSENIOSUM (B.).[1]

Arsenious Acid.

Synonyms.—White Arsenic; Anhydrous Arsenious Acid; Arsenious Anhydride; Arsenic Trioxide; Arsenious Oxide. *Vide* Oxidum Arseniosum. Its formula is As_4O_6, and it is obtained by roasting certain arsenical ores.

Dose.—

Man	- - -	$\frac{1}{60}$ to $\frac{1}{15}$ grain.
Dog	- - -	$\frac{1}{30}$ to $\frac{1}{10}$ „
Pig	- - -	1 to $1\frac{1}{2}$ grains.
Sheep	- - -	1 to 2 „
Horse	- - -	2 to 3 „

ACIDUM BENZOICUM (A. and B.).

Benzoic Acid.

Chemical Composition.—$C_6H_5 \cdot COOH$. Not chemically pure.

Mode of Preparation.—Benzoic acid is obtained by heating benzoin, when benzoic acid sublimes; also from toluene, hippuric acid, and from other organic compounds.

Characters.—It occurs in the form of crystalline plates and needles, which are feathery, flexible, and nearly colourless, and, although odourless, if quite pure possess an agreeable aromatic odour, similar to that of benzoin, when prepared from that substance. Benzoic acid, if pure, melts at 121·4° C., and boils at 249° C. If prepared from benzoin, it melts at 120° C. into a yellow liquid, turning brown, but not red, as the temperature is increased (absence of hippuric acid), and boils at about 238·9° C., then passing away as vapour burning with yellow flame, and with very little residue.

Solubility.—It is soluble in 400 parts of cold or 17 of boiling water, in its own weight of absolute alcohol, in 3 parts of alcohol (90 per cent.), in 2·5 of ether, 7 of chloroform, and in the fixed and volatile oils. With solutions of alkalies and of calcium hydroxide it forms benzoates, from which it is precipitated by hydrochloric acid, except in the case of very highly diluted solutions

[1] It is called Acidum Arsenosum, Arsenous Acid, in the United States Pharmacopœia.

Preparations:

Tinctura Camphoræ Composita, containing 2 grains in 1 fluid ounce.

Ammonii Benzoas.

Sodii Benzoas.

Therapeutics.—Benzoic acid and the benzoates have not as yet been much employed in veterinary practice. Benzoic acid is a stimulant and irritant when applied to raw surfaces. Being destructive to low forms of vegetable life, it acts well as an antiseptic. It is also diuretic, and gives rise to the excretion by the kidneys of hippuric acid. It acts on the bronchial mucous membrane as a stimulating expectorant, diminishing the secretion from the inflamed surface. Combined with other remedies, it has been found of value in treating cough in dogs. Acting also on the mucous membrane of the bladder, it is useful in treating cases of chronic inflammation of that organ. As an antipyretic, benzoic acid is not nearly so efficacious as salicylic acid. It has, nevertheless, been sometimes given in acute rheumatism alternately with salicylates, which cannot be taken for long.

Benzoate of ammonium acts as a diuretic and slight stimulant.

Benzoate of sodium has a powerful stimulant action on the liver of the dog, and may be administered with advantage in rheumatic arthritis in sheep.

Dose of Benzoic Acid:

Man	5 to 15	grains.
Dog	2 to 10	,,
Pig	5 to 20	,,
Horse	½ to 3	drachms.
Cattle	1½ to 4½	,,

Dose of Benzoate of Ammonium:

Man	5 to 15	grains.
Dog	2 to 10	,,
Pig	5 to 20	,,
Horse	1 to 3	drachms.

ACIDUM BORICUM (A. and B.).

Boric Acid.

Synonyms.—Boracic Acid; Hydrogen Borate.

Chemical Composition.—Boric acid is a tribasic acid, of which the formula is H_3BO_3.

Mode of Preparation.—It is obtained by acting upon sodium biborate (borax) with sulphuric acid, and also by the purification of native boric acid.

Characters.—Boric acid is a weak acid, existing in the form of transparent, colourless, odourless, pearly, six-sided crystalline plates, or as irregular masses of crystals. It is easily powdered, and unctuous to the touch. The taste is feebly sour and bitterish, and leaves a sweetish after-flavour in the mouth.

Solubility.—Boric acid is soluble in 3 parts of boiling water, in 4 of glycerine, in 30 of alcohol (90 per cent.), at 15·5° C., and in 30 of cold water.

Tests:

Positive.—Blue litmus-paper, or solution, becomes, when cold, wine-red when acted upon by boric acid, and a hot saturated solution of boric acid turns litmus bright red.

Turmeric paper, moistened with an aqueous solution, turns brown, and this colour remains unaltered in the presence of free hydrochloric acid. When a piece of turmeric paper is placed in a solution slightly acidified in this way and gently dried, it becomes brownish-red; and if solution of potassium hydroxide be added, the brown colour is replaced by green.

If alcohol is added to an aqueous solution of boric acid, or a borate, and a light applied, the flame presents a greenish hue.

The crystals liquefy when warmed, and on careful ignition lose 43·6 per cent. of their weight. The product solidifies when cooled, forming a brittle, glass-like mass.

Negative.—An aqueous solution of boric acid ought not to yield more than mere traces of white precipitates when treated with chloride of barium, nitrate of silver, or with oxalate of ammonium. Otherwise, the presence of sulphuric acid, chlorides, calcium, etc., may be indicated.

It should give no precipitate with sulphide of ammonium, showing the absence of lead and copper, nor impart a strong persistent yellow nor a violet tinge to a colourless flame, such as that of spirit, or of a mixture of air and gas, as in the Bunsen burner, by which coloration the presence of sodium would be indicated. Iron, magnesium, and ammonium should also be absent, except in minute traces.

Therapeutics:

Externally.—Boric acid has the property of destroying low organisms, and, being cheap, non-volatile, and not irritating, has

of late been much used in veterinary practice. The lotion and the ointment act very efficiently as antiseptic applications for surface-wounds, sores, and saddle-galls, in which cases they rapidly promote the healing process. Being non-irritating, boric acid does not interfere with the healing of wounds by first intention, and for fresh wounds it is therefore to be preferred to the preparations of carbolic acid, which are somewhat irritating and more powerful. For burns the ointment proves a valuable application, owing to its bland and soothing character. The ointment is also very useful for eczema in dogs and for cracked heels in horses, and wonderfully good for sore shins in race-horses. For foul surfaces it is customary in the first instance to use an ointment of iodoform, oil of eucalyptus, carbolic acid, and lard, and then, after a few applications, to employ the preparations of boric acid in its stead. In inflammation of the conjunctiva a lotion of 3 grains of boric acid to the ounce of water may be used with advantage.

As boric acid is non-volatile, its application does not require to be so often renewed as in the case of the volatile antiseptics.

Internally.—Boric acid has been found by us to be very useful in scarlet fever in horses and in distemper in dogs.

Dose.—*Man* - - - 5 to 15 grains.
Dog - - - 3 to 10 ,,
Pig - - - 5 to 20 ,,
Horse - - - 1 to 2 drachms.
Cattle - - - 1¼ to 3 ,,

ACIDUM CARBOLICUM (A. and B.).

Carbolic Acid. *Vide* Phenol.

ACIDUM CHROMICUM (A. and B.).

Chromic Acid.

Synonyms.—Anhydrous Chromic Acid; Chromic Anhydride; Chromic Sesquioxide; Chromic Oxide. *Vide* Oxidum Chromicum.

ACIDUM CITRICUM (A. and B.).

Citric Acid.

Chemical Composition.—An acid prepared from lemon-juice or from the juice of the fruit of various species of Citrus, the lime. The formula is $C_3H_4 \cdot OH \cdot (COOH)_3, H_2O$.

Mode of Preparation.—Take of

Lemon-juice, 4 pints;
Prepared Chalk, 4½ ounces;
Sulphuric Acid, 2½ fluid ounces;
Distilled Water, a sufficient quantity.

Heat the lemon-juice to its boiling-point, and add the chalk gradually until no more effervescence results. Collect the deposit on a calico filter, and wash it with hot water until the filtrate is free from colour. Mix the precipitate with a pint of distilled water, and then add gradually the sulphuric acid, previously diluted with a pint and a half of distilled water. Boil gently for half an hour while constantly stirring the mixture. Filter again to separate the acid solution, wash the insoluble matter with distilled water, and add the washings to the filtrate. Concentrate this solution to the density of 1·21, then allow it to cool; and, after about twenty-four hours, decant the liquor from the crystals of calcic sulphate which will have formed. Further concentrate the liquor until a film forms on its surface, and set it aside to cool and crystallize. Purify by recrystallization.

Characters.—Citric acid occurs in colourless prisms belonging to the trimetric system.

Solubility.—Citric acid is very soluble in water (three-quarters of its weight of cold, and half its weight of boiling water), less soluble in alcohol (90 per cent.), and to a small extent in ether. The diluted aqueous solution has a pleasant acid taste. A solution made of about 35 grains to the fluid ounce of water resembles lemon-juice in strength, and in that it undergoes decomposition, and becomes mouldy by keeping.

Tests:

Negative.—The aqueous solution is not darkened by hydrogen sulphide (absence of copper, iron, etc.), gives no precipitate with barium chloride (absence of sulphate), and none when added in excess to solution of acetate of potassium. One drop of ferrous sulphate solution, a few of solution of hydrogen peroxide, and excess of solution of potassium hydroxide, should produce no violet hue (absence of tartaric acid).

The aqueous solution gives no turbidity when sparingly added to cold lime-water.

Therapeutics.—Citric acid is not much used internally in veterinary medicine. In the convalescent stage of influenza and

other depressing fevers, citric acid, in doses of 1 drachm in the drinking water twice daily, has been found to be of great service, particularly in thoroughbreds.

Dose.—*Man* - - - 5 to 20 grains.
Dog - - - 10 to 20 ,,
Horse - - - 1 to 2 drachms.

ACIDUM GALLICUM (A. and B.).

Gallic Acid.

Natural Order.—Galls are excrescences on *Quercus Lusitanica*, which belongs to the Cupuliferæ.

Chemical Composition.—A trihydrobenzoic acid whose formula is $C_6H_2(OH)_3COOH,H_2O$.

Mode of Preparation.—Boil 1 part of coarsely powdered galls with 4 fluid parts of diluted sulphuric acid for half an hour, strain through calico while hot, collect the crystals which are deposited on cooling, and purify these with animal charcoal and by means of repeated crystallization.

Characteristics.—Gallic acid is generally of a pale fawn colour, but sometimes nearly white, and exists in the form of acicular prismatic crystals or silky needles, odourless, and of a slightly acid taste. It loses 9·5 per cent. of its weight when dried at 100° C.

Solubility.—About 100 parts of cold water, but only 3 parts of boiling water, 5 parts of alcohol (90 per cent.), 40 parts of ether, or 12 parts of glycerine, are required to dissolve 1 part of gallic acid.

Tests:

An aqueous solution of gallic acid gives no precipitate with an aqueous solution of isinglass, albumin, alkaloids, or potassio-tartrate of antimony.

Gallic acid leaves no residue when burned with free access of air, and its aqueous solution should not give a precipitate with solution of barium chloride. An aqueous solution gives a bluish-black precipitate with a persalt of iron.

Therapeutics.—The therapeutic actions and doses of gallic acid are the same as those of tannic acid, and will therefore be spoken of in detail under the latter heading.

Dose.—*Man* - - - 5 to 15 grains.
Dog - - - 4 to 10 ,,
Pig - - - 6 to 30 ,,
Horse - - - ½ to 1½ drachms.
Ox - - - 1 to 2½ ,,

ACIDUM HYDROBROMICUM DILUTUM (A. and B.).

Diluted Hydrobromic Acid.

Chemical Composition.—Diluted hydrobromic acid is an aqueous solution of the gas hydrogen bromide (HBr), of which it contains 10 per cent. by weight.

Mode of Preparation.—Take of

Bromine, 1 fluid ounce;
Distilled Water, a sufficient quantity;
Sulphide of Hydrogen, a sufficiency.

Place the bromine in a glass cylinder, and add to it 15 ounces of the water. Pass a current of the gas, sulphide of hydrogen, into the aqueous solution of bromine until its red colour has disappeared. Filter the fluid, and distil the filtrate. Reject the distillate until it is free from the odour of sulphuretted compounds, and then collect it until sulphuric acid begins to distil. Dilute the distilled acid with water until it has a specific gravity of 1·077 at the temperature of 15·5° C. Preserve in glass-stoppered bottles. From the rejected distillate more hydrobromic acid may be obtained by redistillation. It is also obtained by the distillation of bromide of potassium with concentrated phosphoric acid.

Characters.—Diluted hydrobromic acid is a colourless and odourless liquid with a sour taste.

Tests:

Positive.—It possesses an acid reaction.

Evaporated to dryness it leaves little or no residue. When chlorine water is added, bromine is liberated, and then the fluid becomes yellow.

With solution of nitrate of silver it yields a white curdy precipitate, insoluble in nitric acid, and only slightly soluble in solution of ammonia.

Quantitative.—810 grains by weight require for neutralization 1,000 grain-measures of the volumetric solution of soda.

Negative.—Diluted hydrobromic acid does not become discoloured on keeping.

It gives no precipitate with chloride of barium, nor any reaction for arsenium, barium, chlorides, phosphates, sulphates, or sulphites.

Therapeutics.—Two fluid drachms contain 12 grains of bromine, which are equal to about 18 grains of bromide of potassium. As yet it has been very little used in veterinary practice, and is not, as a rule, to be preferred in action to bromide of potassium, except, perhaps, in cases of phosphaturia in man, where the urine is alkaline and there is need for the action of bromine, when it is well to combine it with, *e.g.*, Syrup, Quassia, Cinchona, Gentian, or a small dose of Liq. Strychninæ. It does not cause the depression sometimes following bromide of potassium. Its results, however, do not fulfil expectations.

Dose.—*Man and Dog* - - - $\frac{1}{4}$ to 1 fluid drachm.

ACIDUM HYDROCHLORICUM (A. and B.).

Hydrochloric Acid.

Synonyms.—Muriatic Acid, Chlorhydric Acid, Hydrogen chloride.

Chemical Composition.—The aqueous solution here called hydrochloric acid is in reality composed of the gas chloride of hydrogen (HCl = 36·37, density = 18·185), which forms about 31·79 per cent. by weight of the solution, the remaining 68·21 per cent. being water.[1]

Mode of Preparation.—Hydrochloric acid is prepared by distilling a mixture of chloride of sodium, sulphuric acid, and water, and allowing the hydrochloric acid gas which is given off to pass into a receiver containing distilled water. Sodium sulphate remains in the retort.

Take of

Chloride of Sodium dried, 48 ounces;
Sulphuric Acid, 44 fluid ounces;
Water, 36 fluid ounces;
Distilled Water, 50 fluid ounces.

Pour the sulphuric acid (which must be pure) slowly into 32 fluid

[1] The United States Pharmacopœia acid has 31·9 per cent. by weight of hydrogen chloride, and 68·1 of water.

ounces of the water, being careful to avoid any sudden admixture. The temperature of the mixture will be raised. When the mixture of water and acid has cooled, add it to the chloride of sodium (which must be pure), previously introduced into a large flask capable of containing at least a gallon. The mixture should be poured through a bent tube-funnel. The gas, which is rapidly evolved, should be purified from any sulphuric acid or salt, which might be carried over by passing it through a small quantity of water contained in a wash-bottle. This is effected by connecting the flask with a bent glass tube, which passes through a cork closing the mouth of the flask, and dips into the remaining 4 ounces of water contained in the three-necked wash-bottle. The flask may be gently heated. The gas which is disengaged is conducted through the wash-bottle into a second bottle, which contains the distilled water, by means of a bent tube dipping about half an inch or so below the surface of the water. The evolution of gas should be allowed to continue until the resulting solution of the true acid measures 66 fluid ounces—*i.e.*, until the liquid has a specific gravity of 1·16. The bottle which contains the distilled water should be kept cool throughout the process; and this may be effected by placing it in a large vessel containing cold water, which must be kept at a low temperature.

The reaction which occurs is represented by the equation:

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

The readily soluble acid sulphate of sodium is left in the flask.

Characters.—This solution of chloride of hydrogen is a nearly colourless and very acid liquid, which, when exposed to the air, emits white vapours possessing a pungent odour, and a penetrating effect on delicate mucous membranes. Its specific gravity is 1·16.

Tests.—When evaporated to dryness, it leaves no residue.

With nitrate of silver it produces a curdy white precipitate of chloride of silver, which is soluble in excess of ammonia, but insoluble in nitric acid.

If a drop or two of diluted solution of sulphate of indigo be added to ½ fluid ounce of the acid, the mixture should gain a permanent blue tint.

Negative.—When diluted with four times its volume of distilled water, it should give no precipitate with solution of chloride of barium or with sulphide of hydrogen, and even if boiled should

not tarnish or alter the colour of bright copper foil, and should give no reaction indicating the presence of arsenium, lead, copper, iron, aluminium, bromides, iodides, sulphates, or sulphites. If it be copiously diluted with water, and solution of potassium iodide be added, together with mucilage of starch, no blue colour should be produced, thus proving the absence of free chlorine.

Quantitative.—1 gramme can be neutralized by 8·7 c.c. volumetric solution of sodium hydroxide, and 0·1 gramme is totally precipitated by 8·7 c.c. volumetric solution of nitrate of silver.

Therapeutics.—Hydrochloric acid is corrosive, very irritant, and even in small amount highly poisonous, stains mucous membranes white, and is not advisable for external use. The diluted acid next described is alone employed internally.

ACIDUM HYDROCHLORICUM DILUTUM (A. and B.).

Diluted Hydrochloric Acid.

Mode of Preparation.—Place 301·8 c.c. of Hydrochloric Acid into a glass flask, which has a mark on the neck indicating 1,000 c.c., and add Distilled Water until the mixture at 15·5° C., after being shaken, comes up to this mark.

Characters.—The specific gravity of the diluted hydrochloric acid is 1·052, and it contains 10·58 per cent. by weight of hydrogen chloride, HCl.[1]

Test.—When neutralized, it gives the reactions of chlorides.

Therapeutics.—Hydrochloric acid has tonic, astringent, and antiseptic properties, and is antidotic in poisoning by alkalies. When administered internally, it promotes digestion, and, being eliminated by the kidneys, it increases the volume of urine, modifying its reaction in the way of acidity. The alkalinity of the blood is lessened.

As a general tonic, after abatement of the acute stages of the contagious fevers, diluted hydrochloric acid in a few small doses acts as a valuable tonic. In such cases it may with great advantage be given in conjunction with the cinchona alkaloids.

In horses thriving badly from various causes, the acid may frequently prove beneficial, especially when combined with vegetable tonics. When the intestinal canal is the seat of

[1] The Diluted Hydrochloric Acid of the United States Pharmacopœia contains 10 per cent. of absolute HCl.

worms, hydrochloric acid, given internally, promotes more healthy digestion; and, together with other remedies, is of value in causing their dislodgment. In dyspepsia due to deficiency of acid it may be used, in conjunction with a medium dose of nux vomica and spirit of chloroform, with great advantage. Small doses of the diluted acid not only increase the flow of saliva, but also promote the flow of gastric juice, and in this way they aid the digestion. In young sucking animals suffering from diarrhœa, hydrochloric acid given in small doses often proves efficacious in preventing the acid fermentation and in allaying the irritation of the bowels. Pepsin may be administered together with the acid in such cases. Diluted hydrochloric acid should be given in about fifty times its bulk of water, and in small doses, only seldom repeated. All acids, especially those of a mineral nature, soon do their work, and if continued beyond a few doses work mischief.

Dose.—*Man* - - -) 2 to 10 minims.
Dog - - -)
Sheep and Pigs - 5 to 20 ,,
Horses - - - ½ to 2 fluid drachms.
Cattle - - - 1 to 3 ,, ,,

ACIDUM HYDROCYANICUM DILUTUM (A. and B.).

Diluted Hydrocyanic Acid.

History.—Hydrocyanic Acid was discovered by Scheele in 1782, but was possibly known to the Egyptian priests, who employed it for poisoning the initiated who had divulged the mysteries.

Chemical Composition.—Hydrocyanic acid is a solution of hydrogen cyanide, HCN, in water in the proportion of 2 per cent. by weight of the solution. Scheele's acid may contain from 1 to 5 per cent. of the anhydrous acid. The strength varies. It is employed largely in veterinary practice, especially for poisoning dogs,[1] being put up in 1-ounce bottles. A fresh bottle should be opened on each occasion. It should be kept in the dark, in small glass-stoppered bottles of amber-coloured glass, and the stoppers should have tied over them impervious cloth.

[1] An almost painless way of poisoning cats and dogs is to fix a sponge or cloth steeped in chloroform over the mouth and nose, the animal being then covered with a rug in a hamper or basket, and the lid closed.

Mode of Preparation.—Take of

Ferrocyanide of Potassium, $2\frac{1}{4}$ ounces;
Sulphuric Acid, 1 fluid ounce;
Distilled Water, a sufficient quantity.

Dissolve the ferrocyanide of potassium in 10 ounces of distilled water, and add the sulphuric acid, carefully diluted with 4 ounces of water and cooled, to the solution of the salt. Now place the mixture into a suitable glass or earthenware vessel, to which are attached a condenser and a receiver arranged for distillation. Place 8 ounces of distilled water in the receiver, and arrange for keeping the condenser and receiver cold. Then heat the flask carefully, until by slow distillation the liquid in the receiver measures 17 fluid ounces. Add to this sufficient water to make the acid of the right strength. This is insured by finding that 100 grains (or 110 minims) give a precipitate of cyanide of silver with excess of solution of nitrate of silver, which, when thoroughly washed and dried, weighs 10 grains. When prepared, this acid should be kept in well-corked bottles, which should be enclosed in paper to prevent the action of light. The necks should be surrounded with impervious tissue. When not in use, the bottles should be inverted, and kept in a dark place.

Characters.—Diluted hydrocyanic acid is a colourless liquid possessing a characteristic smell resembling that of bitter almonds, and producing, when inhaled in very small quantities, a peculiar irritation of the throat. It is highly dangerous to inhale the vapour. It is miscible in all proportions with water, alcohol, and ether. The anhydrous acid, as well as its concentrated aqueous solution, is easily inflammable, and burns with a beautiful violet flame. On exposure to light it decomposes very readily. The tendency to decomposition is greatly diminished by the presence of traces of mineral acid or of formic acid, while concentrated mineral acids as well as boiling alkalies decompose it. The products of decomposition of the diluted acid are ammonia, formic acid, and other bodies. On the other hand, hydrocyanic acid and water are formed when the ammonium salt of formic acid is quickly heated. Pure hydrocyanic acid is one of the most powerful and rapid of known poisons. When a small quantity of the vapour of the pure substance is drawn into the lungs, instant death results; while small quantities of the vapour of the diluted acid produce headache, giddiness, nausea, dyspnœa, and palpitation. The specific gravity of the diluted acid is 0·997.

Tests.—Diluted hydrocyanic acid only slightly and transiently reddens blue litmus.

It leaves no residue when evaporated in a platinum dish. It yields, when neutralized, the reactions of cyanides.

If to a little of a mixed solution of the sulphate and of the persulphate of iron a few drops of solution of hydroxide of potassium and of hydrochloric acid be added, Prussian blue is produced.

With solution of nitrate of silver it gives a whitish precipitate of cyanide of silver, which completely dissolves in boiling, strong nitric acid.

Quantitative.—A quantity weighing 1 gramme, to which solution of litmus is added, the mixture being kept faintly alkaline by adding solution of sodium hydroxide throughout the operation, requires 3·7 c.c. of the volumetric solution of nitrate of silver to be added before a permanent precipitate begins to form. The diluted acid contains 2 per cent. of hydrogen cyanide, HCN.

Negative.—There should be no precipitate with chloride of barium, indicating absence of sulphates, and chlorides should also be absent.

Therapeutics:

Action.—Hydrocyanic acid is alike fatal to animal and vegetable life. In toxic doses it paralyzes the cerebro-spinal axis, acting especially on the medulla oblongata and its respiratory centre. Death may be caused in two ways by this potent poison.

A large dose proves fatal in the course of about half a minute. The animal falls as if struck by lightning, and the pupils are widely dilated. The heart and the nerve-centres seem to have their functions arrested simultaneously.

A smaller but fatal dose causes death by paralysis of respiration in about three minutes. The breathing becomes slow and gasping, the heart's action and pulse almost imperceptible, and consciousness is lost. In many cases death is preceded by suffocative convulsions.[1] The dyspnœa is due to two causes—viz., to the paralysis of the respiratory centre in the medulla oblongata, and also to the fact that prussic acid combines with the hæmoglobin of the red corpuscles, thus, probably, interfering with the giving-up of oxygen to the tissues.

[1] Spasmodic movements of a choking character, as if the animal were making desperate efforts to rid itself of the liquid, dreadful to behold, nearly always occur almost immediately after the poison has been swallowed, and even before it has passed into the stomach. Probably some often gets into the trachea.

The toxic effects of this acid are observed in all animals, by whatever way the poison enters the system.

Uses.—When applied to the skin, diluted hydrocyanic acid causes numbness, directly depressing the ends of the sensory nerves. It therefore proves useful in relieving itching in urticaria, prurigo, and eczema. In order to allay pain and irritation in chronic skin affections in dogs, 2 to 3 drachms of the acid mixed with a pint of water may be used as a lotion.

Although hydrocyanic acid has been sometimes employed in treating tetanus in horses, it is of little value in severe cases. In milder cases of the idiopathic variety, it probably has a beneficial action in some instances; but it cannot be relied upon in the treatment of this disease. One drachm of the diluted acid in about a quart of water, when used slowly as an enema two or three times a day, is given to lessen the muscular contractions. As an adjuvant, it is sometimes employed with opium, in cases of dry, irritable cough of a functional character. In animals affected with asthma, also, it proves beneficial, and relieves the spasms. In cases of painful indigestion or obstinate vomiting in dogs, the acid is sometimes prescribed with advantage along with other remedies, such as 2 minims of the diluted acid with 10 grains of carbonate of sodium in 1 ounce of water every hour. Hydrocyanic acid may be given by the mouth in water, or in the form of a ball with solid constituents. It may also be administered hypodermically or in the form of an enema.

Externally.—The power of the acid in relieving itching renders it useful in treating cases of urticaria, prurigo, and eczema. For this purpose, 1 drachm of diluted hydrocyanic acid in 6 fluid ounces of water will prove useful. As this agent is absorbed through the skin, care must be taken in employing it, especially where the skin is raw.

Dose.[1]—*Man* - - - } 2 to 4 minims.
Dog - - - }
Pig - - - 4 to 10 ,,
Sheep - - - 5 to 12 ,,
Horses and Cattle - 20 to 40 ,,

[1] Of Scheele's acid the doses would be from ⅔ to ½ of the above, because it is said to have generally 5 or 4 per cent. of the anhydrous acid, that of the British Pharmacopœia having only 2 per cent.

ACIDUM HYPOPHOSPHOROSUM DILUTUM (A.).

Diluted Hypophosphorous Acid.

Description.—The above is a liquid of which about 10 per cent. by weight is pure Hypophosphorous Acid, of which the formula is HPH_2O_2 and molecular weight 65·88, and the rest—viz., 90 per cent.—is water.

It is colourless, odourless, and has an acid taste and reaction and a specific gravity of 1·046 at 15° C. It is miscible with water in any proportion. If heated, at first water is given off, and then it splits into phosphoric acid and phosphoretted hydrogen, which ignites. Finally, the residue of phosphorus burns away.

Tests.—If nitrate of silver be added in solution, black metallic silver is produced. When heated with solution of sulphate of copper, a yellow precipitate (hydride of copper) forms, and turns brown.

The absence of lead and other metals should be demonstrable by the fact of there being no precipitate if sulphuretted hydrogen be added. Similarly, the addition of ammonia and sulphide of ammonium, and that of oxalate of ammonium, should produce no precipitate, whilst that of chloride of barium should give no more than a trace of turbidity. Also, solution of perchloride of platinum and that of sodium cobaltic nitrite should only give a slight yellowness, signifying the presence of only traces of potassium.

ACIDUM LACTICUM (A. and B.).

Lactic Acid.

Formula and Composition.—It is a liquid, and contains 75 per cent. of lactate of hydrogen, $CH_3 \cdot CHOH \cdot COOH$, and 25 per cent. of water. It can be prepared by the fermentation of lactose.

Characteristics.—It is a liquid of syrupy consistence, hygroscopic, devoid of smell and colour, with a very sour taste, and turns blue litmus very red. It forms a mixture of any required strength with water, or alcohol (90 per cent.), or ether; but is nearly insoluble in chloroform. The specific gravity is 1·21.

It vaporizes at a temperature above 300° F., and towards 350° F. inflammable gases are evolved, which burn at first with a blue flame, which is more luminous as the heat becomes greater. The residue is charred, and at last it amounts to not more than 0·5 per cent. of solid. If Lactic Acid be gently heated with a little permanganate of potassium, the odour of aldehyde is produced. A gramme should be neutralized by 8·3 c.c. of the volumetric solution of hydroxide of sodium. There should be present no lead, copper, arsenium, iron, aluminium, chlorides, citrates, oxalates, phosphates, sulphates, or tartrates. The absence of sarcolactic acid should be capable of proof by the fact that if solution of sulphate of copper be added to Lactic Acid diluted with water no precipitate is yielded. Also the absence of more than a trace of grape-, cane-, and milk-sugar by adding excess of solution of potassio-cupric tartrate, and boiling for some time. The absence of glycerin should be indicated by heating with excess of carbonate of zinc, evaporating so as to dry, adding absolute alcohol, and then again evaporating, when no sweet residue should be left. The application of gentle heat should give no rancid odour of fatty acids. If it be carefully poured on an equal volume of

sulphuric acid, no darkening should occur, as would be produced if there were any organic impurities. The absence of gum, sugar, mannite, or phosphate of calcium should be provable by the fact of no turbidity being occasioned when the Acid is added drop by drop to twice its volume of ether. Finally, it should yield no precipitate with solution of subacetate of lead, thus proving that neither malic nor sulphuric acid is present.

Therapeutics.—*Man and Dog :* Lactic acid is normally present in the gastric juice, and it is also produced by metabolism of muscle.

Internally, it may be given after meals in dyspepsia. It enters the blood in the form of alkaline lactates, and is there decomposed into carbonic acid, and excreted in that form by the urine, thereby, perhaps, alleviating catarrh of the bladder.

ACIDUM NITRICUM (A. and B.).

Nitric Acid.

Mode of Preparation.—Nitric acid is prepared by distillation from nitrate of potassium or nitrate of sodium with sulphuric acid and water.

Characters.—This liquid contains 70 per cent. by weight of hydrogen nitrate, HNO_3, and 30 per cent. of water.[1] It is a colourless liquid when pure, and has a specific gravity of 1·42. When exposed to the air it emits an acid and irritating vapour. If poured on copper, it gives rise to the formation of dense red fumes of nitrogen tetroxide (nitrogen dioxide being first formed, and this uniting with the oxygen of the air to produce the higher oxide). If the acid be mixed with an equal volume of water, and then added to the copper, the colourless gas nitrogen dioxide is produced. This, in coming into contact with the air, combines with it to form the orange-red fumes (nitrogen tetroxide). If the nitrogen dioxide is introduced into a solution of sulphate of iron, it imparts to it a dark purple or brown colour, which is due either to solution of the gas in the sulphate or more probably to a chemical combination between the two. The boiling-point of the acid is 121° C. If submitted to distillation, the product continues uniform throughout the process.

Tests.—It leaves no more residue than 0·005 per cent., when evaporated to dryness ; yields, when neutralized, the reactions of nitrates ; and 1 gramme diluted with water is neutralized by 11·1 c.c. volumetric solution sodium hydroxide.

A mixture of 1 volume with 6 volumes of distilled water gives

[1] The United States Pharmacopœia Nitric Acid contains 68 per cent. by weight of hydrogen nitrate, HNO_3, and 32 per cent. of water.

no precipitate with solution of barium chloride or one of nitrate of silver. It should not contain lead, copper, arsenium, iron, chlorides, bromides, iodates, or sulphates.

Therapeutics.—Strong nitric acid is powerfully irritant and corrosive. The diluted nitric acid only is administered internally. As a caustic, nitric acid is sometimes employed for removing warts and other growths. An external application of 3 minims of the acid to each fluid ounce of water acts as an antiseptic for unhealthy wounds and sores.

ACIDUM NITRICUM DILUTUM (A. and B.).

Diluted Nitric Acid.

Mode of Preparation.—Place 193·2 c.c. of Nitric Acid into a glass flask provided with a mark signifying where 1,000 c.c. would be, and add Distilled Water up to this mark at 15·5° C.

Characters.—This acid is colourless, has a specific gravity of 1·101, and contains about 17·44 per cent. of hydrogen nitrate,[1] HNO_3. One gramme needs for neutralization 2·7 c.c. of the volumetric solution of sodium hydroxide.

Therapeutics.—Diluted Nitric Acid has tonic, astringent, and alterative properties, and is used for pretty much the same purposes as diluted hydrochloric acid. As a general tonic after debilitating diseases, the latter, or the diluted nitro-hydrochloric acid, is generally preferred. In the treatment of dyspepsia, hydrochloric acid, being the acid of the gastric juice, is also preferable to nitric acid.

In cases of farcy, the diluted nitric acid acts beneficially, owing to its alterative and tonic properties. For these reasons, also, it has been administered in some chronic skin diseases which prove incurable by preparations of arsenic.

In cases of enlargement of the liver in beasts, diluted nitric acid is indicated. It is necessary to dilute the liquid freely with water or other fluid before it is administered internally.

Dose.—

Man - - -	2 to 10 minims.
Dog - - -	
Pig - - -	4 to 20 ,,
Sheep - - -	
Horse - - -	1 to 1½ fluid drachms.
Ox - - -	1 to 2 ,, ,,

[1] The United States Pharmacopœia Diluted Nitric Acid contains only 10 per cent. of HNO_3 by weight.

ACIDUM NITRO-HYDROCHLORICUM (A.).

Nitro-hydrochloric Acid.

Mode of Preparation.—Mix well together in a large glass vessel 180 c.c. of Nitric Acid and 820 c.c. of Hydrochloric Acid. After cessation of effervescence, pour the liquid into dark amber-coloured and glass-stoppered bottles, only half filling them, and keeping them in cool places.

Description.—It is a yellow, fuming, and highly corrosive fluid, and smells of Chlorine. If heated, it volatilizes.

Tests.—Gold or platinum is dissolved if to some of the acid a little of either be added. Also from Iodide of Potassium the iodine is set free.

Action.—The most powerful escharotic known.

ACIDUM NITRO-HYDROCHLORICUM DILUTUM (A. and B.).

Diluted Nitro-hydrochloric Acid.

Description.—It is an aqueous solution of chlorine and of hydrochloric, nitric, and nitrous acids.

Mode of Preparation.—Mix 3 fluid parts of Nitric Acid and 4 fluid parts of Hydrochloric Acid with 25 of Distilled Water, and set aside in a glass-stoppered bottle for a fortnight before use.[1]

Characteristics and Tests.—A colourless liquid with acid reaction, smell, and taste. Specific gravity, 1·07. A quantity weighing 4 grammes is neutralized by 10 c.c. volumetric solution sodium hydroxide.

Therapeutics.—Diluted nitro-hydrochloric acid has astringent, alterative, and tonic properties, and is given for similar purposes and in the same doses as the diluted hydrochloric and diluted nitric acid. It is well known that the diluted nitro-hydrochloric acid has an infinitely better effect in the treatment of fevers than either of the acids from which it is made. This is because of the free chlorine it contains. It should only be used in very small doses, copiously diluted, and seldom repeated. In some forms of intestinal indigestion and in cases of catarrhal jaundice in dogs it may be beneficial. In the after stages of influenza it may be useful. It is chiefly administered on account of its action on the skin and liver.

Dose.—

Cat	1 to 5	minims.
Man, *Dog*	3 to 10	,,
Pig	4 to 20	,,
Sheep	6 to 30	,,
Horse	1 to 2	fluid drachms.
Cattle	1 to 2½	,, ,,

ACIDUM OLEICUM (A. and B.).

Oleic Acid.

Chemical Composition.—Oleic acid is a fluid fatty acid whose formula is $CH_3(CH_2)_7CH : CH(CH_2)_7COOH$. As a rule it is not quite pure.

[1] The proportions in the United States Pharmacopœia are Nitric Acid 2, Hydrochloric Acid 9, and Water 39 by volume.

Mode of Preparation.—It is obtained by the saponification of olein or by the action of superheated steam on fats, with subsequent separation from solid fats by pressure.

Characters.—Oleic acid is a straw-coloured liquid, nearly odourless and tasteless. It possesses a very faint acid reaction. If exposed to the air it becomes brown, and more acid in reaction. Its average specific gravity is 0·900.

Solubility.—It is insoluble in water, but readily soluble in alcohol, chloroform, and ether.

At about 5° C. it becomes semi-solid, and at about 14·4° C. it melts again.

Tests.—When warmed with carbonate of potassium it should be completely saponified, and an aqueous solution of this salt, neutralized by acetic acid and treated with acetate of lead, should yield a precipitate which, after washing with boiling water, is almost entirely soluble in ether.

ACIDUM PHOSPHORICUM CONCENTRATUM (A.[1] and B.).

Concentrated Phosphoric Acid.

Chemical Composition.—Concentrated phosphoric acid is a liquid containing 66·3 per cent. of hydrogen orthophosphate, H_3PO_4, with 33·7 per cent. of water.

Mode of Preparation.—It may be obtained by adding water and nitric acid to the residue left after burning phosphorus in air, or thus: Place 6 fluid ounces of nitric acid, diluted with 8 fluid ounces of distilled water, into a glass flask, the mouth of which may be connected with a vertical glass condenser. Add 413 grains of phosphorus, connect the condenser, and boil the contents of the glass flask at such a rate that all condensed products shall return to the flask. Continue boiling until the phosphorus has entirely disappeared. Remove the condenser and concentrate the fluid, either in the flask or in a porcelain dish of hard, well-enamelled ware, until it is reduced to 4 fluid ounces. Transfer to a platinum vessel, and evaporate until about 2 fluid ounces remain, and orange-coloured vapours are no longer produced. Mix the resulting 2 fluid ounces with distilled water until, when cold, it measures 3 fluid ounces and has a specific gravity of 1·5.

Characters.—Concentrated phosphoric acid is a colourless, syrupy liquid, possessing a sour taste and a strongly acid reaction.

With ammonio-nitrate of silver, diluted phosphoric acid gives a canary-yellow precipitate soluble in ammonia and in diluted nitric acid.

When evaporated it leaves a residue, which melts at a low red heat, and upon cooling exhibits a glassy appearance.

Negative.—It is not precipitated by sulphide of hydrogen (showing the absence of metals), nor by chloride of barium (showing the absence of sulphuric acid), nor by nitrate of silver acidulated with nitric acid (showing the absence of hydrochloric acid), nor by solution of albumin (showing the absence of metaphosphoric acid, which coagulates albumin). When mixed

[1] The corresponding preparation of the United States Pharmacopœia is Acidum Phosphoricum, Phosphoric Acid, a more correct name perhaps. It is composed of not less than 85 per cent. by weight of absolute Orthophosphoric Acid (H_3PO_4), and not more than 15 per cent. of water.

with sulphuric acid, and then added to a solution of sulphate of iron, it does not communicate to it a dark colour, thus indicating the absence of nitric acid. When mixed with an equal volume of solution of perchloride of mercury and heated, no precipitate of pyrophosphates is produced.

Therapeutics.—The diluted phosphoric acid only is used internally.

ACIDUM PHOSPHORICUM DILUTUM (A. and B.).

Diluted Phosphoric Acid.

Chemical Composition.—Diluted phosphoric acid is a solution of concentrated phosphoric acid in water in the proportion of 13·8 parts of hydrogen[1] orthophosphate, H_3PO_4, and 86·2 parts of water, by weight.

Mode of Preparation.—Add to 150 c.c. Concentrated Phosphoric Acid enough Distilled Water at 15·5° C. to yield 1,000 c.c.

Characters.—It is a colourless liquid, possessing a sour taste and a strongly acid reaction. The specific gravity is 1·08. For other characters and for tests, *vide* the concentrated form.

Uses.—Phosphoric acid may be used to allay thirst, like other diluted acids, in febrile states and in diabetes.

Therapeutics.—Diluted phosphoric acid is not much used in veterinary practice. It has proved useful when combined with phosphate of lime and cod-liver oil in treating rickets in puppies. As it has the property of dissolving phosphate of lime, it may be administered to animals with calculi composed of this substance. It may also be given in scrofulous diseases and in diabetes, or to diminish the growth of bony tumours. For neutralizing alkalinity of urine in man, hydrobromic acid is preferable.

Compared with the other diluted acids, phosphoric acid has not such marked astringent properties. Small doses, copiously diluted, seldom repeated, and soon discontinued, are best for all acids.

Dose.—*Man* - - - } 2 to 12 minims.
Dog - - - }
Pig - - - 6 to 20 ,,
Horse - - 1 to 2 fluid drachms.

ACIDUM SALICYLICUM (A. and B.).

Salicylic Acid.

Chemical Composition.—The formula of salicylic acid is $C_6H_4{\cdot}OH{\cdot}COOH$. The formula of Phenol being $C_6H_5{\cdot}OH$, it is seen that in salicylic acid the carboxyl group COOH has replaced one of the H atoms. It is a crystalline acid obtained from natural salicylates such as the oils of wintergreen (*Gaultheria procumbens*) and sweet-birch (*Betula lenta*), or by acting on carbolate of sodium with carbonic anhydride.

[1] The preceding preparation of the United States Pharmacopœia is stronger than that of the British Pharmacopœia; but in this instance the contrary is true, for the diluted phosphoric acid of the United States Pharmacopœia contains only 10 per cent. by weight of H_3PO_4, real orthophosphoric acid.

Characteristics.—This important acid exists in white acicular crystals, which are inodorous. They are, however, light, and therefore easily conveyed to the nostrils, thereby irritating them. The taste is at first sweet and then acid. Salicylic acid is soluble in about 500 parts of cold, and 15 of hot, water; 200 of glycerin, 3 of alcohol (90 per cent.), and 2 of ether; also in solutions of citrate or acetate of ammonium, of borax and of alkaline hydroxides and carbonates, forming salicylates, which last, if not weaker than 1 per cent., give a yellowish-brown precipitate with solution of nitrate of uranium, whereby they differ from carbolates and sulphocarbolates.

At about 156·5° C. salicylic acid melts, and below 200° C. it volatilizes without decomposition. An aqueous solution gives, with solution of perchloride of iron, a reddish-violet colour (*vide* Acetic Acid and Carbolic Acid). An alcoholic solution, allowed to evaporate spontaneously, should leave a perfectly white residue.

Therapeutics:

Action.—Salicylic acid is a powerful antiseptic, and, according to Wagner, it is a more efficient disinfectant of wounds than carbolic acid. When added in the proportion of 1 to 10 per cent. to fluids containing the germs of bacteria, it will prevent their development, and in the proportion of 1 in 60 will destroy bacteria when swarming in a fluid (Brunton). In preventing fermentation, it is said to be three times more effectual than carbolic acid. It prevents alcoholic fermentation[1] and destroys the life of the yeast-plant. It is much used for surgical dressings, having, like boric acid, the advantage over carbolic acid in that it is less irritating; but it is far more so than is boric acid. It is not volatile, and therefore does not affect the surrounding atmosphere. In fever salicylic acid is a very efficient agent for reducing the temperature. In healthy animals it seems not to lower the normal heat of the body. On account of this property of reducing temperature, it has been much used in the treatment of acute rheumatism, but for this and other internal purposes it is better to use the salicylate of sodium. Salicylic acid is excreted by the kidneys, skin, and salivary glands, and is eliminated in the urine as salts of salicylic acid and partly as salicyluric acid. In toxic doses it causes feebleness of the circulation, lowers the blood-pressure, and proves fatal through paralysis of respiration.

[1] It also arrests that caused by the organic ferments.

Uses. — Externally, salicylic acid is much used instead of carbolic acid. It acts as a valuable antiseptic in preventing fœtor of gangrenous and offensively smelling sores, and in all descriptions of wounds it arrests suppuration, putrefaction, and fœtor. At the same time it abates the pain, and hastens the healing process. The writer has also used a solution of this acid for an injection into open joints, and, owing to its antiseptic and at the same time non-irritating properties, it acts well.

Salicylic acid is useful in the form of a gargle in cases of foot-and-mouth disease. A solution of the strength of 1 drachm to the fluid ounce of water is very suitable for this purpose, and also as a lotion to be applied to the feet. This acid may also be employed with good effect in the form of an ointment, consisting of equal parts of the acid and lard, as an external application to open joints.

Internally, salicylic acid has proved very valuable in cases of acute and subacute rheumatism, but in this disease we ourselves prefer the salicylate of sodium.

A writer in a Continental journal recommends salicylic acid as an infallible means of curing or preventing the diarrhœa of sucking calves. It was given in small doses to the calf itself, or in larger doses to the mother. He found that the calves of cows to which the medicine was given two days in succession, immediately after calving, remained absolutely free from diarrhœa, while all the others in the sheds were more or less affected.

In the treatment of malignant fevers, such as strangles, malignant influenza, purpura, and scarlet fever, salicylic acid is a useful remedy in reducing the high temperature; but for almost all internal purposes it is preferable to employ the salicylate of sodium, as being more easily and readily absorbed in the system. Salicylic acid increases uric acid, but seems to be not diuretic.

Dr. Charteris, of Glasgow, has ably dealt with the value of salicylic acid in cases of acute rheumatism in human beings. Large doses are irritating, and cause a burning feeling in the gullet, whilst the salicylate of sodium does not produce these disturbing effects.

After a medium dose, however, it may cause symptoms like those of cinchonism—throbbing and a feeling of fulness in the head, with ringing or roaring in the ears; and a large dose may cause deafness, probably due, as in cinchonism, to congestion of the tympanic vessels. Also a large dose causes profuse diaphoresis. The drug is quickly absorbed, and probably circulates as sodium

salicylate in the blood, though some say it is changed into an albuminate. It is also rapidly eliminated, and can usually be detected in the urine within half an hour, although it has been found as long as eight days after the last dose, and may be excreted either as salicylic or as salicyluric acid (which last is formed from glycocol and salicylic acid). A few drops of perchloride of iron added to the urine give a violet hue; but if indican or pyrocatechin be present, an olive-green colour is produced.

Symptoms of poisoning by even small doses may be caused in some susceptible people, and by large doses in many—*e.g.*, nausea, vomiting, collapse, more or less complete deafness, quickening and deepening of the respiration, and even maniacal delirium. Drunkards bear it badly, and have hallucinations, sometimes melancholy, but generally cheerful, which may persist for several days.

Moderate doses in dogs and rabbits stimulate the heart and vaso-motor centres, but large amounts powerfully depress the circulation in all animals. The pulse forms a very convenient method of gauging this effect, just as it does in tobacco-poisoning, and any loss of tone in it is a good danger-signal.

In man collapse is not so frequent as it used to be, since the drug has been made more pure by raising the melting-point, and thus freeing it from poisonous creosol products. Slight doses stimulate, whilst large doses depress, the respiration.

The salicylates greatly increase the excretion of uric acid in the urine. The products of salicylates in the urine rotate polarized light to the left, and hence one should note that in diabetic patients taking salicylates this rotation may be due to the drug taken, and not to sugar.

In healthy patients the salicylates do not affect the temperature, but in febrile conditions they cause profuse sweating and lowering of it.

In acute rheumatism not only is the fever reduced, but the pain in the joints is rapidly relieved, and even some power of mobility gained before the swelling has entirely subsided. This power, however, should not then be utilized. In doses necessary to cure the disease it is not injurious. Old and feeble people are more liable to injurious effects—*e.g.*, nausea, noises or ringing in the ears, difficulty of hearing, and too copious sweating.

It prevents fresh attacks in joints and serous membranes not already affected, if given in correct amount; but, in order to

prevent relapses, smaller doses should be continued for several days after subsidence of acute symptoms. Stricker also held that the salicyl compounds were of only doubtful value in chronic rheumatism, and valueless in gonorrhœal rheumatism and polyarthrites of septic origin.

Salicylic acid was found by Bucholz to arrest the movements of amœbæ, and it is probable that the salicyl compounds in small amount may kill or impair the activity of the germs to which rheumatism is probably due; or they may combine with the toxins, destroying or neutralizing their poisonous properties, and thus aiding or effecting the production of the necessary antitoxins. According to some, it is the nervous system which is mainly acted upon.

The salicyl compounds stimulate the activity of skin, kidneys, and liver. They are used both locally and internally. A man suffering from acute rheumatism should be put to bed between blankets, and fed mainly on milk, with other suitable fluid diet. Of sodium salicylate, 15 grains in aqueous solution are given at first every two hours.[1] In one and a half or two days the pain and temperature are lessened, and then about 10 grains are given every four hours, and after another two days four times daily will suffice. This is gradually further reduced, until after seven days 5 grains thrice daily are enough. The salicylate of quinine in 5-grain doses may be substituted as soon as advisable.

Salicin is a glucoside, a bitter tonic, does not disturb digestion, nor is it a nervous depressant; but it has not so good an effect as a salicylate, nor indeed has salol, which may have an irritant action like that of salicylic acid itself.

Salophen may be useful. It contains 51 per cent. salicylic acid, into which it is decomposed in the body, together with acetylparamidophenol.

Dose.—*Man* - - - 5 to 20 grains.
Dog - - - 3 to 10 „
Pig and Calf - 5 to 25 „
Horse - - - 1 to 1½ drachms.
Ox - - - 1 to 2 „

[1] It may happen that these doses cannot be taken, as some patients cannot bear them, owing to the intense feeling of nausea, and other disagreeable symptoms. If so, the amount must be considerably lowered, to even 5 grains or less, and the addition of compound tincture of cardamoms and spirit of

ACIDUM SULPHURICUM (A. and B.).

Sulphuric Acid.

Chemical Composition.—This acid contains about 98[1] per cent. by weight of real sulphuric acid (H_2SO_4), which consists of the equivalent of water added to the anhydride, sulphur trioxide (SO_3).

Mode of Preparation.—Sulphuric acid is produced by the combustion and oxidation of sulphur or pyrites, and by the oxidation and hydration of the resulting gas, sulphurous anhydride, SO_2, by means of nitrous and aqueous vapours.

Characters.—Sulphuric acid is an intensely acid and corrosive, inodorous and colourless liquid of oily consistence. Its specific gravity is 1·843. On the addition of water, great heat is produced, and the two must be very carefully mixed, in order to prevent a violent reaction.

Tests:

Positive.—It blackens and corrodes most organic substances. When added to sugar, for instance, it decomposes that substance, leaving a black residue.

When diluted with water and added to a solution of chloride of barium ($BaCl_2$), it gives a copious white precipitate of sulphate of barium ($BaSO_4$), insoluble in nitric acid and in hydrochloric acid.

Quantitative.—A quantity weighing 1 gramme, mixed with about 25 c.c. of distilled water, requires for neutralization 20·1 c.c. of the volumetric solution of sodium hydroxide.

Negative.—The following impurities are to be guarded against:

Lead, derived from the leaden chambers in which it is prepared. It may contain so much lead in the form of sulphate that when diluted with water it deposits a white precipitate, as the sulphate of lead is soluble in the strong, but not in the weak acid.

Nitric Acid, from the nitrous fumes by means of which it is produced. If a solution of sulphate of iron be carefully poured over its surface, there should be no purple or brown colour where the liquids meet.

Arsenic, which may have been derived from impure sulphur having been used. The arsenious fumes would pass off, together with the gas, sulphurous anhydride.

Water, which may be present either as a result of fraudulent addition, or from the concentration needed having been imperfectly carried out. The specific gravity should not be below 1·84.

When evaporated in a platinum dish it should leave little or no residue, thus indicating the absence of lead, arsenic, or saline impurities; and when diluted with six times its volume of distilled water it should give no precipitate with excess of sulphide of hydrogen, even when boiled, thus proving the absence of arsenic and lead.

Acidum Sulphuricum has a specific gravity of 1·843, and contains 98 per cent. by weight of hydrogen sulphate, H_2SO_4.

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ammonia may be helpful; or in certain cases an entirely different course of treatment may have to be adopted, such as, for instance, a mixture containing tinct. guaiaci ammoniata and bicarbonate of potassium.

[1] The United States Pharmacopœia Sulphuric Acid is a liquid composed of not less than 92·5 per cent. by weight of absolute hydrogen sulphate (H_2SO_4=97·82), and not more than 7·5 per cent. of water.

Acidum Sulphuricum Dilutum has a specific gravity of 1·094, and contains 13·65 per cent. of real sulphuric acid.

Therapeutics.—Strong sulphuric acid is only employed externally. It is a powerful corrosive, and has been used for the removal of cancerous growths and warts. For this purpose it is mixed with sawdust so as to form a thin pulp. If used, the neighbouring tissues must be protected by a wall of gutta-percha. We, however, consider this bad and objectionable treatment, and for such purposes greatly prefer the hydroxide of potassium and other preparations.

Strong sulphuric acid is sometimes added in small amount to blistering ointments, and is one of the constituents of the preparation known as 'black oil,' which is used for various purposes. 'Black oil' not only acts as a caustic, but also, owing to the free sulphurous acid it contains, has antiseptic properties, and is of great value for dressing abscesses and fistulous wounds.

ACIDUM SULPHURICUM DILUTUM (A. and B.).

Diluted Sulphuric Acid.

Mode of Preparation.—Fill to half its extent a glass flask, with a mark on the neck indicating 1,000 c.c., with Distilled Water, and then add carefully to it, because the mixture causes heat and disturbance, 82·7 c.c. Sulphuric Acid, and then more Distilled Water to come to 1,000 c.c. at 15·5° C.

Characters.—The specific gravity is 1·094.

Tests.—Each gramme needs for neutralization 2·8 c.c. of the volumetric solution of sodium hydroxide. Diluted sulphuric acid therefore contains 13·65 per cent. of real sulphuric acid.[1]

Therapeutics.—Sulphuric acid has astringent, tonic, refrigerant, and antiseptic properties, and externally acts as an astringent, and styptic, and caustic. Internally, the diluted acid is useful in much the same instances as the diluted hydrochloric acid.

As a general tonic after debilitating fevers, the diluted sulphuric acid has a valuable effect, and in cases of unduly relaxed bowels and dysentery it frequently proves very beneficial. In cases of dyspepsia, the diluted hydrochloric acid is preferable to sulphuric acid.

In purpura hæmorrhagica it is sometimes administered, but in this disease the liquid extract of ergot, combined with tincture of perchloride of iron, as recommended by Mr. J. B. Gresswell, is preferable.

Diluted sulphuric acid is the most valuable antidote[2] in cases of lead-poisoning, forming with this metal insoluble sulphate of lead. The acid should be freely diluted when administered internally, and should be used in small and few doses only, and be copiously diluted with water.

Externally.—Diluted sulphuric acid, further diluted with 25 to 50 parts of water, is sometimes used as an astringent application for discharging wounds.

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[1] The United States Pharmacopœia Diluted Sulphuric Acid contains only 10 per cent. by weight of H_2SO_4.

[2] The antidotes against irritant poisoning by sulphuric acid are alkalis, soap, oil, whiting, milk, plaster from a wall, or magnesia.

Dose.—*Dog* - - - 2 to 5 minims.
Man - - - } 3 to 15 ,,
Pig - - - }
Sheep - - - ¼ to ½ fluid drachm.
Horse - - - ½ to 1¼ ,, drachms.
Ox - - - 1 to 2¼ ,, ,,

ACIDUM SULPHUROSUM (A. and B.).

Sulphurous Acid.

Chemical Composition.—Tis most important acid consists of the gas, sulphurous anhydride, SO_2, dissolved in water in the proportion of 5 per cent. by weight, and contains 6·4 per cent. of hydrogen sulphite, H_2SO_3.[1]

Mode of Preparation.—Sulphurous anhydride is made by burning sulphur in air or oxygen, or by boiling sulphuric acid with carbon, mercury, or copper. Place 1 ounce of wood charcoal, broken into small pieces, together with 4 fluid ounces of sulphuric acid, into a glass flask, which is connected by means of a glass tube with a wash-bottle containing 2 ounces of water. From the wash-bottle let a second gas-delivery tube lead to the bottom of a pint bottle containing distilled water. Now heat the flask until gas is evolved and passes through the water in the wash-bottle into the distilled water, which must be kept cold. The process must be continued until the bubbles of gas pass through the solution apparently undiminished in size, and the strength must be tested according to the test mentioned below. The reaction is represented as follows:

$$2H_2SO_4 + C = CO_2 + 2SO_2 + 2H_2O.$$

Characters.—Sulphurous acid is a colourless liquid possessing a strong and very characteristic sulphurous odour. The specific gravity is 1·025, that of the United States Pharmacopœia being 1·035.

Tests.—Sulphurous acid, if chlorine be added to it, is converted into sulphuric acid, and then gives a white precipitate of sulphate of barium when chloride of barium is mixed with it.

[1] Sulphurous Acid of the United States Pharmacopœia contains not less than 6·4 per cent. by weight of the gas SO_2, and not more than 93·6 per cent. of water; but in any case the percentage becomes lower on keeping, so that, unless recently prepared, the acid is apt to contain less SO_2 and more sulphuric acid, owing to the formation of the higher oxide and its solution.

The reaction by which it is transformed into sulphuric acid is thus represented :

$$SO_2 + 2H_2O + Cl_2 = H_2SO_4 + 2HCl.$$

Sulphurous acid is very liable to decompose, and then gives a white precipitate with solution of chloride of barium, thus showing the presence of sulphuric acid. One gramme, with 100 times its volume of recently boiled and cooled water and a little mucilage of starch, should give a persistent blue colour with not less than 15·7 c.c. volumetric solution iodine. If the acid be evaporated, there should be no solid residue.

Therapeutics :

Action.—Sulphurous acid is a powerful deoxidizing, disinfecting, and antiseptic agent. It is very destructive to vegetable life, and destroys disease-germs. It arrests alcoholic fermentation by killing the yeast-plant, and it is equally destructive to bacteria and micrococci. It is on this account very efficacious in destroying the spores and hyphæ of ringworm, and it has also been given internally with the view of combating the vegetable germs of the various specific fevers. It decomposes sulphide of hydrogen, and this proves very useful in directly removing the foul odours which depend on the presence of this gas. It also checks bad smells indirectly, by arresting the process of decomposition which gives rise to them. Liquid sulphurous acid is used both externally and internally, and the gaseous sulphurous oxide also is extensively employed in veterinary practice.

We may first review the medicinal uses of the liquid sulphurous acid, which is a solution in water of 5 per cent. of the oxide.

Internally, this preparation has proved useful in cases of malignant strangles, purpura, and erysipelas in horses. Also in cases of severe influenza it has been employed with good effect. In cattle it has been given for the treatment and prevention of contagious pleuro-pneumonia. In several outbreaks of coughing and diarrhœa in beasts, with temperatures of 105° to 106° and pulses of 100, the liquid acid has proved very efficacious in the hands of Mr. J. B. Gresswell. The outbreaks were attributed to drinking-water contaminated with sewage matter. For tympanitis in beasts the acid is also prescribed, and in this condition it often proves very useful.

Externally, the liquid acid has been employed as a lotion, and also as a spray. As a lotion, the acid, when diluted with 4 to 6 parts of water, proves very useful in the treatment of foul

wounds. Mixed with an equal quantity of glycerine, it proves a very efficacious application for the destruction of the fungus of ringworm. As a spray, the undiluted acid applied for six or eight minutes often arrests, according to Finlay Dun, the pain and inflammation of bruises, strains, or enlarged joints. In cases of sore throat, we have commonly employed the acid freely diluted with water as a gargle; but it is also used as spray in the proportion of 1 part of the acid to 15 parts of water.

Gaseous sulphurous acid, or, in more correct language, sulphurous oxide or sulphurous anhydride, is a most valuable disinfectant for stables, sheds, and kennels, in which animals suffering from infectious diseases have been kept. When it is desired to disinfect thoroughly any building, a quantity of sulphur, previously mixed with one-fourth part of its weight of charcoal, should be thrown upon some burning coals or glowing charcoal placed in some suitable receptacle, such as a brasier, when the gas will be evolved, and speedily permeate the stable. Care must be taken to obviate risks, such as that of the vessel containing the coals being placed near anything likely to catch fire, or that of inhaling the fumes which arise; and, in order that the gas may act the more efficiently, the doors and windows should be speedily closed as soon as the sulphur is thrown upon the coals. The gas may also be generated by igniting sulphur moistened with methylated spirit. The sulphur in this case should be placed in a strong earthenware vessel. However it is generated, the doors and windows should be kept closely shut, and not be opened for several hours.

In cases of nasal gleet and purulent discharges of the nose, we very frequently cause the animal to inhale the gas, and believe it to be of great efficacy. The late Mr. D. Gresswell, in cases of copious purulent discharge from the nose, used to order the inhalation of the gas generated by igniting sulphur mixed with tincture of iodine, and this treatment is found to be of great value.

A solution of sulphurous acid mixed with glycerine may be applied to the skin to cure parasitic fungi. In man it is very useful in cases of vomiting, especially when the vomited matters present a frothy or yeasty appearance, due to the presence of sarcinæ and to the occurrence of fermentation in the stomach. Applied in the form of spray, it sometimes gives relief in laryngeal phthisis.

Dose.—*Man* - - - } 15 to 30 minims.
Dog - - - }
Sheep - - - }
Pig - - - }
Horse - - - ½ to 1 ,, ounce.
Ox - - - ¾ to 1¼ ,, ounces.

These doses must not be repeated more than a few times, or, if given for several days, should be divided by four.

It is necessary, in giving sulphurous acid internally, to freely dilute it with water. It should be administered with glycerine, treacle, or mucilage of linseed, and the dose may be repeated every four hours, or oftener when necessary, but only for a few times.

ACIDUM TANNICUM (A. and B.).

Tannic Acid.

Synonym.—Tannin.

Natural Order.—Galls are excrescences on *Quercus lusitanica* which belongs to the Cupuliferæ.

Chemical Composition. — Tannic Acid has the formula $C_{14}H_{10}O_9 2H_2O$.[1]

Mode of Preparation.—Expose powdered galls to a damp atmosphere for two or three days, and then add sufficient ether to form a soft paste. Allow this to stand in a well-closed vessel for one day, and then, having quickly enveloped it in a linen cloth, press it strongly in a suitable press, so as to separate the liquid portion. Reduce the pressed cake to powder, mix it with sufficient ether diluted with one-sixteenth of its bulk of water to form again a soft paste, and press this as before. Mix the expressed liquids, and allow the mixture to evaporate spontaneously, until, by the aid of a little heat, it has acquired the consistence of a soft extract. Then place it on earthen plates or dishes, and dry it in a hot-air chamber at a temperature not exceeding 100° C.

Characters. — Tannic acid exists in pale yellow vesicular masses or thin glistening scales. The taste is astringent, the reaction acid. It is soluble in 1 part of water or of alcohol (90 per cent.), slowly in 1 of glycerine, almost insoluble in chloroform, benzol, benzine, or pure ether, but soluble in ether with a little water. Hence the addition of water is necessary.

[1] The fact seems to be that our knowledge of the composition of tannic acid is imperfect. Tannin in its natural state is probably a mixture of digallic acid, $C_{14}H_{10}O_9$, with a glucoside of digallic acid.

Tests.—An aqueous solution differs from one of gallic acid in giving precipitates with solutions of most alkaloids and bitter principles, gelatin, albumin, starch, and potassio-tartrate of antimony. When added to a solution of a persalt of iron, both acids produce a bluish-black colour or precipitate. It leaves no residue when burned with free access of air on platinum foil.

Action.—Tannic acid has little or no action when applied to the unbroken skin; but, when this covering is denuded of its epidermal covering, the acid coagulates the albumin and causes contraction of the cells of the skin. When applied to mucous membranes, it coagulates the mucus. The astringent action on the skin and mucous membranes is due to this coagulation of albumin, and not to astringing of the capillaries, which have been observed by Rossbach to be dilated by this agent. When taken into the stomach, tannic acid is absorbed into the blood, and passes out as gallic acid. It acts as an astringent on the intestinal canal, and restrains hæmorrhage in distant organs, as the kidneys and uterus. It has a more powerful local action than gallic acid; but, on account of its being less soluble than this agent, it is not so valuable in cases of internal hæmorrhage.

Uses.—Tannic acid is a useful remedy in diarrhœa and dysentery in animals, and may be combined with opium and other remedies. In cases of hæmorrhage from the kidneys and other organs it is also often prescribed, and may suitably be combined with preparations of ergot.

In cases of poisoning by tartar emetic, tannic acid is indicated, as it forms an insoluble tannate. It is also antidotic to strychnine, morphine, and other alkaloidal poisons.

Externally, tannic acid, with an equal quantity of starch-powder, is used as an insufflation in cases of copious foul discharge from the nasal mucous membrane, and its employment in such instances may be daily alternated with that of a mixture of starch and iodoform. The glycerine of tannic acid is a useful application in cases of sore throat or mouth, and, when this preparation is diluted with an equal bulk of water, it proves valuable in cases of otorrhœa in dogs. Although it is preferable to employ the ointment of hamamelis for piles in dogs, Finlay Dun's formula of 1 drachm of tannic acid, 1 drachm of opium, with 2 ounces of lard, is a very useful one; and the latter might be mixed with the former remedy.

Dose.—*Man* - - - 2 to 5 grains.
Dog - - - 2 to 10 ,,
Sheep and Pig - 15 to 20 ,,
Horse - - - $\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
Cattle - - - 1 to $2\frac{1}{2}$,,

ACIDUM TARTARICUM (A. and B.).

Tartaric Acid.

Chemical Composition. — Tartaric acid has the formula $C_4H_6O_6$. It is dextro-rotatory hydrogen tartrate, and may be looked upon as dihydroxy-succinic acid, thus:

$$\begin{array}{l} CH\cdot OH\cdot COOH. \\ | \\ CH\cdot OH\cdot COOH. \end{array}$$

Mode of Preparation.—It is prepared from the acid tartrate of potassium, chalk, and chloride of calcium. Tartrate of calcium is formed, and this is decomposed by sulphuric acid.

Characters.—Tartaric acid exists in the form of colourless crystals with strongly acid taste, and readily soluble in less than their own weight of water and in less than three times their weight of rectified spirit, and a solution in water rotates the plane of a ray of polarized light to the right.

Test.—When to a solution in water or in rectified spirit not greatly diluted a little acetate of potassium is added, a white crystalline precipitate is formed.

It should leave when burned with free access of air no more than 0·05 per cent. of ash. Lead, copper, arsenium, iron, potassium, sodium, or oxalates should be absent, and only the very slightest traces of calcium or sulphates should be indicated.

Dose.—*Man* - - - - - - - - 5 to 20 grains.

ACONITI FOLIA.

Aconite Leaves.

Natural Order.—Ranunculaceæ.

Description.—The fresh leaves and flowering tops of *Aconitum Napellus*, Monkshood, gathered when about one-third of the flowers are expanded from plants cultivated in Britain. The reason for collecting at this particular period is that those compounds, which are merely of use as nutriment for the growth of the plant, may be taken up to form new tissues, so that what is left is more highly concentrated. The leaves are said to possess only one-sixth of the activity of the root.

Characters.—Aconite leaves are alternate with long channelled stalks, and are deeply cut palmately into five or three segments, which are again deeply and irregularly divided into oblong, acute narrow lobes. A small fragment of a leaf can be recognised. Though extremely poisonous, a very minute portion may be slowly chewed, when a sensation of tingling and numbness results.

The *flowers* are deep blue, helmet-shaped, large, irregular, in a somewhat loose terminal raceme.

Preparations:

Extractum Aconiti.
Unguentum Aconiti.

(The latter is made by mixing 1 part of Extract of Aconite and 2 of Lard.)

ACONITI RADIX (A. and B.).[1]

Aconite Root.

General Description. — The root of *Aconitum Napellus*,[2] collected in the autumn from plants cultivated in Britain and carefully dried. The root is collected before the appearance of the leaves, because at that time there is manifestly a greater proportionate amount of active matter in it.

Characters.—Aconite root is usually from about two to four inches long, and from one-half to three-quarters of an inch thick at the upper extremity, where it is generally crowned with the remains of the base of the stem. As it tapers below, the form is conical, and the root is much shrivelled longitudinally, presenting numerous very small grooves, extending from base to apex. The root is more or less covered with the scars or bases of broken rootlets, and at its top is seen the remnant of an undeveloped bud. It is dark brown externally, and whitish and starchy within, and has a thick cortex and a large stellate pith or central cellular axis with about seven rays. It breaks off short. There should be no part of the stem present, and no empty space or spongy tissue internally. The taste is at first somewhat bitterish-sweet, but when chewed, after some minutes, a sensation of tingling and numbness is produced, which lasts some time. There is no odour.

Properties and Composition.—The chief active principle in both leaves and roots is the alkaloid 'Aconitine,' or 'Aconitia,' which is combined with 'Aconitic Acid.' This alkaloid is only present in small quantity in the leaves. In the root, resinous and fatty matters, and several other active principles, are also present. Nepaul Aconite, or Bikh, the root of *Aconitum Ferox*, contains an alkaloid called 'Pseudaconitine,' which is much more active than 'Aconitine.' Japanese Aconite is said to contain an alkaloid

[1] In the United States Pharmacopœia it is styled Aconitum, Aconite, the tuber of *Aconitum Napellus*, Linné (N. O. Ranunculaceæ).

[2] Bentl. and Trim. Med. Pl., vol. i., plate 6.

which is much more powerful even than 'Pseudaconitine.' It is therefore very important indeed that official preparations should be made only from the root of *A. Napellus*.

ACONITINA (B.).

Aconitine.

Synonym.—Aconitia.

Description.—Aconitine is an alkaloid obtained from aconite root, and has the formula $C_{33}H_{45}NO_{12}$.

Mode of Preparation.—The aconitate of aconitine is dissolved out of the pounded root by macerating in spirit. If ammonia were now added, the aconitine would be set free, but, being soluble in spirit, would not be precipitated. The spirit is therefore removed by distillation, and the residual extract dissolved in water, in which the aconitate of aconitine is soluble, though the alkaloid itself is very sparingly so dissolved. Now, by adding ammonia, aconitine is precipitated, mixed with colouring matter and other principles. It is then dissolved in ether, which leaves the colouring matter behind. The ether is recovered by distillation, and the aconitine is further purified by dissolving it in water acidulated with sulphuric acid and reprecipitating by ammonia.

Characters.—Aconitine is a white, usually amorphous, solid, very active poison. It is not very soluble in water or petroleum spirit, but readily soluble in alcohol and in chloroform, and less readily in ether.

Tests.—It turns reddened litmus markedly blue, and neutralizes acids. It is precipitated from solutions of its salts by the caustic alkalies, but not by carbonate of ammonium or the bicarbonates of sodium or potassium.[1] When heated, aconitine melts and burns with a smoky flame, leaving no residue if ignited with free access of air. When rubbed on the skin, it causes a tingling sensation, followed by prolonged numbness.

Physiological Action of the Preparations of Aconite.—Aconite, when given internally, reduces the strength of the pulse, and thus retards the circulation. When administered in moderate

[1] An aqueous solution, even so highly diluted as 1 in 4,000, with a few drops of acetic acid and of solution of permanganate of potassium, deposits a red crystalline precipitate. A drop of an aqueous solution of 1 in 1,000 produces a tingling if placed on the tongue. The salts of the alkaloid are crystalline, viz., the hydrochloride which melts at 149° C., and the hydrobromide, which melts at 164° C.

doses, this powerful depressant reduces the number of the beats of the heart, and renders the breathing slower; while, when large or poisonous doses are taken, the pulse is accelerated, and the breathing becomes sharp and hurried. Physiological observers have shown that aconite paralyzes the heart of the dog, arresting its action in systole.

After death from aconite, the heart fails to respond to galvanic stimulation; and it is therefore believed that this poison affects the cardiac muscle itself.

According to the experiments of Ringer and Murrell, aconite paralyzes all nitrogenous tissues, and affects all the structures of the heart—viz., in the first place its ganglia, next the nerves, and finally the muscular substance. Regarding the action on the nervous system, Boehm concludes that aconitine first paralyzes the sensory, and then the motor, part of the cord; while Liegois and Hottot believe that it first paralyzes the perceptive centres above the spinal cord, and afterwards the terminations, and, lastly, the trunks of the sensory nerves.

The latter observers record that frogs poisoned with aconite lose sensation, whilst voluntary and reflex action remain; and reflex action itself ceases, whilst the animal still retains voluntary power.

On administering strychnine, these observers produced tetanus, the paroxysms of which could be excited by irritating any part of the body. They therefore conclude that at this stage the sensory nerves are not affected, and that anæsthesia depends on the influence of the aconite on the sensory perceptive centres.

After a time, however, irritation of the afferent nerves fails to excite a tetanic paroxysm; wherefrom they conclude that aconite next paralyzes the terminations, and then the trunks of the sensory nerves. According to Ringer, aconite is a protoplasmic poison, and destroys the functions of all the nitrogenous tissues—first of the central nervous system, next of the nerves, and last of the muscles; but it has an especial affinity for the sensory apparatus, paralyzing first the sensory perceptive centres.

Aconite, like tartar emetic, is undoubtedly a powerful depressant; and Ringer suggests that these drugs do not merely depress through their paralyzing effect on the heart, but that they do this also by their poisonous action on the central nervous system and on the motor nerves.

On the muscles aconite has little or no effect. Under the influence of aconite the temperature falls constantly.

Uses of the Various Preparations of Aconite.—When due care is taken in its administration, aconite is a most valuable remedy in veterinary medicine. Nevertheless, it must be emphatically stated that the greatest precaution is necessary in prescribing this most useful drug. When carelessly given in improper doses, and unsuitably or at too frequent intervals, it has too often caused death. Very frequently has it been illustrated how easily death may be caused by those who, uninitiated in the veterinary art, exercise but little caution, and so poison the horses under their charge by overdoses, or by too frequent repetition of the proper dose of this medicinal agent.

Aconite is an efficient antipyretic, sedative, diaphoretic, and anodyne, and it is especially valuable in controlling the inflammation and subduing the accompanying fever of many acute febrile disorders. In the febrile condition depending upon local inflammations, such as congestion of the lungs, inflammation of the lungs—or pneumonia, pleurisy, laryngitis, mammitis, enteritis, lymphangitis, peritonitis, pericarditis, erysipelas, laminitis, it is of great potency. In cases of colic, aconite has often been administered along with other remedies, more especially ether, opium, and spirit of nitrous ether. For enteritis also it acts well together with the hypodermic injection of morphia. In asthma it relieves the spasmodic contraction of the bronchioles.

In the contagious fevers of animals aconite is not indicated.

In the earlier stages of acute tenatus aconite often is indicated, more especially in those instances where the temperature is high, and the animal is highly bred and of a nervous temperament. In this disease it may be administered by the mouth, but it is preferable to employ the hypodermic method. Five to 10 minims of Fleming's tincture injected hypodermically have been found to be very efficacious in abating the acute symptoms in severe cases. It is possible, however, that in the treatment of tetanus in horses the antitetanic serum, now on its trial, will be found to be the most efficacious remedy. In rabies in horses aconite has not been found of any value (*Vet. Journal*, November, 1883).

In treating hypertrophy of the heart in thoroughbreds it has been administered by us, and was found to control the excessive or irregular action of this organ. In frequently repeated doses, Dun has found aconite of benefit at the outset of both forms of puerperal fever in cattle. It has also been given with success to ewes in the lambing season, when 'the animals have a hard time,

begin to blow, or show symptoms of fever.' It is a useful remedy for tympanitis in cattle and sheep, and for all painful affections of the bowels, and they can take it in fair doses.

In dogs aconite has been administered in acute febrile disorders with great advantage, especially in acute pneumonia. Externally, aconite is generally employed in the form of the liniment or ointment. As local anodynes these preparations have been found very useful in treating painful rheumatic affections. In cases of synovitis the application of the liniment of aconite has a most beneficial effect.

One-twentieth of a grain of aconitine, injected hypodermically under the skin of a horse, was found to cause salivation, champing of the teeth, retching, and reduction of the number and force of the heart's action. The ointment of aconitine is more reliable than the ointment of aconite.

Doses of Aconitine.—*Dog* - $\frac{1}{150}$ to $\frac{1}{100}$ grain.
Pig - $\frac{1}{100}$ to $\frac{1}{50}$,,
Horse - $\frac{1}{8}$ to $\frac{1}{2}$,,

ADEPS (A. and B.).

Lard.

Description.—Prepared lard is simply the purified fat of the hog, *Sus scrofa* (Linn.).

Mode of Preparation.—Remove as much as possible of the external membranes from the perfectly fresh internal fat of the abdomen of the hog, and suspend the fat, so that it shall be freely exposed to the air for some hours. Cut it into small pieces, and reduce them to a uniform mass, in which the membranous vesicles are completely broken by beating in a stone mortar, or in some other suitable manner. Now place the mass in a vessel surrounded by warm water, and heat to 54·4° C., until the fat has melted and separated from the membranous matter. Finally, strain the melted fat through flannel.

Characters.—Prepared lard is a soft, white, fatty substance, which melts at 37·8° C., and has no rancid odour. It dissolves entirely in ether, and has specific gravity 0·932 at 15° C.

Tests:

Negative.—Distilled water, in which prepared lard has been boiled, when cooled and filtered, gives no precipitate with nitrate of silver (absence of chlorides, etc.), and is not rendered blue by solution of iodine (absence of starch).

Therapeutics.—Lard is sometimes given internally in veter-

inary practice as a demulcent. In constipation in cattle it is still customary with some to administer internally 1 pound of melted lard daily as an adjunct to purgatives. It is extensively employed as a vehicle for ointments.

ADEPS BENZOATUS (A. and B.).

Benzoated Lard.

Mode of Preparation.—Melt 100 parts by weight of lard on a water-bath, then add 3 parts of powdered Benzoin, and heat for two hours, with constant stirring. Remove by straining any excess of Benzoin, and stir until cold.[1]

Therapeutics.—It is preferable to ordinary lard, on account of not being liable to become rancid, and, being emollient, is used as a basis for ointments.

ADEPS LANÆ (B.).

Wool-Fat.

Description.—This is the cholesterin-fat of sheep's wool, purified.

Characteristics.—It is a yellow, tenacious substance, having scarcely any smell, melting at about 42·2° C., easily soluble in ether or in chloroform, but only slightly in alcohol.

Tests.—A portion weighing 1 gramme should dissolve in 75 c.c. of boiling alcohol, which on being cooled deposits most of it in the form of a flocculent precipitate. If heated with free access of air, not more than 0·3 per cent. of ash should be left, and this should not be alkaline. If 10 grammes be dissolved in 25 c.c. of ether, and 2 drops of solution of phenolphthalein be added, not more than 0·1 c.c. of volumetric solution of hydroxide of sodium should be necessary to produce a permanent red colour (limit of acidity). If a solution of wool-fat in chloroform be carefully poured over sulphuric acid, it should become purple-red. Again, if to wool-fat a solution of hydroxide of sodium be added and the mixture heated, no odour of ammonia should be given off, as would be the case if nitrogenous animal matter were present.

[1] The corresponding Adeps Benzoinatus, Benzoinated Lard, of the United States Pharmacopœia contains a proportion of 2 of Benzoin to 100 of Lard by weight, and is therefore a milder preparation.

ADEPS LANÆ HYDROSUS (A.[1] and B.).

Hydrous Wool-Fat.

Mode of Preparation.—Put 140 grammes of Wool-fat in a warm mortar, and add 60 c.c. of Distilled Water gradually, constantly triturating the mixture.

Characteristics. — It is yellowish in colour and free from rancidity. If it be heated, a separation takes place into an upper oily, and a lower watery, layer. A portion weighing 10 grammes, if heated on a water-bath and stirred, should yield 7 grammes of wool-fat, containing, therefore, only 30 per cent. of water.

ÆTHER (A. and B.).[2]

Ether.

Synonym.—Sulphuric Ether.

Chemical Composition.—Ether is a volatile liquid prepared from ethylic alcohol by distillation with sulphuric acid, and containing not less than 92 per cent. by volume of ethyl oxide $(C_2H_5)_2O$.

Mode of Preparation.—Take of

Rectified Spirit, 50 fluid ounces;
Sulphuric Acid, 10 fluid ounces;
Chloride of Calcium, 10 ounces;
Slaked Lime, ½ ounce;
Distilled Water, 13 fluid ounces.

Mix the sulphuric acid with 12 fluid ounces of the spirit in a glass flask with a wide neck, and capable of containing at least 2 pints. Do not allow the mixture to cool. Connect the flask by means of a bent glass tube with a Liebig's condenser, and distil at a temperature which is sufficiently high to maintain the liquid in brisk ebullition. As soon as the ethereal fluid begins to pass over, supply fresh spirit through a tube into the flask in a continuous stream, and in amount sufficient to equal the volume of the fluid which distils over. This may be done by

[1] In the United States Pharmacopœia it is spoken of as the purified fat of the wool of sheep (*Ovis Aries*, Linné; order Ruminantia).

[2] Ether of the United States Pharmacopœia consists of about 96 per cent. by weight of Ethyl Oxide, and about 4 per cent. of Alcohol containing a little water.

using a tube provided with a stop-cock. At one end the tube is connected with a vessel containing the spirit raised above the level of the flask, and below it dips into the acid liquid, passing through a hole in the cork of the flask. When 50 fluid ounces of the spirit have been added, and 42 fluid ounces of ethereal liquid have distilled over, the process may be stopped. Dissolve the 10 ounces of chloride of calcium in the 13 fluid ounces of distilled water, add the lime and the impure ether. Agitate the mixture in a bottle, and then leave it at rest for ten minutes. Pour off the light supernatant fluid, and distil it until a glass bead of specific gravity 0·735 placed in the receiver begins to float. When this is the case, the specific gravity of the product is known to be the same. The ether and spirit retained by the residue may always be recovered by distillation, and used in subsequent operations.[1]

Characters.—Ether is a colourless, very volatile, and inflammable liquid of specific gravity 0·735. It emits a strong and characteristic odour. It boils below 40·5° C.

Test.—Ether evaporates without residue. Fifty measures agitated with an equal volume of water are reduced to 45. Thus 10 per cent. is absorbed.[2]

Action.—Ether when applied to the skin quickly evaporates, and this causes great coldness, and, indeed, the surface may in this manner be frozen and rendered quite insensible to pain. In the mouth, ether excites the salivary secretion. When taken into the stomach, it stimulates the movements of this organ, dispels flatulence, and increases the flow of the gastric juice. It is believed that it tends also to increase the co-ordination of the movements of this organ and of the intestines, thus diminishing spasm and relieving pain. When ether enters the body, it stimulates the circulation, and, after stimulating for a very short time the nerve-centres, it depresses them. It first affects the cerebral hemispheres, causing delirium and unconsciousness. It then acts on the gray matter of the spinal cord, after which the white part is also influenced. The cardiac and vaso-motor centres in the medulla oblongata are lastly acted upon. The heart is much

[1] Ether should be preserved in well-stoppered tin cans, in a cool place, away from fire or lights.

[2] It does not affect litmus, and the absence of organic impurity is indicated by there being no colour caused by dissolving it drop by drop in sulphuric acid kept cool.

less readily paralyzed by ether than by chloroform, and for this reason death from syncope during operations on dogs is less to be feared when the former anæsthetic is employed. Chloroform, however, we may mention, is the agent almost exclusively employed for causing anæsthesia in the horse, and its administration, when carefully performed, is very rarely fatal. For dogs ether is preferable to chloroform as an anæsthetic.

Uses. — Ether is administered internally as a powerful and prompt diffusible stimulant. It has also antispasmodic, diaphoretic, and diuretic properties. Externally applied, ether acts as an anodyne, refrigerant, and local anæsthetic. In the form of vapour, when inhaled in sufficient quantity, it causes general anæsthesia.

We may first speak of the use of ether as administered by the mouth. In treating colic in horses, whether of the spasmodic or flatulent type, ether, in combination with opium and spirit of nitrous ether, is of extreme value. In treating these disorders, the ordinary dose may be doubled, and the medicine may be given fairly frequently. Ether is also of great value in relieving flatulence in animals, and is a potent remedy in stomach-staggers of horses. In asthma it relieves the spasmodic contractions of the muscular walls of the small bronchioles. In cases of enteritis in horses ether has its own peculiar effect in relieving pain, and it wonderfully enhances the action of the hypodermic injection of morphine. As a general diffusible stimulant, ether is also frequently useful in many debilitated conditions in the horse, and, in fact, in all animals.

In cattle and sheep ether is a standard remedy for tympanitis, and also in spasmodic and painful affections of the bowels, and it may be used in rather large doses.

Chloroform is, perhaps, better adapted as a general anæsthetic in all the domesticated animals, excepting the dog and cat, for which ether is more suitable. For producing local anæsthesia for the purpose of removing tumours and for performing other operations—such, for instance, as that of neurotomy—ether is the agent selected.

We have also used it occasionally for spasms, and have found it most efficacious.

As an anæsthetic, administered in the form of vapour, dogs take from about 3 to 4 fluid drachms, horses and cattle from 3 to 6 fluid ounces.

Dose.—As an internal remedy:

Man - -	10 to 30 minims; but if only one administration, 40 to 60 minims.	
Dog - -	15 to 60	minims.
Pig - -	½ to 2	fluid drachms.
Sheep - -	¾ to 3	,, ,,
Horse - -	½ to 1½	,, ounces.
Ox - -	1 to 2½	,, ,,

ÆTHER ACETICUS (A. and B.).[1]

Acetic Ether.

Description and Formula.—It is a liquid consisting of Acetate of Ethyl, $CH_3 \cdot COO(C_2H_5)$, together with small amounts of ethylic alcohol or other substances, and prepared by distillation from a mixture of ethylic alcohol, sulphuric acid, and dried acetate of sodium, digestion of the distillate with dried carbonate of potassium,[2] and subsequent separation by distillation of the portion which boils between 73·9° and 77·8° C.

Mode of Preparation.—Take of

Rectified Spirit, 32¾ fluid ounces;
Sulphuric Acid, 32½ fluid ounces;
Acetate of Sodium, 40 ounces;
Freshly dried Carbonate of Potassium, 6 ounces.

To the spirit add slowly the sulphuric acid, keeping the fluid cool. The product being cold, add the acetate, mixing thoroughly. Distil 45 fluid ounces. Digest the distillate with the carbonate of potassium for three days in a stoppered bottle. Separate the ethereal fluid, and again distil, until all but about 4 fluid ounces has passed over. Preserve the acetic ether thus formed in a well-closed bottle in a cool and dark place, away from lights.

Characters.—Acetic ether is a colourless liquid with nice odour and taste. Its specific gravity is about 0·9 to 0·905, and its boiling-point about 75·85° C. It is soluble in all proportions in alcohol, ether, or chloroform, and in water in the proportion of 1 part in 10 by weight at 15·5° C.

Tests.—It should have no action on litmus; should not be coloured by sulphuric acid, thus showing absence of organic impurities; and filter-paper dipped in it should be odourless when the fluid has evaporated.

Therapeutics. — Acetic Ether is used in the preparation of Liquor Epispasticus, but not as an anæsthetic. It is stimulant and antispasmodic, and with the acetates of iron and potassium good for albuminuria.

Dose.—*Man* - - 20 to 40 minims, or 60 to 90 for a single dose.

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[1] The Acetic Ether of the United States Pharmacopœia contains about 98·5 per cent. by weight of Ethyl Acetate, and about 1·5 per cent. of Alcohol containing a little water. Its specific gravity at 15° C. is about 0·894, and its boiling-point about 76° C., whilst the specific gravity of the British Pharmacopœia preparation is 0·9025, and the boiling-point very nearly as high as 76° C.

[2] $C_2H_5OH + NaC_2H_3O_2 + H_2SO_4 = CH_3 \cdot COO(C_2H_5) + NaHSO_4 + H_2O$.

ÆTHER PURIFICATUS (B.).

Purified Ether.

Description.—From ether the greater part of the ethylic alcohol may be removed by washing it with distilled water, and the greater part of the water by distillation in the presence of chloride of calcium and recently prepared lime.

Tests.—The specific gravity should be about 0·721. A portion measuring 5 c.c., spontaneously evaporated, should not give off any unusual smell nor leave any residue. The vapour is heavy and very inflammable. It should be dissolved by an equal volume of bisulphide of carbon, thus proving the absence of excess of water. When heated it begins to distil at about 34·5° C., showing the absence of methylic ether. Absence of aldehyde is proved by the addition of hydroxide of potassium, when no effect is produced; the absence of acid by moistened blue litmus-paper being unaltered after a day's exposure to it. The absence of peroxide of hydrogen is proved by shaking it with half its volume of a diluted solution of bichromate of potassium, together with a little sulphuric acid, and setting aside, when the ether on the surface should not become blue. If filter-paper be moistened with ether, and it be allowed to evaporate, no smell should be left.

ALCOHOL ABSOLUTUM (A. and B.).

Absolute Alcohol.

Formula and Mode of Preparation.—The above is really ethyl hydroxide, C_2H_5OH, with no more than 1 per cent. by weight of water, and it is prepared by abstracting water from weaker ethylic alcohol, and distilling.

Characteristics.—The specific gravity is about 0·79545. At ordinary temperatures it is very volatile and hygroscopic.

Test.—If it be mixed with 1·5 per cent. of anhydrous sulphate of copper in a tightly-stoppered bottle, and set aside and now and then shaken for about three hours, the salt does not turn markedly blue, showing absence of excess of water.

ALLIUM (A.).

Garlic.

Description.—The bulb of *Allium sativum* (Linné), a plant belonging to the Liliaceæ. It is more or less globular, and consists of about eight wedge-

shaped little bulbs, concentrically placed around the base of the stem, and covered by dry scales. The smell is pungent and the taste acrid. It should not be dried before use.

Preparation.—Syrupus Allii.

Uses in Human Beings.—As a counter-irritant in convulsions in children, a mixture of garlic juice and oil, or bruised garlic steeped in spirit. Internally the syrup is given for atonic dyspepsia and for nervous vomiting, for nervous coughs in children and in bronchitis after the acute stage. It is useful either as enema or by the mouth for ascarides.

ALOE BARBADENSIS (A. and B.).

Barbados Aloes.

Natural Order.—Liliaceæ.

Description. — The inspissated juice which flows from the transversely cut leaves of *Aloe vera*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 282), *Aloe chinensis*, Bak. (*Bot. Mag.*, plate 6,301), and other species, evaporated to dryness. It is imported from the West Indian Islands, and is known in commerce as Barbados and Curaçao aloes.

Characters. — Barbados aloes is almost entirely soluble in alcohol (90 per cent.) to which has been added half its volume of water, and the proportion insoluble in cold water should not be more than 30 per cent. It occurs in hard pieces or lumps, and the colour varies from yellowish- or reddish-brown, or chocolate-brown, to dark-brown or black. The fracture is dull and waxy, with opaque splinters, or glassy, with transparent splinters. In mass it is opaque, but thin films are translucent, and of an orange-brown tint. The powder is dull olive-yellow. The odour is strong and disagreeable, especially when the aloes is breathed upon; while that of Socotrine aloes is not unpleasant. The taste is exceedingly bitter and nauseous. The Curaçao variety is generally more glassy and translucent than the ordinary Barbados kind, and has a distinctive odour. When a thin stratum of the opaque variety is examined under the microscope, numerous minute crystals are seen embedded in a transparent mass. The powder turns nitric acid crimson, and if sulphuric acid be added and the vapour of nitric acid, a slight bluish-green, and not a bright blue colour, should be formed, thus indicating the absence of Natal aloes.

Dose.—*Man* - - - 2 to 5 grains.

ALOE CAPENSIS.

Cape Aloes.

Natural Order.—Liliaceæ.

Description.—Cape aloes is the inspissated juice of the leaf of *Aloe spicata* and several other allied species. It is imported from the Cape of Good Hope in skins and in chests.

Composition.—Similar to that of *Aloe Barbadensis*.

Characters.—Cape aloes has a glossy and resinous appearance. Its colour is dark-brown with a strong greenish-yellow shade. The odour is strong, but not disagreeable. The taste is acrid and bitter. It is very brittle, being not unlike resin in this respect. It is readily powdered, and the powder has a strong greenish-yellow colour.

Preparations, etc.—Similar to those of Barbados aloes. Cape aloes is scarcely so certain in its action as Barbados.

ALOE SOCOTRINA (A. and B.)

Socotrine Aloes.

Natural Order.—Liliaceæ.

Description.—The juice, when inspissated, which flows from the transversely cut leaves of *Aloe Perryi*, Baker (*Bot. Mag.*, plate 6,596), and other species of Aloe, evaporated to dryness. It is imported principally by way of Bombay and Zanzibar, and is known in commerce as Socotrine and Zanzibar aloes.

Characters.—*Socotrine* aloes is much lighter in colour than the other two varieties, being of various shades of reddish- or yellowish-brown. It darkens by exposure to the air; sometimes it is more or less opaque and liver-coloured, and is then called hepatic aloes. When dry it forms hard dark-brown or nearly black masses. The fracture is usually dull and waxy and uneven, or smooth and resinous, or rarely rough and irregular. In thin films it is transparent, and orange-red or orange-brown. The powder is bright brown. The odour is strong and rather agreeable. The taste is very bitter. Like Barbados aloes, when moistened with rectified spirit and examined in a thin layer under the microscope, it exhibits numerous crystals, and it is similarly soluble almost entirely in proof spirit.

Zanzibar aloes is generally imported in liver-brown masses, and it has a dull and waxy and uneven fracture, characteristic odour and bitter taste.

Both varieties are opaque even when in small splinters, and show, when examined with the microscope, many minute crystals embedded in a transparent mass, and turn nitric acid

reddish. If the vapour of nitric acid is blown over the powder mixed with sulphuric acid no blue colour forms (absence of Barbados and Natal aloes). They are both soluble in alcohol (90 per cent.) to which half its volume of water has been added, and about 50 per cent. should be soluble in water.

Doses of the three kinds of Aloes:

Man	- - -	2 to 5 grains.
Dog	- - -	15 to 60 ,,
Pig	- - -	1 to 4 drachms.
Horse	- - -	2 to 8 ,,

ALOINUM (A. and B.).

Aloin.

Description.—It is extracted from Barbados or Socotrine aloes by solvents, and purified by recrystallization. The different kinds of aloes yield slightly different forms of aloin, but the medicinal properties are similar. That extracted from Barbados aloes has the formula $C_{16}H_{16}O_7,3H_2O$.[1]

Characteristics.—Aloin has the form of little groups of acicular crystals, which are yellow, odourless, and have the taste of aloes. It is to a small extent soluble in cold water, more so in alcohol (90 per cent.), freely in hot water or alcohol, but almost insoluble in ether. It is not easily acted upon by acid or neutral solutions, but is quickly altered by alkaline ones.

Action of Aloes.—Aloes acts upon the stomach and intestines as a bitter and purgative. Its chief purgative action is upon the colon and distal part of the small gut. Although one of the slowest of the purgatives, aloes is a reliable and valuable cathartic in horses. Its action as a purgative is due to the increase of the peristaltic action of the bowels and to the augmentation of the flow of secretion from the glands of the intestinal mucous membrane. It also increases the flow of the bile. Aloes produces its action by whatever channel it enters the system, and of all cathartics is the one most suitable for equine practice. On ruminants its action is much less certain. This is attributable to the fact that in these animals the part of the gut on which aloes chiefly acts is not nearly so large as in the horse, while at the same time the

[1] The formula $C_{16}H_{18}O_7$ is given by Brunton. The United States Pharmacopœia mentions Barbaloin from Barbados Aloes, and Socaloin from Socotra or Zanzibar Aloes.

stomach of ruminants is much more complex than in horses. In pigs aloes is a very useful purgative. In dogs aloes is not so prompt in its action as castor-oil, jalap, syrup of buckthorn, and preparations of mercury.

Of the varieties of aloes, Barbados is the most active, and is the kind most used in veterinary practice.

East Indian aloes is not quite so potent, and Cape aloes has a still milder effect. These two latter varieties, if given in somewhat larger doses than the Barbados aloes, are said to have quite as good an effect as the Barbados aloes. The Cape variety is especially serviceable in cases where it is desired to produce catharsis in a horse recently taken up from grass.

The nauseating and griping effect of aloes may be obviated somewhat by giving it with aromatics, such as ginger, cloves, or peppermint.

Aloin, the active principle of aloes, has not been as yet extensively used in veterinary practice. On the horse it has, however, a somewhat better action than aloes, inasmuch as it is not so liable to cause nausea and griping. On cattle its action is also, perhaps, better than that of aloes. To dogs, like aloes, aloin must be given in large doses to produce any effect.

Uses.—In equine practice aloes is very extensively administered in cases of constipation, obstruction of the bowels, colic, and dyspepsia. In cases of prolonged constipation in horses, when an immediate action of the bowels is requisite, the injection of sulphate of eserine into the jugular vein[1] has been lately practised as a very efficient means of causing evacuation of the bowels. In habitual constipation in horses small doses of aloes given in conjunction with strychnine prove very useful.

In treating most of the acute inflammatory diseases of the horse, especially in plethoric cases, aloes may be given with advantage in the first stages of the disease in doses of 2 to 3 drachms only. In laminitis, hepatitis, lymphangitis, and as a vermifuge, aloes may be given in full doses. In cases of mammitis and laryngitis a moderate dose of 4 drachms, and in cases of pneumonia, pleurisy, erysipelas, influenza, and strangles about 2 drachms may be given. In congestion or inflammation of the liver in horses aloes is indicated in full doses. When employed as a vermifuge after a fast, aloes should also be given in full doses.

For the latter purpose it may be given alone or with anthel-

[1] *Vide* Sulphate of Physostigmine.

mintics, such as oil of turpentine, or it may be administered on the day following the administration of santonine, filix mas, or other remedies. In the form of an enema, aloes is sometimes used to expel worms in the rectum.

In various kinds of lameness and wounds in horses, attended with febrile action, aloes is commonly given with good effect.

In cattle and sheep aloes is seldom administered alone, being usually combined with sulphate of magnesium or sodium, or more powerful cathartics. Aloes is not often given to dogs.

Doses of Aloes as a Cathartic:

Man - - -	2 to 5 grains.
Dog - - -	15 grains to 1 drachm.
Pig - - -	1 to 4 drachms.
Sheep - - -	2 to 6 ,,
Horse - - -	2 to 8 ,,
Ox - - -	4 to 12 ,,

Aloes as a Laxative and Alterative.—The dose is about one-eighth part of the above.

Aloes is administered in equine practice in the form of a ball or sometimes in the form of solution. The mass of aloes, the composition and manufacture of which we give (massa aloes), will be found very efficient and reliable.

Doses of Aloin:

Man - - -	½ to 2 grains.
Dog - - -	2 to 25 ,,
Horse - - -	1 to 2 drachms.
Ox - - -	1 to 3 ,,

ALTHÆÆ RADIX (A.).[1]

Marshmallow Root.

Description.—The root of a plant called *Althæa officinalis* (Linné) belonging to the Malvaceæ. It has the shape of cylindrical pieces about 12 centimetres in length and 12 millimetres in diameter, and the pieces are deeply wrinkled. The brown corky layer is stripped off, and the small roots are rejected. On the outside they are white, and have circular spots and look hairy, owing to loose bast-fibres, whilst the inner surface is white and fleshy. The fracture is short, granular, and soft or mealy. The smell is aromatic, and taste sweet and mucilaginous.

Composition.—Contains about 35 per cent. each of vegetable mucin and starch.

[1] Styled simply Althæa in the United States Pharmacopœia.

Uses.—A useful demulcent in sore throat, coughs, or irritation of intestines. An ointment made by boiling the cut fresh leaves with lard for half an hour has been beneficial in palmar psoriasis in man (Berry).

Dose.—Infusion of Althæa:

Dog - - -	1 to 2½	fluid ounces.
Pig - - -	2 to 8	,, ,,
Horse - - -	10 to 20	,, ,,

Syrup of Althæa:

Man - - -	1 to 4	fluid drachms.

ALUMEN (A. and B.).

Alum.

Chemical Composition. — The formula for Potassium Alum is:

$$Al_2(SO_4)_3,K_2SO_4,24H_2O,$$[1]

and for Ammonium Alum:

$$Al_2(SO_4)_3,(NH_4)_2SO_4,24H_2O.$$

They are produced by the combination of aluminium sulphate with sulphate of potassium in the one case and with sulphate of ammonium in the other.

Characters. — Alum exists in colourless, transparent, octahedral crystalline masses, and possesses an acid, sweetish astringent, and not unpleasant taste. It is soluble in ten times its weight of cold and in one-third of its weight of boiling water, and the solution is acid in reaction. It is freely soluble in glycerine, but insoluble in alcohol.

Tests.—An aqueous solution gives with potassium or sodium hydroxide a white precipitate soluble in excess of the reagent, and if ammonia alum be boiled with either hydroxide, ammonia is given off.

With solution of chloride of barium a white precipitate is at once yielded.

On the addition of ferrocyanide or ferricyanide of potassium no blue colour is produced. Copper, Lead, Zinc, Calcium, and Sodium should be absent, and only the slightest trace of iron be indicated.

Therapeutics.—Alum has astringent and styptic effects, and is chiefly used for external purposes.

Alum coagulates albumin, and is absorbed into the blood

[1] The United States Pharmacopœia includes only Potassium Alum; of which it gives the formula $Al_2K_2(SO_4)_4+24H_2O=946{\cdot}46$. If Ammonia Alum is meant, it should be expressly stated, so as to avoid error.

probably as an albuminate. It has been employed in conjunction with other astringents in cases of diarrhœa, dysentery, and hæmorrhage from the kidneys. In lead-poisoning it is also commonly administered. In cattle it is frequently used for arresting the secretion of milk.

Externally, alum is used in solution or as a powder. In weak solution, coupled with weak solution of permanganate of potassium and a little Liquor Hyd. Perch., it may be used as an injection in discharges from the vagina, uterus, and urethra. As an astringent wash in conjunctivitis, although sometimes used, it cannot be recommended. As a powder, alum arrests bleeding. As a strong solution or as a powder it has been used in cases of foul discharge from the nostril.

Dose.—*Man* - - - - 5 to 10 grains.
Dog - - - - 10 to 20 ,,
Sheep and Pig - - - 20 grains to 1½ drachms.
Horse and Cattle - - 2 to 4 drachms.

ALUMEN EXSICCATUM (A. and B.).

Dried Alum.

Chemical Composition.—The formula is $Al_2(SO_4)_3,K_2SO_4$.[1]

Mode of Preparation.—Heat the alum in a porcelain or other vessel until it liquefies, then raise the heat, not allowing it to exceed 204·4° C., and continue heating until aqueous vapour ceases to be set free. The salt will then have lost 45½ per cent. of its weight.[2] Reduce the residue to powder, and preserve in a well-stoppered bottle.

Character.—It is slowly but completely soluble in water.

Therapeutics.—Dried alum is very little used. It has the property of absorbing water, and is somewhat caustic if the skin be broken, as, for instance, over ulcers. It is sometimes dusted over wounds to destroy exuberant granulations.

ALUMINII HYDRAS (A.).[3]

Hydrate of Aluminium.

Formula and Synonym.—$Al_2(OH)_6$. Hydroxide of Aluminium.

Preparation.—Dissolve separately 100 grammes of alum and carbonate of sodium respectively in 1,000 c.c. of distilled water, filter the solutions separately, and heat each to boiling; then pour the hot solution of carbonate of sodium into a large vessel, and gradually add the boiling solution of alum,

[1] $Al_2K_2(SO_4)_4=515·42$.

[2] Or 45 per cent. according to the United States Pharmacopœia.

[3] This and the next drug are called in the United States Pharmacopœia Alumini Hydras and Alumini Sulphas; but in this country the metal is styled Aluminium and not Aluminum.

keep stirring, and add an equal volume of boiling distilled water. After the precipitate has subsided, pour off the clear liquid, and pour upon the precipitate 2,000 c.c. of hot distilled water. After a short interval, pour off the water again, remove the precipitate to a strainer, and wash it with hot distilled water until the fluid used for washing gives only a faint cloudiness with solution of chloride of barium (due to formation of sulphate of barium). Now allow the water to drain away, dry at a temperature not higher than 40° C., and reduce it to a fine powder.

Characteristics and Tests. — Hydrate of aluminium is a white, light powder, devoid of both odour and taste, and permanent in dry air. It is insoluble in water or alcohol, but forms a compound solution with hydrochloric or sulphuric acid, or solution of hydroxide of potassium or of sodium. If heated to redness, it loses about 34·6 of its weight (water of hydration).

A solution in a solution of hydroxide of potassium or sodium should not give a precipitate with sulphuretted hydrogen, thus indicating the absence of zinc or lead. If it be boiled with 20 parts of water and filtered, and the filtrate be evaporated, there should not be more than a slight residue of alkali.

ALUMINII SULPHAS (A.).

Sulphate of Aluminium.

Formula.—$Al_2(SO_4)_3 + 16H_2O$.

Characteristics and Tests. — It is a white crystalline powder, odourless, and with a taste at first sweet and then astringent, and is permanent in the air. It is soluble in 1·2 parts of water at 15° C., and much more so in boiling water, but insoluble in alcohol. If it be gradually heated to 200° C., its water of crystallization, representing 45·7 per cent. of its weight, is lost.

The salt turns blue litmus red. An aqueous solution gives with solution of chloride of barium a white precipitate insoluble in hydrochloric acid. If a solution of hydroxide of potassium or sodium be added to an aqueous solution of the salt, a white gelatinous precipitate is yielded, which is soluble in excess of the reagent, but reprecipitated if a solution of chloride of ammonium be also added.

A filtered 10 per cent. aqueous solution should not give a precipitate with sulphide of hydrogen, proving the absence of copper, lead, or zinc; and if 1 gramme of the salt be gently heated with 5 c.c. of solution of hydroxide of potassium or of sodium, no odour of ammonia should be caused.

Dose.—

Dog	5 to 20 grains.
Pig	10 to 40 ,,
Horse	1 to 3 drachms.

AMMONIACUM (A. and B.).

Description.—Ammoniacum is a gum-resin exuded from the flowering and fruiting stem of *Dorema ammoniacum*[1] and other species,[2] after it has been punctured by beetles.

[1] D. Don., natural order, Umbelliferæ.

[2] *Trans. Linn. Soc.*, Ser. II., Bot., vol. iii., pl. 23-25.

Characters.—This substance occurs in the form of brownish tears, which vary in size from that of a coriander fruit to that of a cherry, or in nodular masses of agglutinated tears, varying in size from ¼ to 1 inch, and in form. When fresh, the substance is pale yellowish-brown externally, but when kept darkens, becoming crimson brown. Internally, it is milky white or yellowish and opaque. When cold it is hard and brittle, and breaks with a dull, waxy fracture; but it is readily softened by heat. The odour is faint, peculiar, and non-alliaceous. The taste is bitter and acrid. It forms when triturated with water a nearly white emulsion.

Tests.—Solution of hydroxide of potassium colours it yellow.

A solution of chlorinated soda imparts to it a bright orange hue. If a small piece be heated strongly in a dry test-tube and cooled, and a little boiling water be then added and the whole shaken, then more cold water and a little ammonia, a blue fluorescence is not produced, as would be if asafœtida or galbanum were present.

Therapeutics.—Ammoniacum is used in veterinary practice for making charges and plasters. Internally it acts as a disinfectant expectorant, but is very seldom prescribed.

Dose.—*Man*	5 to 15	grains.
Dog	5 to 20	,,
Pig	10 to 60	,,
Sheep	½ to 1½	drachms.
Horse	1 to 3	,,
Ox	2 to 4	,,

AMMONII BENZOAS (A. and B.).

Benzoate of Ammonium.

Chemical Composition.—The formula is $C_6H_5 \cdot COONH_4$.

Mode of Preparation.—Dissolve 2 ounces of benzoic acid in 3 fluid ounces of solution of ammonia, which have been mixed with 4 fluid ounces of distilled water. Evaporate, adding, if necessary, a little ammonia, so that it may be in slight excess, and allow crystals to form.

Characters.—Benzoate of ammonium occurs in colourless lamellar crystals. It is soluble in 6 parts of cold water, 30 of alcohol (90 per cent.), and 8 of glycerine.

Tests.—Like all other salts of ammonium, when heated with solution of hydroxide of potassium, it evolves the gas ammonia.

With ferric salts it gives a bulky yellowish precipitate.

If a little sulphuric acid be added to a fairly strong aqueous solution, benzoic acid is deposited as a crystalline precipitate.

It sublimes when heated without residue. Chlorides and sulphates should be absent. A cold aqueous solution does not redden litmus, but if it be boiled, ammonia is given off, and the benzoic acid set free.

Therapeutics.—Benzoate of ammonium, being much less irritant than benzoic acid, can be given in larger doses.

Its actions and uses are similar to those of the acid.—*Vide* Benzoic Acid.

Dose.—*Man* - - - - - - 5 to 15 grains.
Dog - - - - - - - 3 to 12 ,,
Pig - - - - - - - 7 to 20 ,,
Sheep - - - - - - ½ to 1½ drachms.
Horse - - - - - - 1 to 2 ,,

AMMONII BROMIDUM (A. and B.).

Bromide of Ammonium.

Formula.—NH_4Br.

Mode of Preparation.—Bromide of ammonium may be formed by neutralizing hydrobromic acid with the gas ammonia or solution of ammonium hydrate ($HBr + NH_4HO = NH_4Br + H_2O$), evaporating, and allowing to crystallize.

Characters.—Bromide of ammonium exists in the form of small colourless crystals, which after exposure to the air become slightly yellow. It should therefore be kept, as should also the iodide of ammonium and the iodide and bromide of potassium, in bottles covered with paper. The taste of this salt is pungent and saline in character. On the application of heat, bromide of ammonium can be sublimed without change. It is readily soluble in water, but less so in alcohol.

Tests.—If it be heated to redness, no residue should be left. The absence of lead, iron, bromates, iodides, or nitrates should be demonstrable, and there should only be the slightest traces of sulphates or chlorides.

Therapeutics.—The therapeutics and posology of bromide of ammonium are nearly the same as those of the other bromides, and the reader is referred for their description to potassium bromide. Ammonium bromide contains more bromine in proportion to the ammonium than the potassium or sodium salts do to their metallic elements, and should be given in less doses, and copiously diluted. It is not so useful as the potassium salt, and it causes rather acidity than alkalinity of urine in man.

Dose.—*Man* - - - - - 5 to 30 grains.
Dog - - - - - 3 to 10 ,,
Pig - - - - - 7 to 20 ,,
Horse - - - - - 1 to 2 drachms.

AMMONII CARBONAS (A. and B.).

Carbonate of Ammonium.

Synonym.—Ammoniæ Sesquicarbonas.

Formula.—$N_3H_{11}C_2O_5$.

Mode of Preparation.—Carbonate of ammonium is produced by submitting a mixture of sulphate or chloride of ammonium with carbonate of calcium to sublimation and resublimation. It may be looked upon as a varying mixture of ammonium hydrogen carbonate (NH_4HCO_3) with carbamate of ammonium ($NH_4NH_2CO_2$).

Characters.—Carbonate of ammonium is a volatile and pungent salt, existing in translucent crystalline masses. It possesses a strong ammoniacal odour and a marked alkaline reaction. It is soluble in 4 parts of cold water, and more sparingly in alcohol. If exposed to the air, it becomes covered with a white efflorescence, which should be scraped off before use.

Tests.—When heated it volatilizes entirely, and is readily dissolved by acids with effervescence.

If diluted nitric acid be added to it in slight excess, and the solution be boiled, it will give no precipitate with solution of chloride of barium or nitrate of silver (absence of sulphates and chlorides).

An aqueous solution neutralized with acid and evaporated to dryness should give only a slight residue, and it should be devoid of odour and colour (absence of tarry matters).

Therapeutics.—The action of ammonium carbonate, although not so powerful and irritating as ammonia, is, nevertheless, similar. Ammonium carbonate is very largely used in veterinary medicine. As a stimulant in conjunction with vegetable and mineral tonics, no remedy is so valuable for horses in the later stages of many debilitating diseases, such as influenza, strangles, scarlet fever, purpura, and other maladies. In chronic bronchitis, and in the later stages of pneumonia and of acute bronchitis, ammonium carbonate acts well, owing to its influence in stimulating the respiratory centre, and promoting the expectoration of mucus. In cases of dyspepsia and flatulence it is very useful, and in flatulent colic it has a very good action in expelling the flatus. In the treatment of puerperal apoplexy in cows, ammonium carbonate in full doses, frequently repeated, is invaluable.

In tympanitis in cattle, ammonium carbonate is very effectual; and in dyspepsia in dogs it may very advantageously be given with spirit of chloroform.

As a local application, ammonium carbonate in solution neutralizes the poison of wasps' stings.

Ammonium carbonate is usually administered in the form of a ball in horses; but in other animals—and in horses also, where it is desired to have an immediate effect—it is best given in solution.

The spirit of ammonia is the preparation usually employed when it is desired to administer the drug in liquid form (see Spiritus Ammoniæ).

Dose.—

Man and Dog	3 to 10	grains.
Pig	5 to 20	,,
Sheep	7 to 30	,,
Horse	1 to 2	drachms.
Ox	1½ to 3½	,,

AMMONII CHLORIDUM (A. and B.).

Chloride of Ammonium.

Synonym.—Sal Ammoniac.

Formula.—NH_4Cl.

Mode of Preparation.—Chloride of ammonium may be formed by neutralizing hydrochloric acid with gas-liquor, or ammonia, or carbonate of ammonia, evaporating to dryness, and purifying the crystals by sublimation.

Characters.—Chloride of ammonium exists in colourless, inodorous, minute crystals, or in translucent fibrous masses, which are tough and difficult to powder. It is soluble in 3 parts of cold water and in 60 parts of alcohol (90 per cent.).

Tests.—This salt gives the reactions of a salt of ammonium and those of a chloride.

When heated to redness, it volatilizes without change, and leaves no residue. There should be no lead, copper, arsenium, calcium, carbonates, or nitrates, and only the slightest traces of iron or sulphates. An aqueous solution should yield no redness with ferric chloride solution, thus proving the absence of thiocyanates.

Therapeutics.—Chloride of ammonium is stimulant, diuretic, and diaphoretic. It is not much used internally in veterinary practice, but is sometimes prescribed for congestion of the liver, and in the later stages of pneumonia and bronchitis in horses. It stimulates the mucous surfaces and glands of the body, acting especially on the liver.

Externally, a solution of chloride of ammonium and nitre in water is often used as a cooling application for sprains and bruises.

Dose.—

Man, *Dog*, *Pig*	5 to 20 grains.
Sheep	½ to 2 drachms.
Horse	1 to 4 ,,
Ox	2 to 6 ,,

AMMONII IODIDUM (A.).

Iodide of Ammonium.

Description.—The formula is NH_4I, and molecular weight 143·84. The salt has a yellowish colour, and it should be placed in small, well-closed bottles, and in the dark. When its colour is deep, it shows that free iodine is present; if so, it can be purified by adding enough sulphide of ammonium solution to render it colourless, filtering, and then evaporating to dryness on a water-bath. It has the form of small cubical crystals, devoid of colour, or of a white granular powder. If iodine be present, there is that characteristic smell and colour. The taste is sharp and saltish. It is very hygroscopic, and soon becomes yellow by the action of light, ammonia being given off, and iodine set free.

It is soluble at 15° C. in 1 part of water and in 9 parts of alcohol, in 0·5 part of boiling water and in 3·7 parts of boiling alcohol.

Tests.—If it be heated on platinum foil, it entirely volatilizes, giving off iodine and ammonia. An aqueous solution has a neutral reaction, and if it be heated with solution of a hydroxide of sodium or potassium, the well-known smell of ammonia is produced. If to 10 c.c. of an aqueous solution a little chloroform be added, and then a few drops of chlorine water, the chloroform, after shaking the mixture, becomes violet.

AMMONII PHOSPHAS (B.).

Phosphate of Ammonium.

Formula and Mode of Preparation.—Its formula is $(NH_4)_2HPO_4$, and it results from adding solution of ammonia to phosphoric acid.

Characteristics.—The salt has the form of transparent prisms, devoid of colour or odour. It is soluble in 4 parts of cold water, insoluble in alcohol.

Tests.—Those of phosphates, and of salts of ammonium. If 2 grammes be dissolved in water, and solution of ammonio-sulphate of magnesium be added in excess, a crystalline precipitate is produced; and if this be washed on a filter with solution of ammonia, to which an equal volume of water has been added, and then dried and heated to redness, it should weigh 1·68 grammes. An aqueous solution should be free from lead, copper, or arsenium, and almost entirely devoid of iron, chlorides, or sulphates.

Dose.—*Man* - - - - - - - 5 to 20 grains.

Therapeutics of Salts of Ammonium.—The actions and uses of the salts of ammonium, all of which are colourless and soluble and easily decomposed, giving off ammonia gas if mixed with soda, potash, or lime, and gently heated, may be thus summarized:

(*a*) *Externally.*—Stimulate nerves and tissues, causing pain and burning sensation, and redness of the part by dilatation of blood-vessels; and blistering may be produced, if the vapour be confined for some time, diluted preparations only causing a redness and heat. It is used as Linimentum Ammoniæ and Linimentum Camphoræ Ammoniatum to stimulate the circulation, as in stiff or chronically diseased joints, or as a counter-irritant—*e.g.*, on the surface of the chest in bronchitis. It should not be used as a caustic or blister. It has been applied to snake-bites; but for this purpose the injection of Permanganate of Potassium in saturated solution is better.

(*b*) *Internally.*—Salts of ammonium stimulate the vaso-motor centre, and in larger doses act as convulsants. Tetanus is produced by the action of ammonia and chloride of ammonium on the spinal cord, and not on the cerebral centres, for, like the tetanus caused by strychnine, section of the cord does not prevent it.

Ammonia is a strong muscular irritant, and causes contraction, and subsequently rigor mortis, when directly applied to voluntary muscular fibres. Salts of ammonium augment the secretion of the mucous glands of the bronchi and of the intestines, and of the sweat-glands and kidneys. In the blood of mammals ammonia is nearly totally converted into urea, but in birds into uric acid. It increases the production of glycogen in the liver. Neither ammonium nor carbonate of ammonium, nor salts of ammonium with organic acids, diminish, but rather augment the acidity of the urine in man, thus differing from potassium, sodium, and lithium.

AMYGDALA AMARA (A. and B.).

Bitter Almond.

Description.—The ripe seed of the bitter almond-tree, *Prunus amygdalus*,[1] var. amara, resembles the sweet almond in appearance, but is broader and shorter, and also differs in having a very bitter taste, and by the fact that an aqueous emulsion has an odour like that of ratafia or of peach-blossoms.

Preparation.—Oleum amygdalæ is yielded by expression.

AMYGDALA DULCIS (A. and B.).

Sweet Almond.

Description.—This is the ripe seed of the sweet almond-tree, *Prunus amygdalus*,[2] var. dulcis, imported from Malaga, and known as the Jordan almond. The sweet almond is about an inch or somewhat more in length, nearly oblong in form, pointed at one end and round at the other, flattened, and covered by a thin, rough, and scurfy cinnamon-brown coat. The taste is bland, sweet, and nutty. When triturated with water, it forms a white emulsion of an agreeable taste, which differs from that of the bitter almond in not possessing any marked odour.

Preparation.—Oleum amygdalæ.

AMYL NITRIS (A. and B.).

Nitrite of Amyl.

Chemical Composition.—The liquid named as above consists chiefly of iso-amyl nitrite, $C_5H_{11}NO_2$, but also contains other nitrites of the homologous series.

Mode of Preparation.—It is produced by the action of nitrous acid on amylic alcohol, which has been distilled between 127·7° and 132·2° C. It should be stored in hermetically sealed vessels or in well-stoppered bottles, and kept in a cool and dark place.

Characters.—It is an ethereal liquid of a yellowish colour, and possesses a peculiar and agreeable odour, and only the faintest acid reaction. The specific gravity is 0·877, and it volatilizes at about 128° to 132° C. When distilled, about 70 per cent. passes over at about 95° C., the bulb of the thermometer not dipping below the surface of the residual fluid. Nitrite of amyl is nearly insoluble in water, but is soluble in *alcohol* in all proportions.

If it be added drop by drop to fused hydroxide of potassium, iso-valerianate of potassium is formed. If shaken with an equal

[1] *Prunus amygdalus*, Stokes, var. Amara, Baillon, De Candolle (natural order, Rosaceæ).

[2] *Prunus amygdalus*, Stokes, var. Dulcis, Baillon, De Candolle (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 99).

volume of solution of potassium hydroxide, the aqueous portion should have only a pale yellow colour (limit of aldehyde). If a test-tube containing a little nitrite of amyl be placed in melting ice, it retains its transparency (absence of water, which would freeze). It must be stored in carefully stoppered bottles.

Action.—The specific action of nitrite of amyl is almost restricted to its influence on the vascular system. The whole arterial system is relaxed, and the arterial blood-pressure is greatly reduced. This vascular relaxation is either due to the action of the drug on the vaso-motor centre in the medulla, or to its action on the vaso-motor nerves and muscular walls. The heart's action is greatly accelerated.

Belladonna causes doubling of pulse-rate in man and dogs; but in rabbits no appreciable effect, because, although it paralyzes the inhibitory power of the vagus nerve over the heart, in the rabbit the normal restraining power of that nerve is small, whereas in dogs and men it is great.

Similarly, if we measure the blood-pressure in the arteries of a rabbit and of a dog, and then cause both animals to inhale nitrite of amyl, we find that the small vessels have so widened that the blood has easily passed out of its due proportion from the arterial into the venous system; but though the arterial blood-pressure sinks greatly in the rabbit, it is only slightly lessened in the dog. The dog's heart is, however, beating so rapidly as to keep up the pressure, whereas the rabbit's heart was beating so rapidly before that it cannot act much more quickly. If, however, we cut both vagi in the dog before administering the nitrite of amyl, so that the heart acts as rapidly as in the normal rabbit, the blood-pressure in that case does sink during the inhalation, because the heart beats more quickly owing to section of vagi already, and cannot act much more swiftly. It has been shown by Dr. Wood that the loss of the reflex irritability and voluntary power is owing to the depressing action of the nitrite on the motor tracts of the cord, and, to a slight extent, on the motor nerves and on the muscles.

It lowers the temperature by checking oxidation.

Uses.—In the treatment of idiopathic and traumatic tetanus in horses it has been tried by many, and although favourable results have been recorded, our experience does not lead us to have any confidence in its value. In angina pectoris in horses, the nitrite of amyl has been administered by Professor Williams with

success. In asthma in horses it has also been administered with great advantage. It is also antidotic to strychnine poisoning. Nitrite of amyl is administered as an inhalation, or hypodermically, or as a draught by the mouth. With the object of dispelling spasmodic affections, such as of the bronchial tubes, it is best given in the form of an inhalation or by the mouth. In the treatment of tetanus, it is best given hypodermically.

Doses of Nitrite of Amyl by Inhalation:

Man *Dog*	The vapour of	2 to 5	minims.
Pig	5 to 20	,,	
Horse	½ to 1½	fluid drachms.	
Ox	1 to 2	,,	,,

Hypodermically, or internally through the mouth, about ⅓ or ¼ of the above doses may be used:

Dog	½ to 2	minims.
Horse	10 to 20	,,
Ox	10 to 30	,,

AMYLUM (A. and B.).[1]

Starch.

Natural Order.—Graminaceæ.

Formula.—$C_6H_{10}O_5$.

Description.—Starch procured from the grains of common wheat, *Triticum sativum;* maize, *Zea Mays;* and rice, *Oryza sativa.* (Bentl. and Trim., *Med. Pl.*, vol. iv., plates 291 to 296).

Characters.—Starch is white and inodorous, and exists in fine powder or in irregular angular or columnar masses, which can be readily reduced to powder. Mixed with a little cold water, it is neutral in reaction. When viewed under a microscope, the following characters may be seen:

Wheat Starch appears as a mixture of large and small granules, which are lenticular in form, and marked with faint concentric striæ surrounding a central hilum.

Maize Starch.—The granules are more uniform in size, frequently polygonal, a little smaller than the granules of wheat starch, and they possess a very distinct hilum, but are without evident concentric striæ.

Rice Starch.—The granules are minute, nearly uniform in size, and polygonal, without evident, or with only a small, hilum, and without striæ.

The starch should have no other granules. Starch grains are ellipsoidal. When magnified, a light spot and around it concentric lines are seen. The light spot is called the nucleus or hilum, and contains water. The layers

[1] In the United States Pharmacopœia starch is defined as the fecula of the seed of *Zea Mays*, Linné. In the British Pharmacopœia it is as above from *Triticum sativum*, Lam.; *Zea Mays*, Linné; and *Oryza sativa*, Linné.

external to it contain alternately less and more water, and the most external layer, which has been formed last, contains the least water. Under the influence of polarized light most starches show a black cross. Every starch granule consists of starch granulose, which becomes blue, when acted upon by iodine, and of starch cellulose, which becomes blue, when iodine and sulphuric acid are added to it. If acted upon by saliva or diluted acid, starch granules give up the granulose, while the cellulose which remains maintains the form of the granules.

Tests.—When starch is lightly rubbed with a little cold distilled water, the mixture is neither acid nor alkaline, and the filtered liquid does not become blue, when solution of iodine is added.

If starch is mixed with boiling water and cooled, the solution gives a deep blue colour with iodine, which disappears on warming, and reappears on cooling.

Therapeutics.—Mucilage of starch is the vehicle of many of the enemata, being demulcent and emollient in its action on the mucous membranes. In relaxed conditions of the bowels, it is a very suitable medium in which to administer astringent medicines, by the mouth or by the rectum. Starch is also a suitable medium for the administration of many medicines, and is antidotic to iodine poisoning. Externally, starch is protective and absorbent in the form of dusting-powder. It is a suitable basis for making antiseptic and drying powder. Mixed with equal parts of calomel and iodoform, it is very useful in nasal gleet, in which cases it may be injected into the nostrils by an insufflator. It is used externally in the making of starch bandages for fractured limbs.

ANETHI FRUCTUS (B.).

Dill Fruit.

Description.—The dry ripe fruit of *Peucedanum graveolens*, Benth. and Hook. f. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 132.)

Characteristics.—The two mericarps of which the fruit consists are generally separate and free from the pedicel. Each mericarp is brown and broadly oval, about $\frac{1}{8}$ inch long and $\frac{1}{10}$ inch broad, strongly compressed dorsally, and the transverse section displays six vittæ. The dorsal ridges are small, but the lateral are prolonged into wings of a paler brown hue. The smell and taste are aromatic.

Action and Use.—Carminative for human infants, and to disguise the taste of sodium salts.

Dose.—

Dog	10 to 30 grains.
Pig	30 to 60 ,,
Horse	2 to 6 drachms.

ANISI FRUCTUS (A. and B.).[1]

Anise Fruit.

Natural Order.—Umbelliferæ.

Description.—This is the dried ripe fruit of *Pimpinella anisum*, Linné (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 122). With the exception of the

[1] The corresponding United States Pharmacopœia name is Anisum, Anise.

Russian variety, which is shorter, anise fruits are about $\frac{1}{8}$ inch in length, and $\frac{1}{12}$ inch broad, grayish-brown, ovoid oblong, flattened laterally, and covered with short bristly hairs. The two constituent mericarps of each fruit are united and attached to a common stalk. The primary ridges are pale, slender, and entire. Each mericarp is traversed by five pale, slender, entire ridges, and the transverse section exhibits about fifteen vittæ. Anise fruit has an agreeable aromatic odour, and a sweetish spicy taste.

Preparation.—Oleum Anisi.

Therapeutics.—Anise is aromatic, stomachic, and carminative. On the bronchial mucous membrane it has a specially stimulant action, like that of ammoniacum. In cattle it is a diuretic. Anise is used in veterinary practice, chiefly as a flavouring agent in the preparation of tonic, alterative, and condition powders.

The oil of anise is sometimes used in the preparation of aloes mass with the view of preventing griping and nausea, and in other masses as a carminative.

Dose of Powdered Anise Fruit :

Dog	10 to 30 grains.
Pig	$\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
Sheep	1 to 2 ,,
Horse	$\frac{1}{2}$ to $1\frac{1}{2}$ ounces.
Ox	1 to 2 ,,

ANISI STELLATI FRUCTUS.

Star-Anise Fruit.

Natural Order.—Magnoliaceæ.

Description.—The above is the dried fruit of the plant *Illicium anisatum*, cultivated in China. Star-anise fruit is generally composed of eight fully developed carpels, diverging horizontally in a stellate manner from a short, central, generally stalked axis. Each carpel is boat-shaped, more or less beaked, irregularly wrinkled, rusty brown in colour, and commonly split on its upper margin, so as to expose its solitary, flattish, smooth, shining, somewhat oblique, reddish-brown seed. The odour and taste of both pericarp and seed closely resemble anise fruit.

Preparation.—Oleum Anisi.

ANTHEMIDIS FLORES (A. and B.).[1]

Chamomile Flowers.

Natural Order.—Compositæ.

Description.—The dried expanded single and double flower-heads, or capitula, of *Anthemis nobilis*, Linné (Bentl. and Trim., *Med. Pl.*, vol. iii., plate 154). The plants are cultivated. The flower-heads are about 16 millimetres in diameter, hemispherical, and nearly white. The single chamomile flowers of commerce are those in which the capitula have some yellow

[1] The corresponding United States Pharmacopœia name is Anthemis.

tubular florets in the centre, surrounded by a varying number of white ligulate ones. The double flowers are those in which all, or nearly all, the florets are white and ligulate. In both kinds the receptacle is solid, conical, and densely covered with chaffy scales. Both varieties, but especially the single, have a strong aromatic odour and very bitter taste.

Preparation.—Extractum Anthemidis.

Therapeutics.—Chamomile flowers have aromatic, stomachic, and tonic properties. They are seldom given in veterinary practice. The extract is a carminative and stomachic for adding to purgatives in pills for dogs.

Dose.—

Dog	10 to 30 grains.
Pig	20 to 75 ,,
Sheep	30 to 90 ,,
Horse	2 to 10 drachms.
Cattle	3 to 12 ,,

ANTIMONIUM.

Antimony.

Symbol and Atomic Weight.—Sb = 119.

In the metallic state antimony is not employed for medical purposes. The symbol Sb is derived from the Latin word *Stibium*. All the preparations are obtained from the native or black tersulphide, the most abundant ore.

ANTIMONII OXIDUM (A. and B.).

Oxide of Antimony.

Formula.—Sb_4O_6.

Mode of Preparation.—Pour 16 fluid ounces of solution of terchloride of antimony, $SbCl_3$, into 2 gallons of water; mix thoroughly; allow the precipitate to settle; remove the supernatant liquid by a syphon. Add 1 gallon of distilled water, mix well; let the precipitate subside as before, and again withdraw the supernatant fluid. Once more repeat the process described. Add 6 ounces of carbonate of sodium dissolved in 2 pints of distilled water. Leave them in contact for half an hour, stirring frequently; collect the deposit on a calico filter, and wash with boiling distilled water, until the washings cease to give a precipitate with a solution of nitrate of silver, acidulated by nitric acid. Dry the product at a temperature not exceeding 100° C.

Characters.—A grayish-white powder, fusible at a low red heat, insoluble in water, but readily dissolved by hydrochloric acid.

Tests.—The solution in hydrochloric acid, when dropped into distilled water, gives a white deposit (antimony oxychloride), which is at once changed to orange by sulphuretted hydrogen.[1]

[1] If to an amount weighing 0·5 gramme dissolved in hot aqueous solution of 1 gramme acid potassium tartrate, 3 grammes sodium bicarbonate be added,

It dissolves entirely when boiled with an excess of the acid tartrate of potassium, showing that higher oxides are not present.

Absence of lead, copper, arsenium, calcium, sodium, or potassium, and only slight traces of iron, and the slightest of chlorides or sulphates, should be demonstrable.

Therapeutics.—The oxide of antimony is used in the preparation of antimonial powder, and of tartar emetic or potassio-tartrate of antimony. It is not much given in veterinary practice, but its actions and uses are very similar to those of tartar emetic.

Dose.—

Man	1 to 2 grains.
Dog	2 to 8 ,,
Pig	5 to 20 ,,
Horse	1 to 2 drachms.
Ox	1½ to 3 ,,

ANTIMONII POTASSIO-TARTRAS (A. and B.).[1]

Potassio-Tartrate of Antimony.

Synonyms.—Antimonium Tartaratum; Tartarated Antimony; Tartar Emetic.

Chemical Composition.—The formula of this salt, which is an oxytartrate of antimony and potassium, is $[K(SbO)C_4H_4O_6]_2H_2O$.

Mode of Preparation.—Mix 5 ounces of oxide of antimony and 6 ounces of finely powdered acid tartrate of potassium with sufficient distilled water to form a paste, and set aside for twenty-four hours. Then add about 2 pints of distilled water, and boil for a quarter of an hour, stirring frequently. Filter, and set aside the clear filtrate to crystallize. Pour off the mother liquor, evaporate to one-third, and set aside so that more crystals may form. Dry the crystals on filtering-paper at the ordinary temperature.

Characters.—Potassio-tartrate of antimony occurs in colourless transparent crystals with triangular facets, soluble in 17 parts of cold and 3 of boiling water, forming a slightly acid solution, and is almost insoluble in alcohol. It has a sweet metallic taste. It decrepitates and blackens upon the application of heat.

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rendering the mixture alkaline, the same when cold should remove the colour of 70 c.c., v. s., iodine.

[1] Called in British Pharmacopœia, Antimonium Tartaratum, Tartarated Antimony; and in United States Pharmacopœia, Antimonii et Potassii Tartras, Antimony and Potassium Tartrate.

Tests.—An aqueous solution gives with hydrochloric acid a white precipitate, soluble in excess, which is not formed if tartaric acid be previously added. It gives a precipitate with a solution of tannic acid, alkalies and alkaline carbonates, but not with gallic acid. Lead, copper, arsenium, iron, calcium, sodium, ammonium, chlorides, and sulphates should be absent. Addition of sodium bicarbonate should not cause effervescence (absence of acid tartrate of potassium). A quantity weighing 1·66 grammes should be slowly but completely dissolved by 25 c.c. of water at 15·5° C. A quantity weighing 29 grains dissolves slowly, but without residue, in a fluid ounce of distilled water at 15·5° C., and the solution gives, with sulphuretted hydrogen, an orange precipitate, which, when washed and dried at 100° C., weighs 15·1 grains.

Action.—In large doses tartar emetic is an irritant poison, causing severe gastro-intestinal inflammation. Locally applied, it has an irritant effect, causing pain, heat, and redness, and the appearance of papules which become pustular.

When taken internally in medicinal doses, tartar emetic has sedative and antiphlogistic and alterative effects on horses and cattle and sheep. On the carnivora, as the dog and cat, and on the pig, it acts as an expectorant and diaphoretic, and in somewhat larger doses as an emetic and sedative. Tartar emetic does not produce any nauseating effect on horses or cattle, even though it be given in very large quantities. Half-ounce doses even do not cause nausea.

The effect of tartar emetic as an emetic is partly direct, due to the irritant action of the drug upon the walls of the stomach; partly indirect, from immediate stimulation of the vomiting centre in the medulla.

Uses.—Tartar emetic, owing to the small action which it is capable of exerting on the horse, is not very often administered in equine practice. In the first stage of acute inflammatory diseases, such as pneumonia, bronchitis, and laminitis, in strong subjects it proves a useful adjunct to other remedies. As an anthelmintic, this salt is not very efficacious, although it is sometimes administered to horses with the object of destroying ascarides, tapeworms, and oxyurides. It is believed by some that its properties as an anthelmintic are owing to its aiding the action of the purgatives, with which it is sometimes administered. If tartar emetic be given as a vermicide, 4 or 5 drachms are given in aqueous solution to the fasting horse, followed by a dose of oil,

or by a smart aloes purge, which should be administered on the following morning.

In pigs, and in dogs and other carnivora, this substance is given as an emetic at the commencement of acute inflammation of the lungs, bronchi, larynx, or liver, with the view of promoting secretion from the mucous membrane of the bronchial tubes and stomach. Tartar emetic is given in less doses at regular intervals in pneumonia, laryngitis, and other acute inflammations, with the object of promoting diaphoresis and expectoration, when the bronchi, larynx, or lungs are inflamed. As an emetic it is not suitable in cases of poisoning, where rapid evacuation is of the first importance, or when there is much general depression, or if the toxic agent be of an irritant character.

As an external irritant, tartar emetic is not to be recommended, it being liable to cause sloughing of the tissues. A mixture of 1 part of this salt and 4 of lard is occasionally added to blistering ointments.

Doses of Tartar Emetic :

Man.—As diaphoretic	$\frac{1}{24}$ to $\frac{1}{8}$ grain.
As emetic	1 to 2 grains.
As alterative :	
Horse	$\frac{1}{2}$ to $\frac{3}{4}$ drachm.
Ox	$\frac{1}{2}$ to $1\frac{1}{4}$ drachms.
As febrifuge and diaphoretic :	
Cat	$\frac{1}{8}$ to 1 grain
Dog	$\frac{1}{8}$ to $1\frac{1}{2}$ grains
Pig	1 to 3 ,,
Horse	$\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
As vermicide :	
Horse	1 to 3 drachms.
As sedative :	
Cat	$\frac{1}{8}$ to 1 grain.
Dog	$\frac{1}{8}$ to 2 grains.
Horse	1 to 2 drachms.
Ox	1 to 3 ,,
As emetic :	
Cat	$\frac{1}{2}$ to $1\frac{1}{2}$ grains.
Man	1 to 2 ,,
Dog	$1\frac{1}{2}$ to 5 ,,
Pig	4 to 11 ,,

ANTIMONII SULPHIDUM PURIFICATUM (A. and B).[1]

Purified Sulphide of Antimony.

Synonym.—Purified Black Antimony.

Formula.—$Sb_2S_3 = 335{\cdot}14$.

Mode of Preparation.—Take 100 grammes native sulphide of antimony, and, if necessary, it may be fused before being powdered, in order to free it from siliceous matter. Then very finely powder it, separate the coarser particles by elutriation, and when the finely divided sulphide is deposited, pour off the water, and add 50 c.c. solution of ammonia; leave it to macerate for five days in a well-closed vessel, frequently shaking it. Let the powder settle, pour away the fluid, wash often with water, and at length dry the remaining substance with a gentle heat. This process is to remove arsenium.

Characteristics and Tests.—It is a heavy, blackish, crystalline powder, devoid of lustre, odour, and taste, almost entirely soluble in boiling hydrochloric acid, forming chloride of antimony and sulphide of hydrogen, which is evolved. This solution of the chloride yields a white precipitate of the oxychloride, if water be added. If sulphide of antimony be raised to a temperature below a red heat, it melts, forming a dark brown liquid.

If 1 grain be dissolved in hydrochloric acid, a little water added, a piece of bright copper placed in the test-tube, the latter heated with a spirit-lamp for a few minutes; then the copper be removed, dried, and heated carefully in a dry, narrow test-tube by itself, no deposition of crystalline sublimate of arsenious anhydride should occur in the upper cool part of the tube.

If 2 grammes be mixed and cautiously ignited in a porcelain crucible with 8 grammes of pure nitrate of sodium, cooled, and the fused mass boiled with 25 c.c. of water, the residue should be nearly white, and neither yellow nor brown, thus indicating the absence of other metallic sulphides. Again, if the filtrate, separated from this residue, be boiled with a little nitric acid, until no more nitrous vapours are given off, and then dissolved in 0·1 gramme of nitrate of silver, and again filtered, and a few drops of ammonia water poured gently on it, no more than a white cloud, and no reddish precipitate, should appear between the two fluids, thus proving the absence of more than about 0·1 per cent. of arsenic.

Use.—It is used in the preparation of antimonium sulphuratum.

ANTIMONIUM SULPHURATUM (A. and B.).

Sulphurated Antimony.

Description.—The above is a mixture containing sulphides and oxides of antimony and sulphur, Sb_2S_3 (or Sb_4S_6) and Sb_2O_3, Sb_2S_5 and Sb_2O_5.

Mode of Preparation.—Mix 10 ounces of purified black antimony with 10 ounces of sublimed sulphur and of solution of soda (5 pints of distilled

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[1] The British Pharmacopœia preparation is styled Antimonium Nigrum Purificatum, Antimonious Sulphide.

water containing in solution 5 ounces of caustic soda) and boil for two hours, stirring frequently, and adding distilled water from time to time in order to maintain the same volume. While it is still hot, add 9 pints of boiling distilled water. Strain the liquor through calico, and, before it cools, add to it by degrees a sufficient quantity of diluted sulphuric acid, until the acid is in slight excess. Collect the precipitate on a calico filter, wash with distilled water until the washings no longer give a precipitate with chloride of barium, and dry at a temperature not exceeding 100° C.

Characters.—Sulphurated antimony is an orange-red powder, readily dissolved by solutions of hydroxide of sodium and also by hot hydrochloric acid, with the evolution of sulphide of hydrogen and the separation of sulphur.

Test.—Only the very slightest trace of arsenium is allowable.

Therapeutics.—Sulphurated antimony is seldom employed in veterinary practice. As an alterative, however, it is a useful remedy in cases of eczema and humour in the horse.

Dose.—

Man	1 to 2 grains.
Dog	2 to 8 ,,
Pig	5 to 20 ,,
Horse	½ to 1 drachm.

APOCYNUM (A.).

Synonym.—Canadian Hemp.

Natural Order.—Apocynaceæ.

Description and Characteristics.—It is the root of *Apocynum cannabinum*, Linné, and occurs in long cylindrical pieces, slightly branched, about 7½ millimetres thick, brownish-gray, wrinkled lengthwise, fissured from side to side, brittle, and has a short white fracture. The bark is thickish. The wood is porous and spongy, with faint medullary rays. It is odourless, but has a bitter taste.

Composition.—Contains *apocynin*, easily soluble in alcohol, but insoluble in water; also a glucoside, *apocynein*, readily soluble in water.

Action.—Laxative in small dose, but emetic and cathartic in large dose. The two active principles act on the heart as cardiac tonics, and are diuretic. Useful in dropsy.

Dose.—For man, 15 to 30 grains of powdered root.

Of the decoction, made by boiling ½ ounce in 1½ pints of water, the dose is 1 to 2 fluid ounces thrice daily.

APOMORPHINÆ HYDROCHLORIDUM (A. and B.).[1]

Hydrochloride of Apomorphine.

Description.—The above is a hydrochloride of an alkaloid, obtained by heating morphine hydrochloride or codeine hydrochloride in sealed tubes with hydrochloric acid.

Formula.—$C_{17}H_{17}NO_2,HCl$.

Characters.—Hydrochloride of apomorphine exists in the form of small, grayish-white, shining acicular crystals, which become green if exposed to light and air, are inodorous, and display a very faint acid reaction on moistened blue litmus paper. It is soluble in 50 parts of water and more soluble in alcohol, and the solutions are decomposed with the production of a green colour, when they are boiled.

Tests.—Bicarbonate of sodium throws down from solutions a precipitate which becomes green on standing, and then forms a purple solution with ether, violet with chloroform, and bluish-green with alcohol. With diluted solution of perchloride of iron it gives a deep red, and with nitric acid a blood-red coloration. If the salt gives a green colour when shaken with 100 parts of water, it should be rejected.

Therapeutics.—Hydrochloride of apomorphine is an efficient emetic, and is useful when it is desirous to produce vomiting, whether in man, dogs, or certain other animals.

For this purpose the injectio apomorphinæ hypodermica is made thus:

Boil 10 c.c. distilled water for several minutes, cool, add 0·1 c.c. diluted hydrochloric acid and 0·1 gramme apomorphine hydrochloride, and add enough recently boiled and cooled distilled water to make 10 c.c. of the fluid (which has 1 gramme per 100 c.c. and 1 grain in 110 minims). The dose of this by subcutaneous injection for a man is 5 to 10 minims.

If about 10 minims be injected under the skin of the back of the wrist of a man, within about seven and a half minutes an effectual vomiting will occur—if the stomach be, for instance, full of too copious draughts of beer and undigested food. The vomiting-centre is affected.

[1] In the United States Pharmacopœia it is called Apomorphine Hydrochlorate.

Dose.—*Man*—Injectio apomorphinæ hyp. 10 minims (containing $\frac{1}{11}$ grain of the solid).
By the mouth, $\frac{1}{10}$ to $\frac{1}{4}$ grain of the solid.
Dog—Hypodermically, 5 to 10 minims.
By the mouth, $\frac{1}{5}$ grain of the solid.
Pig—By the mouth, $\frac{1}{2}$ to $1\frac{1}{2}$ grains.

AQUA CAMPHORÆ (A. and B.).[1]

Camphor Water.

Mode of Preparation.—Dissolve 5 grammes of camphor in enough alcohol (90 per cent.) to yield 15 c.c. of solution, add this in portions to 5 litres of distilled water, shaking well after each addition.

AQUA CHLORI (A.).

Chlorine Water.

Description.—It is an aqueous solution of chlorine (Cl = 35·19), and should at least contain 0·4 per cent. of this gas.

Mode of Preparation.—Place 10 grammes of dioxide of manganese in a flask connected by a suitable tube with a small wash-bottle which contains 50 c.c. of water, and connect this with a bottle of 1,000 c.c. capacity containing 400 c.c. of distilled water previously boiled and then allowed to cool. This test-bottle should be loosely stopped with cotton-wool, and kept at about 10° C.

To the dioxide in the flask now add 35 c.c. of hydrochloric acid which has been diluted with 25 c.c. of water. By the medium of a sand-bath heat gently. The chlorine is passed through the water in the wash-bottle into the bottle containing the distilled water. When the air in the test-bottle has been displaced by the chlorine, disconnect it, insert the stopper, shake the bottle, loosening the stopper now and again, until the gas is as completely dissolved as possible, and if the water be not saturated the bottle can be reconnected, and more gas passed in. The chlorine water should be poured into dark, amber-coloured, glass-stoppered bottles, which should be filled, and kept in a cool, dark place. In order to be of full strength, the solution should be freshly prepared.

Characteristics.—It is a clear yellowish liquid, with suffocating odour and unpleasant taste. If it be evaporated, no residue is left. It has the power of decolourizing solutions of litmus, indigo, red or other vegetable colouring. If it be shaken with excess of mercury until the smell of chlorine has been

[1] In the United States Pharmacopœia the mode is: Triturate 8 grammes of camphor with 5 c.c. of alcohol and 5 grammes of precipitated calcium phosphate, and then with enough distilled water gradually added to make 1,000 c.c., and filter.

removed, the liquid left should only be faintly acid, due to the presence of hydrochloric acid.

Add 17·7 grammes chlorine water to a solution of 1 gramme of iodide of potassium in 10 c.c. of water, and a deep red liquid results, which should require for total decolourization not less than 20 c.c. of decinormal hyposulphite of sodium (V.S.), showing presence of at least 0·4 per cent. of chlorine.

Dose.—*Dog* - - - - - - 5 to 30 minims.
Pig - - - - - - 15 to 60 ,,
Horse - - - - - - 2 to 6 drachms.

AQUA CHLOROFORMI (A. and B.).

Chloroform Water.

Add 30 minims of chloroform to 25 fluid ounces of distilled water, and shake well together until the chloroform is dissolved.

Dose.—*Dog* - - - ½ to 1½ fluid ounces.
Pig - - - 1 to 3 ,, ,,
Horse - - 10 to 20 ,, ,,

AQUA DESTILLATA (A. and B.).

Distilled Water.

Mode of Preparation.—Place 10 gallons of water of the purest quality, and free from all odour, unusual taste, colour, or visible impurity, and cleared, if necessary, from any suspended solid by filtration, in a copper still, connected with a block-tin worm.[1] Reject the first ½ gallon, and preserve the next 8 gallons.

Tests.—A fluid ounce when evaporated in a clean glass capsule should scarcely leave any visible residue. It should be neutral in reaction. The various metals, as well as chlorides, nitrates, nitrites, or sulphates, should be absent. It should give no precipitates with sulphide of hydrogen, oxalate of ammonium, nitrate of silver, chloride of barium, solution of lime, or a mixture of starch mucilage and iodide of potassium, and only a faint coloration when a solution of potassio-mercuric iodide is added to 3 or 4 ounces.

[1] In the United States Pharmacopœia one is directed to distil 1,000 volumes, and collect the first 100 volumes in the block-tin or glass condenser, and throw them away, and then to place the next 800 volumes in glass-stoppered bottles, first rinsed with hot distilled water

AQUA PIMENTÆ (B.).

Pimento Water.

Mode of Preparation.—Take of bruised pimento 250 grammes, and of water 10 litres, and distil 5 litres.

ARECÆ SEMINA.

Areca Seeds.

Synonym.—Areca nut.

Natural Order.—Palmaceæ.

Description.—Areca seeds are the seeds or kernels of the fruit of the catechu or betel-nut palm, *Areca Catechu*. The medicinal properties depend upon the tannic and gallic acids they contain. They are spheroidal, about ¾ inch in diameter, hard, reddish-brown in colour, and astringent in taste.

Therapeutics.—Areca nut is an astringent, and is a valuable anthelmintic, especially for dogs. The pulverized nut may be given in the form of a ball, or in milk on an empty stomach. It is generally rapid in its action, and proves destructive equally to tape or round worms. The dose may, if necessary, be repeated twice in close succession. It is then advisable, if the worms be not evacuated, to give some purgative, such as jalap or castor oil, with a dose of oil of turpentine.

Dose.—*Dog* - - - - - - 15 grains to 2 drachms.
Pig - - - - - - ½ to 2 drachms.
Horse - - - - - - 4 to 8 ,,

ARGENTI IODIDUM (A.).

Iodide of Silver.

Formula.—AgI = 234·19.

Mode of Preservation.—This salt should be stored in dark, amber-coloured vials, and kept in a dark place.

Characteristics and Tests.—It is a heavy powder of light yellow colour, odourless and tasteless. It is insoluble in water, alcohol, diluted acids, solution of carbonate of ammonium, but soluble in about 2,500 parts of stronger solution of ammonia, and also in an aqueous solution of cyanide of potassium, and in a concentrated solution of iodide of potassium, in which last two cases the solution gives a black precipitate with either sulphide of hydrogen or sulphide of ammonium.

If the salt be heated to 400° C., it melts, forming a dark red liquid, which, on being cooled, becomes a soft yellow mass. If mixed with solution of ammonia it becomes white, but regains the yellow hue if washed with water. If a little chlorine water be shaken with the salt, and to the filtrate a little solution of starch be added, a blue colour (iodide of starch) results.

ARGENTI NITRAS (A. and B.).

Nitrate of Silver.

Synonym.—Lunar Caustic.

Symbol.—$AgNO_3$.

Mode of Preparation.—Add 2½ fluid ounces of nitric acid and 5 fluid ounces of distilled water to 3 ounces of silver in a flask, and apply a gentle heat until the metal is dissolved. Pour off the clear liquor from any black powder which may be present. Evaporate, and set it aside to crystallize. Again pour off the liquor, and set aside to crystallize. Let the crystals drain in a glass funnel, and dry them by exposure to the air, carefully avoiding the contact of all organic substances. If it is desired to have the salt in rods, fuse the crystals in a capsule of platinum or thin porcelain, and pour the melted salt into proper moulds. Nitrate of silver should be preserved in bottles carefully stoppered, and kept away from the action of light, as, for instance, by being wrapped up.

Characters.—Nitrate of silver exists in the form of colourless tabular crystals, the primary form of which is the right rhombic prism. When moulded as above, it is in the form of white cylindrical rods. It is soluble in less than its own weight of cold distilled water, slightly soluble in alcohol (90 per cent.), and soluble in ether and glycerin.

Tests.—With hydrochloric acid or a chloride, solution of nitrate of silver gives a curdy-white precipitate, which darkens by exposure to light and is soluble in solution of ammonia.

A small portion heated on charcoal with the aid of the blowpipe first melts and then deflagrates, leaving a dull white metallic coating.

A quantity weighing 1 gramme dissolved in 15 c.c. of distilled water gives with hydrochloric acid a precipitate of chloride of silver, which, when washed with hot distilled water and thoroughly dried, weighs 0·843 gramme. The filtrate, when evaporated with a water-bath, leaves no residue. Lead, copper, iron, sodium, potassium, or sulphates should be absent.

Action.—In large doses nitrate of silver is irritant and corrosive, and acts as a stimulant on the spinal cord. In medicinal doses it is tonic, astringent, and stimulant. Externally it is a caustic, causing destruction with deep staining of the superficial layers, acute pain, inflammation of the deeper layers,

separation of the part as a slough, and then rapid healing. It differs from potash in that its effects are limited to the area of application; and for general use it is thus the best caustic, and may be employed to destroy the affected part in bites by rabid dogs and venomous animals. When applied to the broken skin or a mucous membrane, it has a similar action to salts of lead, but in a greater degree. It precipitates the albumins and chlorides of the plasma or discharge, coagulates the protoplasm of the young cells of the part, causes active contraction of the arteries, veins, and capillaries, and rapidly coagulates the blood.

Uses.—Nitrate of silver is not much employed as an internal remedy in veterinary practice. In the dog it has been prescribed for chorea and epilepsy, also for diarrhœa and dysentery. As an external application it is used extensively. Nitrate of silver is a very valuable local antiphlogistic for controlling the exudation, growth, and vascular irritation of the inflammatory process. It is very useful for touching indolent ulcers, and for applying to fungous growths and warts. A solution of 2 to 5 grains to the ounce of water is serviceable in treating conjunctivitis. In treating opacities of the cornea, nitrate of silver proves very useful, when such conditions are the result of accident. A weak, watery solution of nitrate of silver is useful as a lotion for burns and scalds, alleviating pain in the early stages and lessening the inflammation and discharge in the later stages.

In the treatment of vegetable parasitic diseases of the skin, nitrate of silver is sometimes employed as a lotion containing 20 grains in each fluid ounce of water. We do not recommend it for this purpose, as many more efficient lotions and ointments can be made. For mange, however, the lotion is more serviceable; but for this affection also other applications are more suitable.

With the view of preventing the spread of erysipelas, a lotion of the same strength as the above mentioned is sometimes applied around the circumscribed part.

Dose.—

Man	- - - -	$\frac{1}{4}$ to $\frac{1}{2}$ grain.
Dog	- - - -	$\frac{1}{8}$ to $\frac{1}{2}$,,
Pig	- - - -	$\frac{1}{2}$ to $1\frac{1}{2}$ grains.
Sheep	- - - -	2 to 4 ,,
Horse	- - - -	4 to 10 ,,
Ox	- - - -	4 to 12 ,,

If injected subcutaneously, half the above.

ARGENTI NITRAS INDURATUS (B.).

Hardened Nitrate of Silver.

Mode of Preparation.—The above, which is known as 'toughened caustic,' is prepared by pressing and mixing together thoroughly 475 grains of nitrate of silver and 25 grains of nitrate of potassium in a capsule made of platinum or thin porcelain, and pouring the melted mixture into moulds.

Characteristics.—White cylindrical rods, very soluble in water, but only slightly in alcohol.

Tests.—Those of potassium, silver, and nitrates. If 1 gramme be dissolved in 15 c.c. of water and hydrochloric acid be added, a precipitate is yielded which, washed and dried, weighs 0·8 gramme, and the filtrate, when evaporated, leaves a white remnant.

ARGENTI NITRAS MITIGATUS (A. and B.).

Mitigated Nitrate of Silver.

Mode of Preparation.—Fuse and mix thoroughly 1 ounce of nitrate of silver and 2 ounces of nitrate of potassium in a capsule of platinum or thin porcelain, and when the mixture is melted, pour it into moulds.

ARGENTI OXIDUM (A. and B.).

Oxide of Silver.

Mode of Preparation.—Oxide of silver, Ag_2O, is formed by mixing a solution of nitrate of silver with one of hydroxide of calcium.

Characteristics and Tests.—It is a brown powder, which, on the application of a low heat, gives off oxygen and leaves the metal, silver. The oxide, unlike the metal itself, is soluble in nitric acid without giving off red fumes, which are, however, evolved if silver be present. One gramme dissolved in nitric acid gives, on addition of hydrochloric acid, a white precipitate of chloride of silver, weighing, when washed and dried, 1·237 grammes. It should not contain lead, copper, or iron. A danger to be guarded against is that, if mixed with creosote, phenol, permanganate of potassium, and many other drugs, it explodes with violence.

Dose.—

Dog	¼ to 2 grains.
Man	½ to 2 ,,
Pig	1 to 5 ,,
Horse	8 to 60 ,,

ARGENTUM.

Silver.

Solutions of the salts of silver give a white precipitate with hydrochloric acid, which blackens on exposure to light, and also a black precipitate with sulphuretted hydrogen.

Action.—Soluble silver salts, *e.g.*, the nitrate, act on the cement substance, by which epithelial and endothelial cells are united, and are used to stain microscopical preparations. They unite with albumin, forming albuminate of silver. Applied to the skin, nitrate of silver produces a white mark, which becomes black by exposure to light, and is subsequently destroyed and loosened. It causes greater contraction of the vessels locally than other metals do. It has an astringent taste, and acts as a caustic on mucous membranes. If given in small doses, it acts as an astringent in the stomach, and may lessen vomiting; but larger doses are irritant and poisonous, and may cause vomiting. Small doses are astringent in the intestine, and produce, like small doses of zinc or copper, a tonic effect on some parts of the nervous system. It is apt to cause a darkening of the skin, if taken for too long a time. Also, when taken too long, it seems to cause fatty degeneration of the tissues. Silver salts seem to be eliminated very tardily by means of albuminous secretions—*e.g.*, bile.

Uses to Mankind of Nitrate of Silver.—To destroy parasitic fungi, to remove epidermic structures, such as warts, and check the bleeding from leech-bites. Solutions of nitrate of silver relieve the itching of pruritus and of lichen. If sponged over the skin, it hardens the epidermis and may prevent bed-sores. If the vesicles in small-pox be opened, and the surface below touched with a solution, pitting is said to be prevented. In erysipelas, if the solution be painted over and beyond the affected surface, extension may often be stayed. Diluted solutions may be applied to the eye in tinea tarsi and conjunctivitis. It may be useful for painting the tonsils and back of throat in follicular tonsillitis and pharyngitis. It is best to use a brush and a strong solution, as, if the solid salt be used and a piece break off and be swallowed, irritant poisoning will occur. The best plan, in that case, would be to give plenty of common salt, whereby chloride of silver, insoluble and inert, is produced. The salt should be given with gruel, along with an emetic, so

that the stick may be vomited covered with a mucilaginous material.

It has been used to destroy the false membrane in croup, and also for laryngeal phthisis, in a solution of 30 grains to the ounce, by means of a brush. Or lycopodium may be dipped in the solution, dried, and then blown by a curved tube into the larynx.

It has also been used, in weak solutions, in gonorrhœa, and in small doses in cases of irritable stomach, in chronic diarrhœa and dysentery, in chorea and epilepsy; but for all these diseases we possess far better and more reliable remedies.

ARNICÆ FLORES (A.).

Arnica Flowers.

Description.—The above are the flower-heads of *Arnica montana*, Linné (Nat. Ord., Compositæ). They are about 3 centimetres in breadth and somewhat round in shape, and consist of a scaly involucre arranged in two rows, and of a small, flat, hairy receptacle, which supports about sixteen yellow, strap-like, ten-nerved ray-florets, and several yellow, five-toothed, tubular disc-florets, which are provided with slender, spindle-like achenes, crowned with a hairy pappus. The odour is slightly aromatic, and taste bitter and acrid.

Preparation.—Tinctura Arnicæ Florum.

Action and Uses.—(*a*) *Externally.*—The keynote of its action is that it increases the circulation in the skin, and may do so to such an extent as to cause hyperæmia, eczema, and spreading erysipelas. It is used for bruises to prevent and to remove swelling, but is not so harmless a remedy as is often supposed.

(*b*) *Internally.*—Like other volatile oils it stimulates, and in strong doses powerfully irritates the alimentary canal. Reflexly, it stimulates the whole system—heart and brain and spinal cord—and has been used in asthenic febrile conditions, delirium tremens, and mental disorders, though no decided value to it in these respects can be assigned. In the tissues its effects are like those produced by turpentine. In large doses it depresses the circulation and nerve-centres, headache, unconsciousness, and convulsions being produced, as well as a lowering of temperature; but it should not be used for this latter purpose. Remotely it stimulates both skin and kidneys, and has been used for eczema and chronic rheumatism, though perhaps unwarrantably.

Dose of the Powdered Flowers:

Dog	10 to 30 grains.
Pig	20 to 60 ,,
Horse	2 to 6 drachms.

ARNICÆ RHIZOMA (A. and B.).[1]

Arnica Rhizome.

Natural Order.—Compositæ.

Description.—The dried rhizome and rootlets of *Arnica montana*. The rhizome is cylindrical, dark brown, from 1 to 2 inches or more long, and of the diameter of about $\frac{1}{6}$ to $\frac{1}{4}$ inch, contorted, rough from the scars of the fallen leaves (some remains of which are usually to be found at its upper end), and giving off from its under-surface many dark brown, filiform wiry rootlets, and often the hairy remnants of the stem and leaves may be present. On the inner side of the cortex, resin ducts are present. The odour is peculiar and somewhat aromatic. The taste is acrid and slightly bitter.

Preparation.—Tinctura arnicæ.

Therapeutics.—Arnica is one of those remedies which is more extensively employed in veterinary practice than its value in the treatment of internal and external disorders warrants. When applied externally, arnica increases the activity of the circulation in the skin. The tincture, suitably diluted, is much used for bruises, wounds, and sprains, with the object of preventing swelling and hastening the absorption of effused blood.

Internally, arnica is a stimulant to the alimentary canal, and has also alterative properties. In large doses it is a powerful irritant. In moderate doses it stimulates the heart and circulation in the brain and spinal cord. The tincture has been administered in several diseases in veterinary practice, more especially to animals recovering from debilitating diseases. In rheumatism it has no value when given internally.

Dose of Tincture of Arnica:

Dog	5 to 10 minims.
Pig	10 to 50 ,,
Horse	$\frac{1}{4}$ to 1 fluid ounce.
Ox	$\frac{1}{2}$ to $1\frac{1}{2}$ fluid ounces.

ARSENII IODIDUM (A. and B.).

Iodide of Arsenium.

Synonyms.—Iodide of arsenic, arsenious iodide.
Formula.—AsI_3.

[1] In the United States Pharmacopœia it is called Arnicæ Radix.

Mode of Preparation.—Iodide of arsenium is obtained by the direct combination of the two elements iodine and arsenium, or by evaporating to dryness an aqueous mixture of arsenious and hydriodic acids.

Characters.—The salt exists in the form of small orange-coloured crystals or masses, which are readily and almost entirely soluble in water and in rectified spirit.

Tests.—The aqueous solution is neither alkaline nor acid, and gives, like all solutions of compounds of arsenic, a yellow precipitate with sulphide of hydrogen. If heated in a test-tube, iodide of arsenic almost entirely volatilizes, violet vapours of iodine being set free.

Preparation.—Liquor Arsenii et Hydrargyri Iodidi, the strength of which is about 1 grain in 100.

Therapeutics.—Iodide of arsenic is used in the preparation of Donovan's solution, or solution of iodide of arsenic and mercury.

Dose.—*Man* - - - - - - $\frac{1}{20}$ to $\frac{1}{8}$ grain.
Dog - - - - - - $\frac{1}{20}$ to $\frac{1}{10}$,,
Pig - - - - - - $\frac{1}{8}$ to $\frac{3}{4}$,,
Horse - - - - - - 1 to 5 grains.

ASAFETIDA (A. and B.).[1]

Description.—Asafetida is a gum-resin, obtained by incision from the living root of *Ferula fœtida*, Regel (*Trans. Linn. Soc.*, Ser. 2, Bot., vol. iii., plates 12 to 14), and probably other species. It exists rarely in tears, usually in irregular masses, which vary in consistence and in size, and are composed of tears agglutinated together by a material which is softer and more darkly coloured. The exposed surfaces of a piece which has been broken or cut have an amygdaloid appearance, and are at first opaque and milk-white, but change gradually to purplish-pink or reddish-pink, and finally to a dull yellowish-brown colour. The taste is bitter, acrid, and onion-like. The odour is highly disagreeable, strong, characteristic, and alliaceous. When triturated with water, asafetida forms a white emulsion.

Tests.—The freshly fractured surface of a tear when touched with nitric acid, to which an equal volume of water has been added, assumes for a short time a fine green colour. If a small piece be strongly heated in a dry test-tube, and boiling water be added and shaken, and then cold water and solution of ammonia, a blue fluorescence is manifested.

Asafetida should yield not more than 10 per cent. of ash when burnt with access of air.

It should be soluble to the extent of about 65 per cent. in alcohol (90 per cent.).

Therapeutics.—Asafetida has the stimulant action of other volatile oils and resins upon the alimentary canal. Although not much used in veterinary practice, it is not uncommonly prescribed as a stimulant and disinfectant expectorant in chronic cough in horses and cattle. Having some power in expelling flatulence and arresting muscular spasm, it is occasionally given in colic and tympanitis, along with other remedies. In chorea in dogs it has no permanent effect.

[1] In the United States Pharmacopœia it is spelt Asafœtida.

Dose.—*Man and Dog* - - - - - 5 to 15 grains.
Pig - - - - - - 10 to 60 ,,
Sheep - - - - - - 15 to 90 ,,
Horse - - - - - - 2 to 3 drachms.
Ox - - - - - - 3 to 6 ,,

ASCLEPIAS (A.).

Description.—Asclepias, or Pleurisy Root, is the root of *Asclepias tuberosa*, Linné (Nat. Ord., Asclepiadaceæ). It is large and fusiform, dried in longitudinal or transverse sections, from 2 to 15 centimetres in length and about 2 centimetres in thickness. The head is knotty and slightly ringed, the rest wrinkled lengthwise, orange-brown on the outside and whitish internally. It is tough, and breaks with an uneven fracture. The bark is thin, and has two layers, the inner of which is whitish. The wood is yellowish, and has large white medullary rays. It is odourless, but has a bitter taste. If kept, it turns gray.

Preparation.—Extractum Asclepiadis Fluidum.

Composition.—It contains *resins*, and an odorous fatty substance.

Use.—In moderate doses is a diaphoretic or expectorant, but larger doses are emetic and purgative.

Dose.—*Man* - - - - - - ½ to 1 drachm.

ASPIDIUM (A.).[1]

Description.—Aspidium, or Male Fern, is the rhizome of *Dryopteris Filix-mas*, Schott, or of *Dryopteris marginalis*, Asa Gray (Nat. Ord., Filices). It is about 10 centimetres long and about 17·5 millimetres thick, and, together with the close, dark brown, round, and slightly curved stipe, remains about 62·5 millimetres in diameter. It is thickly covered with brown, glossy, soft, chaff-like scales. Internally it is of a pale green colour and rather spongy. The vascular bundles in *Dryopteris Filix-mas* are about ten, whilst there are only about six in *Dryopteris marginalis*, and they are arranged in the form of an interrupted circle. The odour is unpleasant, taste sweetish, rather bitter, astringent, and nauseous. The chaff and the dead portions should be removed, and only the green parts used.

Preparation.—Oleoresina Aspidii.

ASPIDOSPERMA (A).

Aspidosperma.

Description.—Aspidosperma, or Quebracho, is the bark of *Aspidosperma Quebracho-blanco*, Schlechtendal (Nat. Ord., Apocynaceæ). It exists in the form of flattish pieces, about 2 centimetres in thickness. The outer surface is yellowish or brownish in colour, and deeply fissured. The inner portion is yellowish or reddish-brown, and striated. It breaks with a fracture, which exhibits two strata of equal thickness, both marked with whitish dots, and striæ arranged in the direction of tangential lines. The outer fracture is light

[1] In the British Pharmacopœia it is represented by *Filix-mas*, Male Fern.

and rather coarsely granular, whilst the inner is darker and splintery. The taste is very bitter and slightly aromatic, and there is no smell.

Preparation.—Extractum Aspidospermatis Fluidum.

Composition.—Contains six alkaloids, of which quebrachine, aspidosamine, and aspidospermine are most active, and also a peculiar kind of tannic acid.

Use.—To lessen dyspnœa in asthma, emphysema, and phthisis.

ATROPINA (A. and B.).

Atropine.

Formula.—$C_{17}H_{23}NO_3$.

Mode of Preparation.—This alkaloid is obtained from the dried root, branches, or leaves of *Atropa belladonna*. It cannot be profitably prepared on a small scale. The chief parts of the process are the precipitation of acid colouring matter from a strong tincture by means of lime, removal of the alcohol, addition of water and carbonate of potassium, taking up the alkaloid from the alkaline solution by chloroform, and subsequent purification.

Characters.—Atropine exists in colourless acicular crystals, which are soluble in 300 parts of water, but more readily in alcohol, in chloroform, and in ether. It is an active poison.

Tests.—The aqueous solution has an alkaline reaction.

It gives a citron-yellow precipitate with perchloride of gold, has a bitter taste, and powerfully dilates the pupil.

It leaves no ash when burned with free access of air.

The melting-point is 115·25° C. A solution in alcohol, if warmed with mercuric chloride, gives a yellow precipitate, which turns red. An aqueous solution gives with auric chloride a yellow precipitate, which, if collected and dissolved in boiling water and precipitated therefrom by hydrochloric acid, is crystalline, and if dried, has a powdery consistence (thus differing from hyoscyamine).

If a little nitric acid be added to a small quantity of atropine, and then be evaporated to dryness on a water-bath, and then a little solution of potassium hydroxide be added, a fleeting reddish-violet colour is yielded.

Physiological Properties.—If a small dose of atropine be injected into the jugular vein of a dog, the cardiac and respiratory movements will be quickened, and the arterial blood-pressure will be raised.

The quickening of the heart's action is due to the paralyzing of the cardiac inhibitory filaments of the vagi; the acceleration of the respiration is due to stimulation of the respiratory centre in

the medulla; while the raising of the blood-pressure is due to contraction of the systemic arterioles, probably through the medium of the sympathetic.

Atropine has both a paralyzing and a stimulant action on the spinal cord; but the former effect is greater than the latter.

In order to show the spinal stimulant action of atropine, animals whose respiratory muscles may be paralyzed without causing death have been experimented upon. In the frog a dose below the fatal minimum paralyzes, firstly, the cutaneous sensory nerves, next the motor nerves and spinal cord. It does not impair idio-muscular contractility.

After the lapse of a variable number of hours or days, tetanic symptoms, not unlike those of strychnine poisoning, are produced. These are due to the excitant action of the alkaloid on the spinal cord. This effect of atropine on the spinal cord was pointed out by Dr. Fraser, who has shown (1) that in frogs tetanic symptoms follow the subcutaneous injection of a dose of sulphate of atropine equivalent to about one-thousandth of the weight of the animal; (2) that this tetanus sometimes sets in on the second day, but more frequently on the third, fourth, or fifth; (3) that it varies in its duration from a few hours to seventeen days; (4) that it is due to the action of the drug on the cord (medulla oblongata and medulla spinalis). The afferent or sensory nerves are unaffected, or but little affected, by atropine. The accelerator nerve of the heart is probably stimulated by it.

Ringer thus summarizes the probable effects of atropine:

1. It tetanizes the cord and heightens its reflex function.
2. It stimulates the respiratory centre and the inhibitory centre of the heart.
3. It stimulates the cardiac accelerator nerve or its centre.
4. It stimulates the vaso-motor centre, and so heightens arterial pressure.
5. It paralyzes the motor nerves, first affecting the trunks.
6. It paralyzes the terminations of the vagi, both in the heart and lungs.
7. It paralyzes the terminations of the secretory nerves of the salivary glands, and perhaps those of the sweat glands.
8. It paralyzes the terminations of the inhibitory fibres of the splanchnics.
9. Large doses slightly depress the functions of the afferent nerves.

10. It paralyzes the terminations of the oculo-motor nerves and stimulates the sympathetic, so far as the iris itself is concerned.

It appears, therefore, that, whilst it acts as a stimulant to a large part of the central nervous system, on many of the nerves it operates as a paralyzer.—(From Dr. Gresswell in the *Veterinary Journal*.)

Therapeutics.—Sulphate of atropine is the best form in which to use the alkaloid atropine.

Dose.—*Men* . - - - - $\frac{1}{200}$ to $\frac{1}{100}$ grain.

ATROPINÆ SULPHAS (A. and B.).

Sulphate of Atropine.

Formula.—$(C_{17}H_{23}NO_3)_2H_2SO_4$.

Mode of Preparation.—Mix 120 grains of atropine with 4 fluid drachms of water, and add a sufficient quantity of diluted sulphuric acid gradually, stirring them together until the alkaloid is dissolved and the solution is neutral. Evaporate to dryness at a temperature of 37·8° C.

Characters.—Sulphate of atropine is nearly colourless, crystalline, or pulverulent, soluble in 1 part of cold water and in 10 parts of alcohol (90 per cent.), forming solutions which are neutral to test-paper, and, when applied to the eye, dilate the pupil. It is not soluble in ether or chloroform; it melts at 183° C. A saturated solution in water gives, with sodium carbonate solution, a white precipitate of atropine. It leaves no ash when burned with free access of air. Sulphate of atropine is a powerful poison, and is intended for external application.

Preparation.—Liquor Atropinæ Sulphatis, which contains 1 grain of the salt in 10 fluid minims of the solution, and 1 gramme in 100 c.c.

Therapeutics.—Sulphate of atropine is a convenient form in which to employ belladonna. Recently it has been much used in veterinary practice for internal and external purposes.

Internally it has more especially been given by subcutaneous injection, but also by the mouth in the form of a ball or in solution.

Subcutaneously, sulphate of atropine is recommended by Burness and Mavor for relieving pain in cases of colic, enteritis,

gastro-enteritis, lumbago, sciatica, pleurisy, pleurodynia, spasm of the diaphragm, myalgia, etc. In these cases it may be given with morphine, in order to prolong the effects and to prevent the nausea so frequently caused by morphine when given alone in the canine and feline species. Atropine has also been given in cases of nephritis in the horse. In tetanus of the idiopathic and traumatic varieties, sulphate of atropine is said to have proved very efficacious, and by Burness and Mavor it is recommended in this disease to be given in conjunction with strychnine. Injected hypodermically, it has been successfully administered in the treatment of garget in cows. For controlling cough, sulphate of atropine has a good effect, and in many cases externally a lotion of 2 to 4 grains of this alkaloidal salt to 1 ounce of water is effectual as a mydriatic. A few minims of this solution dropped into the conjunctival sac speedily dilate the pupillary opening. This solution is invaluable in cases of recurrent ophthalmia in horses and in iritis in animals. As a mydriatic it is useful in dilating the pupil, when it is desired to perform an operation on the eye, or to examine it for cataract. For relieving pain locally in animals, preparations of belladonna are generally preferred.

Dose of Sulphate of Atropine:

Man	$\frac{1}{200}$ to $\frac{1}{100}$ grain.
Dog	$\frac{1}{60}$ to $\frac{1}{30}$,,
Pig	$\frac{1}{15}$ to $\frac{1}{5}$,,
Sheep	$\frac{1}{15}$ to $\frac{1}{10}$,,
Horse	$\frac{1}{2}$ to $1\frac{1}{2}$ grains
Ox	$\frac{1}{2}$ to $2\frac{1}{2}$,,

Hypodermically, $\frac{1}{10}$ of the above doses in each case would suffice.

Dose of Liquor Atropinæ Sulphatis:

Man	$\frac{1}{2}$ to 1 minim.

AURANTII CORTEX RECENS (B.).[1]

Fresh Bitter Orange-peel.

Description.—This is the fresh outer portion of the pericarp of *Citrus aurantium*, var. Bigaradia, Hook. f. (Bentl. and Trim., *Med. Pl.*, vol. i., plate 50). Nat. Ord., Rutaceæ.

[1] In the United States Pharmacopœia the corresponding *Aurantii Amari Cortex* is the rind of the fruit of *Citrus vulgaris, Risso*. This bitter orange-peel may be fresh or dry.

Characteristics.—On the outer surface it is of a deep orange-red or red colour, and is generally rough and glandular, whilst its inner aspect, which should be present to a very small extent, is white and spongy. It has an aromatic odour and a bitter taste.

AURANTII CORTEX SICCATUS (B.).

Dried Bitter Orange-peel.

Characteristics.—This is the same as above, but dried. It occurs in thin strips.

AURI ET SODII CHLORIDUM.

Chloride of Gold and Sodium.

Description.—The above-named preparation is a mixture of equal parts by weight of dry chloride of gold ($AuCl_3 = 302{\cdot}81$) and of chloride of sodium ($NaCl = 58{\cdot}37$). It must be preserved in carefully stoppered vials. It is an orange-yellow powder, devoid of smell, but with a saline and metallic taste, and slightly deliquesces in damp air. It is very soluble in water, and at least half of it is soluble in cold alcohol. If heated to redness, metallic gold is formed, and it imparts an intense yellow colour to a colourless flame, as do all substances containing sodium. An aqueous solution is slightly acid, and yields with solution of nitrate of silver a white precipitate of chloride of silver insoluble in nitric acid. If a glass rod, dipped in solution of ammonia, be placed close to the compound, no white fumes should be formed, thus indicating the absence of free acid.

BALSAMUM PERUVIANUM (A. and B.).[1]

Balsam of Peru.

Description.—This is a balsam exuded from the trunk of *Myroxylon Pereiræ*, after the bark has been beaten, scorched, and removed. It is a liquid somewhat less viscid than treacle, appearing nearly black in bulk, but in thin layers deep orange-brown or reddish-brown and transparent. The odour is agreeably balsamic, more especially when the balsam is heated. The taste is, however, acrid, and when swallowed it leaves a disagreeable burning sensation in the throat. It is insoluble in water, but soluble in chloroform. One volume is soluble in 1 volume alcohol (90 per cent.); but if 2 or more volumes of alcohol be added, the mixture becomes turbid. The specific gravity is about 1·1435. Ten drops triturated with 6 grains of slaked lime produce a permanently soft mixture (absence of copaiba and resins); and the mixture, on being warmed until all volatile matter is given off and until charring commences, gives no fatty odour (absence of castor-oil and other fatty oils). It should not diminish in volume when shaken with an equal bulk of water (showing absence of ethylic alcohol).

Therapeutics.—Balsam of Peru has the properties and actions of its com-

[1] In the United States Pharmacopœia the balsam is got from *Toluifera Pereiræ* (Royle), Baillon (Nat. Ord., Leguminosæ). That of the British Pharmacopœia is from *Myroxylon Pereiræ*, Kotzsch (B. and T., *Med. Pl.*, vol. ii., plate 84).

ponents, benzoic acid and its allies, and resins. It is seldom employed in veterinary practice. In dogs it is very useful as an external application for mange, as it destroys the acarus, relieves the irritation and itching, and subdues the inflammatory action. The best method of applying it is to anoint the whole skin with a mixture of 1 or 2 drachms to 1 ounce of soft paraffin, after the dog has been thoroughly washed with soft soap and warm water. On the day following, the mixture may be washed off, and reapplied as before in a couple of days. It is, however, well to remember that for this malady a more effectual remedy is found in ointment of sulphur.

Dose.—*Man* - - - - - - 5 to 15 grains.

BALSAMUM TOLUTANUM (A. and B.).[1]

Balsam of Tolu.

Description.—Balsam of Tolu exudes from the trunk of *Myroxylon Toluifera*, after incisions have been made in the bark of the trunk. When first imported, it is a soft and tenacious solid, but it becomes harder by keeping, and in cold weather is brittle like resin. In thin films it is transparent and yellowish-brown.

Tests.—When a minute portion is pressed between pieces of glass with the aid of heat, and then examined with a lens, an abundance of crystals of cinnamic acid is exhibited. The odour is highly fragrant, especially when the substance is warmed. The taste is somewhat aromatic and slightly acid. Balsam of tolu is soluble in alcohol (90 per cent.), and the solution has an acid reaction.

Preparation.—Tinctura Benzoini Composita.

Therapeutics.—The action and uses of balsam of tolu are very similar to those of the preceding balsam. The syrup and the compound tincture of benzoin are sometimes prescribed for cough in dogs.

Dose.—*Man* - - - - - 5 to 15 grains.
Dog - - - - - 5 to 20 ,,
Pig - - - - - 10 to 60 ,,
Horse - - - - - 2 to 4 drachms.

[1] In the United States Pharmacopœia it is said to be obtained from *Toluifera Balsamum*, Linné (Nat. Ord., Leguminosæ). In the British Pharmacopœia it is from *Myroxylon Toluifera*, H. B. and K. (B. and T., *Med. Pl.*, vol. ii., Plate 84).

BELÆ FRUCTUS.

Bael Fruit.

Natural Order.—Aurantiaceæ.

Description.—Bael fruit is the fruit of *Ægle marmelos*, from Malabar and Coromandel, and should be dried when half-ripe. The fruit is roundish, and of about the size of a large orange, with a hard, woody, nearly smooth rind. As usually imported, it exists in dried more or less twisted slices, or in fragments, consisting of portions of the rind, and adherent dried pulp and seeds. The rind is about one-eighth of an inch thick, hard, and covered with a nearly smooth pale-brown or grayish firmly adherent epicarp. The pulp is firm and brittle, and of an orange-brown or cherry-red colour externally. When broken, it is seen to be nearly colourless internally. Bael fruit has no odour, and its taste is simply mucilaginous, and very slightly acid.

Preparation.—Extractum Belæ Liquidum.

Therapeutics.—Although it contains no appreciable amount of tannin, and the fresh fruit is laxative, dried Bael fruit has astringent properties, and is useful for diarrhœa and dysentery. The preparation is the liquid extract, the dose being for men 1 fl. dr. to ½ fl. oz. Probably its usefulness is due to an effect also apparently produced by cotoine, which Albertoni thinks causes dilatation of intestinal vessels and consequent increased absorption of fluid from the digestive canal.

Dose of Liquid Extract of Bael Fruit:

Horses	2 to 4 fluid ounces.
Foals	1 to 2 ,, ,,
Cattle	4 to 6 ,, ,,
Calves	1 to 3 ,, ,,

BELLADONNÆ FOLIA (A. and B.).

Belladonna Leaves.

Natural Order.—Atropaceæ.

Description.—The fresh leaves of *Atropa Belladonna*, separated from the branches and carefully dried. The leaves are gathered from plants growing wild or cultivated in England, when the fruit has begun to form. The leaves are alternate below, being in pairs above of unequal size. All are shortly stalked, from 3 to 8 inches long, broadly ovate, acute, entire and smooth. The expressed juice of the fresh leaves, or an infusion of the dried leaves dropped into the eye, dilates the pupil.

Dose.—

Dog	2 to 9 grains.
Pig	5 to 30 ,,
Horse	2 to 12 drachms.
Ox	4 to 14 ,,

BELLADONNÆ RADIX (A. and B.).

Belladonna Root.

Natural Order.—Atropaceæ.

Description.—The root of *Atropa Belladonna*,[1] obtained in the autumn from plants growing wild or cultivated in Britain, and carefully dried, or imported in a dried state from Germany. Belladonna root exists in rough, irregular, branched pieces, from 1 to 2 feet long, and from ½ inch to 2 or more inches thick, generally marked at their upper end by the hollow bases of the stems which they once bore. The root is covered with a dirty gray or brownish integument, which is easily scraped off by the nail, when the exposed surface presents a whitish appearance. It breaks readily with a short fracture, and the surface is then seen to consist of a thin cortical portion of a yellowish or pale brown colour, separated by a dark line from a large central portion of a brownish colour, and marked throughout by scattered and more darkly coloured dots, but without evident medullary rays. An infusion dropped into the eye dilates the pupil.

Therapeutics.[2]—Belladonna is extensively used (*a*) *internally* and (*b*) *externally*.

(*a*) *Internally*, for laryngitis in horses and cattle it is a valuable remedy, as also for catarrh, bronchitis, and inflammation of the lungs. In some specific fevers, especially those in which the breathing organs are involved, such as influenza, strangles, purpura, and scarlet fever in horses, and distemper in dogs, it proves beneficial. We have already mentioned disorders in which the sulphate of atropine is administered. For these, belladonna is also suitable, when a very rapid action is not essential. In many painful disorders belladonna has been frequently prescribed. In spasm of the diaphragm, spasmodic colic, and asthma, it proves useful, and it assuages the pain of pleurisy and neuralgia, and is sometimes prescribed in rheumatism. In tetanus the drug is not of much value, nor has it proved of great benefit in nervous diseases, such as epilepsy and chorea. When the bowels are very sluggish, belladonna frequently restores tone to the lax involuntary muscle fibres of the walls of the intestines. For this purpose it may be administered with aperient remedies, either in solution, or in the

[1] Linn (B. and T., *Med. Pl.*, vol. iii., plate 193).

[2] Belladonna leaves and root contain about 0·18 per cent. of atropine, and belladonnine, homologous with atropine, and probably identical with hyoscyamine, daturine, and duboisine. The alkaloids exist in the plant as malates.

form of a ball. In inflammation of the udder in mares and cattle the drug acts usefully by relieving the pain, heat, and swelling. In this condition it is customary to prescribe full doses internally, and to apply the liniment of belladonna externally. In inflamed conditions of the bladder or kidneys belladonna is an esteemed remedy.

(*b*) *Externally*, belladonna has many uses. For the eye, however, it is preferable to employ a solution of sulphate of atropine (see Atropinæ Sulphas), as this alkaloidal salt is more convenient than the preparations of belladonna itself. For lumbago and other painful or rheumatic affections the liniment of belladonna is a good application. A very efficacious mixture may be made of equal parts of the liniments of belladonna and of aconite. This mixture is a very good one for applying to the spine in cases of lockjaw. In garget or inflammation of the udder the local application of the ointment or chloroform of belladonna proves very useful indeed.

Dose.—Leaves :

Dog	2 to 9 grains.
Pig	5 to 30 ,,
Horse	¼ to 1½ ounces.
Ox	½ to 2 ,,

Extract :

Man	¼ to 1 grain.
Dog	½ to 3 grains.
Pig	2 to 6 ,,
Sheep	4 to 25 ,,
Horse	½ to 1½ drachms.
Ox	¾ to 2 ,,

Succus or Tincture :

Dog	5 to 15 minims.
Pig	10 to 30 ,,
Horse	½ to 1 fluid ounce.
Ox	¾ to 1½ fluid ounces.

BENZOINUM (A. and B.).[1]

Benzoin.

Description.—Benzoin is a balsamic resin obtained from *Styrax Benzoin*, and probably other species of *Styrax*, Linn. It is

[1] The same name of plant is given in both the United States and British Pharmacopœias, viz., *Styrax Benzoin*, Dryander (Nat. Ord., Styraceæ). (B. and T., *Med. Pl.*, vol. iii., plate 169.)

called commercially Siam and Sumatra benzoin. It is generally procured by making deep incisions in the bark of the trees, and allowing the liquid which exudes to concrete by exposure to the air. It occurs in masses composed of loosely agglutinated tears, or more often of tears closely welded together by a deep amber-brown, reddish-brown, or grayish-brown translucent substance. The tears may be an inch or more in length. When it is broken, the surfaces exposed are at first opaque and milk-white. Sometimes the white substance is very small in amount, and the masses, when broken, resemble reddish-brown granite. Benzoin is very brittle, softens readily by the warmth of the mouth, and gives off, when heated, fumes of benzoic acid. The odour is agreeable and resembles vanilla, or, in some cases, storax. Benzoin has no taste. It is soluble in rectified spirit, and in solution of hydroxide of potassium.

Therapeutics.—Benzoin is slightly stimulating to the vessels. It has also expectorant, antiseptic, and disinfectant properties. It is sometimes used as Friar's balsam—externally for wounds and sores, internally for chronic bronchitis in dogs.

Dose of Benzoin :

Dog - - - -	5 to 20 grains.
Pig - - - -	15 to 40 ,,
Horse - - - -	2 to 4 drachms.

Of Compound Tincture of Benzoin—i.e., Friar's Balsam (1 in 10) :

Dog - - - -	$\frac{1}{4}$ to $\frac{1}{2}$ fluid drachm.
Pig - - - -	1 to 2 ,, drachms.
Horse - - - -	1 to $1\frac{1}{2}$,, ounces.

BENZOL (B.).

Description.—The above is really a mixture of homologous hydrocarbons, and is obtained from light coal-tar oil. Its components include about 70 per cent. of Benzene, C_6H_6, and about 25 per cent. or more of Toluene, $C_6H_5.CH_3$.

Characteristics.—Benzol is a volatile liquid, devoid of colour and of opalescence, and having a strong odour, and a specific gravity of 0·884. It should begin to distil at 80° C., and at 100° C. about 90 per cent. of the whole should pass over, and all of it below 120° C.

Use.—For preparation of Charta Sinapis and Liquor Caoutchouc.

BISMUTHI CARBONAS (B.).[1]

Oxycarbonate of Bismuth.

Mode of Preparation. — Oxycarbonate of Bismuth, $(Bi_2O_2CO_3)_2,H_2O$, is produced by acting on Nitrate of Bismuth with Carbonate of Ammonium.

Characteristics and Tests.—It is a white powder, which, like oxide of bismuth and oxynitrate of bismuth, is heavy, insoluble in water, but soluble in nitric acid diluted with half its volume of water. If either of these be dissolved in hydrochloric acid, and a little water added, and sulphuretted hydrogen gas be passed through the solution, a brownish-black sulphide of bismuth is precipitated, which, rapidly washed on a filter with water and dried at 212° F., shows the amount of bismuth present. The suitable tests should show the absence of silver, lead, copper, arsenium, iron, zinc, calcium, magnesium, selenium, tellurium, chlorides, or sulphates.

It gives the reactions, of course, for carbonates, but only the slightest indication of nitrate. One gramme should give 0·99 gramme of sulphide of bismuth.

Dose.—*Man* - - - - - - 5 to 20 grains.

BISMUTHI ET AMMONII CITRAS (A.).

Citrate of Bismuth and Ammonium.

Mode of Preparation.—Citrate of bismuth and ammonium is prepared from its solution by evaporating over a water-bath to the consistence of a syrup, and then spreading the thick fluid in thin layers on glass or porcelain plates, and drying at a temperature not exceeding 37·8° C. Remove the scales, and preserve them in a stoppered bottle.

Characters—This salt occurs in the form of small, shining, translucent scales, which possess a slight metallic taste, and are very soluble in water.

Tests.—If it be warmed with a little fixed alkali, the gas ammonia is evolved.

On ignition, the salt chars, and yields a residue which is black, but with a yellow surface, and is soluble in a little nitric acid.

Preparation.—Liquor Bismuthi et Ammonii Citratis.

Therapeutics.—In view of the sedative and astringent action which the salts of bismuth have on the stomach, they are sometimes employed in the treatment of pain, due to catarrh or other organic disease of this organ in the dog. For this purpose the solution of bismuth and citrate of ammonium may be given in doses of ½ to 1 fluid drachm (= 1½ to 3 grains of the solid).

BISMUTHI SUBNITRAS (A. and B.).

Subnitrate of Bismuth.

Preparation.—The above salt, often termed oxynitrate of bismuth, $BiONO_3,H_2O$, results from the action of water on nitrate of bismuth.

[1] In the Unites States Pharmacopœia it is represented by Bismuthi Subcarbonas, Subcarbonate of Bismuth.

Characteristics and Tests.—It is a heavy white powder, devoid of smell, and is in the form of very small crystalline scales, and has only a slight acid reaction. One gramme should yield 0·84 gramme of sulphide. It should only possess a trace of carbonate. Let 1 gramme be dissolved in nitric acid, add a solution of about 2 grammes of citric acid, and enough solution of ammonia to cause alkalinity, and boil. No precipitate of phosphate of calcium should be yielded.

Solutions of the nitrate or chloride give, when thrown into water, a milky white precipitate of oxynitrate or oxychloride, and this is blackened by hydrogen sulphide.

Actions and Uses of Bismuth Salts.—A combination of the oxynitrate and Dover's powder is very good for the pain and vomiting of gastric ulcer and malignant disease in man. Generally for gastric catarrh 20-grain doses of the oxynitrate are useful, and may be increased with safety.

Doses:

Dog	2 to 10 grains.
Man	5 to 20 ,,
Pig	5 to 20 ,,
Horse	1 to 2 drachms.

BISMUTHI OXIDUM (B.).

Oxide of Bismuth.

Mode of Preparation.—Boil Oxynitrate of Bismuth with solution of hydroxide of sodium.

Characteristics and Tests.—It is a brownish-yellow powder. One gramme yields 1·1 grammes of sulphide of bismuth. If heated to redness, it should not weigh appreciably less, proving the absence of oxycarbonate and oxynitrate of bismuth and of water.

BISMUTHI SALICYLAS (B.).

Salicylate of Bismuth.

Synonym.—Oxysalicylate of Bismuth.

Mode of Preparation.—Salicylate of bismuth,

$$C_6H_4 \cdot OH \cdot COO \cdot BiO,$$

may be formed by acting upon nitrate of bismuth with salicylate of sodium.

Characteristics.—It is a nearly white amorphous powder.

Tests.—Those of bismuth may be obtained. If it be added to diluted test solution of ferric chloride, a violet colour is gained by the latter. It should only yield the faintest characteristic reaction, if the copper test for nitrates be applied, thus proving the absence of nitrate. Similarly, the absence of free salicylic acid should be indicated by the fact of there being no violet coloration, if alcohol (90 per cent.) be shaken with it, and the test solution of ferric chloride be added. It is distinguished from carbolates and sulphocarbolates by the fact that, if it be heated with solution of carbonate of sodium, and to the liquid part of the mixture, if containing not less that 1 per cent. of salicylate, solution of nitrate of uranium be added, a yellowish-brown precipitate will be given.

Each gramme of the salicylate of bismuth should yield 0·7 gramme of sulphide of bismuth. Again, if the salt be heated, salicylic acid volatilizes, and about 63 per cent. of oxide of bismuth is left. Salicylate of bismuth and other salts of bismuth should be free from silver, lead, copper, arsenium, iron, zinc, calcium, magnesium, selenium, tellurium, sulphates, or chlorides.

Dose.—*Man* - - - - - 5 to 20 grains.

BORAX. (See Sodii Biboras.) (B.)[1]

Synonym.—Biborate of sodium.

Formula.—$Na_2B_4O_7,10H_2O$.

Description.—Borax is a salt which occurs as such in nature.

BROMUM (A.).

Bromine.

Description.—Bromine is the only element, with the exception of mercury, which at ordinary temperatures is liquid. It is obtained from sea-water and some saline springs. It is a dark, brownish-red, very volatile liquid, possessing a strong and disagreeable odour. Its specific gravity is 3·055. At the average temperature of the air it gives off red vapours, and at about 60° C. it boils.

Test.—If agitated with solution of soda in such proportion that the spirit remains very slightly alkaline, it forms a colourless liquid, which, if coloured by the addition of a little more bromine, should not become blue if a cold solution of starch be added, thus proving the absence of iodine.

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[1] In the United States Pharmacopœia it is called Sodii Boras, Sodium Borate.

BRYONIA (A.).

Bryony.

Description.—Bryony is the root of *Bryonia alba* and of *Bryonia dioica*, Linné (Nat. Ord., Cucurbitaceæ). It is supplied in transverse sections, about 5 centimetres in diameter. The bark is of a gray-brown colour, rough, thin, whilst the inner portion is whitish or grayish, with many small wood bundles arranged in circles and radiating lines. It breaks with a short fracture. It is devoid of odour, but has a bitter, unpleasant taste.

Preparation.—Tinctura Bryoniæ.

Composition.—Contains a bitter substance, *bryonin*.

Use.—Hydragogue purgative.

BUTYL-CHLORAL HYDRAS (B.).

Butyl-Chloral Hydrate.

Formula and Preparation.—Butyl-Chloral Hydrate, or Trichlorbutylidene Glycol, $CH_3{\cdot}CHCL{\cdot}CCl_2{\cdot}CH(OH)_2$, is a crystalline hydrate prepared by adding water to the liquid butyl-chloral obtained by the action of chlorine on aldehyde.

Characteristics and Tests.—It has the form of pearly-white trimetric laminæ, with pungent smell and nauseous taste. It fuses at 77·8° C., and the liquid, cooling, begins to solidify at 71·1° C. It is soluble in about 50 parts of water, and in its own weight of glycerine or alcohol, and slowly in 20 parts of chloroform. The aqueous solution is only slightly acid, or neutral. The absence of hydrate of chloral should be demonstrable by the fact of no chloroform being yielded when it is heated with solution of hydroxide of potassium or with milk of lime.

Actions and Uses in Mankind.—Butyl-chloral hydrate is less rapid, less certain, and less strong as a hypnotic than ordinary chloral hydrate. It is, therefore, inferior for use, except that it is said to be less depressant to the heart, and to be therefore more suitable for sleepless patients with cardiac weakness; but it is doubtful if this be incontrovertible, and it is best, perhaps, to avoid both salts in such cases.

It, however, does produce anæsthesia of the region supplied by the trigeminus—*i.e.*, of the face and part of the scalp—preceding sleep. Some cases of tic-douloureux and facial neuralgia are very speedily relieved, and other pains in the face may be soothed, as also toothache by local application. It may also be tried for neuralgia of the limbs and in cases of dysmenorrhœa.

Dose.—*Man* - - - - - - - - - 5 to 20 grains.

CALAMUS (A.).

Calamus.

Description.—Calamus, or Sweet Flag, is the rhizome of *Acorus Calamus*, Linné (Nat. Ord., Aroideæ). It exists commercially in the form of sections of varying length, unpeeled, about 2 centimetres in breadth, wrinkled lengthwise. On its upper surface it is marked with leaf-scars triangular in shape, and on its lowest surface with the circular scars of the removed rootlets. On the outside it is reddish-brown and somewhat ringed, owing to remains of

leaf-sheaths. On the inside it is white and spongy. It breaks with a short, cork-like fracture, displaying several oil-cells and scattered wood-bundles crowded within the endoderm. Smell aromatic, taste bitter.

Preparation.—Extractum Calami Fluidum, the dose of which is ½ to 1 fluid drachm.

Uses.—Stomachic and stimulant.

CALCII CARBONAS.[1]

Carbonate of Calcium.

Synonyms.—Creta Præparata, prepared chalk.

Description.—Chalk, freed from most of its impurities by elutriation, and afterwards dried in small, generally conical, masses. It is a white amorphous substance.

Like all other carbonates, carbonate of calcium effervesces, when acids are added, giving off carbonic acid gas, and dissolving with only a slight residue in diluted hydrochloric acid, forming chloride of calcium. If to this solution of chloride of calcium, solution of ammonia and oxalate of ammonium are added, a copious white precipitate of oxalate of calcium is produced.

Preparation.—Hydrargyrum cum Creta (2 parts in 3).

Therapeutics.—Prepared chalk is used in the preparation of gray powder. As an internal remedy, the succeeding preparation of precipitated carbonate of calcium is generally used. The uses and doses are the same.

CALCII CARBONAS PRÆCIPITATUS (A. and B.).

Precipitated Carbonate of Calcium.

Mode of Preparation.—Dissolve 5 ounces of chloride of calcium in 2 pints of water. Also dissolve 13 ounces of carbonate of sodium in 2 pints of water. Mix the two solutions, and allow the precipitate to subside. Collect it on a calico filter, wash it with boiling distilled water, until the washings cease to give a precipitate with nitrate of silver, and dry the product at 100° C.

Characters.—It is a white crystalline powder, insoluble in water, but soluble with evolution of carbonic acid gas in hydrochloric acid and other acids.

Tests.—The solution in hydrochloric acid, when neutralized by ammonia, gives rise, on the addition of oxalate of ammonium, to a copious white precipitate. When diluted nitric acid is added to it, a clear solution is produced, which, if perfectly neutral and deprived of carbonic acid gas by boiling, is neither precipitated by saccharated solution of lime in excess, nor by solution of nitrate of silver.

Therapeutics.—Prepared chalk has antacid properties, and is often prescribed in cases of diarrhœa, dysentery, and indigestion caused by too great acidity, with great benefit. In diarrhœa it may be combined with opium and catechu, or opium and bael fruit, or, in diarrhœa of young stock, with bael fruit and camphor. For dysentery it is best combined with ipecacuanha, bael fruit, and opium. For dyspepsia a mild purgative should be given with it, and chloroform may be added.

It is also antidotic to poisoning by the oxalic, carbolic, and mineral, acids.

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[1] In the United States and British Pharmacopœias this is given as Creta Præparata.

Dose.—*Dog* - - - - - - 10 to 12 grains.
Man - - - - - - 10 to 20 ,,
Pig - - - - - - 20 to 90 ,,
Sheep - - - - - - 1 to 2 drachms.
Horse - - - - - - 3 to 8 ,,
Ox - - - - - - 1 to 1½ ounces.

CALCII CHLORIDUM (A. and B.).

Chloride of Calcium.

Formula.—$CaCl_2,2H_2O$.

Mode of Preparation.—Chloride of calcium may be formed by neutralizing hydrochloric acid with carbonate of calcium, adding a little solution of chlorinated lime and slaked lime to the solution, filtering, evaporating until the chloride of calcium becomes solid, and finally drying it at about 200° C.

Characters.—Chloride of calcium exists in white agglutinated masses, which are dry, but very deliquescent.

Tests.—The salt evolves no chlorine or hypochlorous acid on the addition of hydrochloric acid.

It is entirely soluble in an equal weight of water, and also in 3 parts of alcohol (90 per cent.).

An aqueous solution is not precipitated by the addition of lime-water. Iron, aluminium, and carbonates should be absent, and only a mere trace of magnesium is permissible. If hydrochloric acid be added, no chlorine or hypochlorous acid should be given off, thus indicating that no hypochlorite is present.

Therapeutics.—Chloride of calcium is sometimes prescribed in cases of scrofulous diseases of the glands and for enlarged lymphatics. For such purposes the phosphate of lime, however, is often preferred. It is hæmostatic.

Dose.—*Dog* - - - - - - 1 to 5 grains.
Man - - - - - - 5 to 15 ,,
Pig - - - - - - 5 to 20 ,,
Sheep - - - - - - 10 to 15 ,,
Horse - - - - - - 15 to 30 ,,
Ox - - - - - - 20 to 60 ,,

CALCII HYDRAS (B.).

Hydrate of Calcium.

Synonym.—Slaked Lime, Calcium Hydroxide.

Formula.—$Ca(HO)_2$.

Mode of Preparation.—Calcium hydroxide should be recently prepared by the action of water on calcium oxide. Place 2 pounds of lime in a metal pot, and pour 1 pint of water upon it. When vapour ceases to be given off, cover the pot with its lid, and set it aside to cool. When the temperature has fallen to that of the air, put the slaked lime on an iron-wire sieve, and by gentle agitation cause the fine powder to pass through the sieve. Place the powder which passes through, rejecting what does not, into a well-stoppered bottle, and keep it excluded as much as possible from the air. Hydrate of

calcium should be only used when it has recently been prepared, as it is very liable to absorb carbonic acid gas from the air, and be thus converted into carbonate of calcium.

Tests.—If strongly heated, it loses nearly one-fourth of its weight of water. Absence of iron, aluminium, magnesium, sodium, potassium, carbonates, chlorides, phosphates, sulphates, or silica, should be demonstrable.

Therapeutics.—Hydrate of calcium, when applied externally, has a caustic action. With fused potash it forms the so-called Vienna paste, or potassa cum calce. Internally, hydrate of calcium is used for its antacid properties, in virtue of which it proves useful in cases of indigestion, tympanitis, and hoven. Partly owing to this antacid property, partly to an obscure sedative effect on the intestinal glands, which diminishes the excretion of water in the bowel, and partly to its physical action, it also acts as an astringent. As such it is given in cases of diarrhœa, for which it may be prescribed with opium or vegetable astringents. In the treatment of diarrhœa in young animals it is commonly added to the milk in order to prevent the coagulating of the casein.

Lime is a valuable antidote for poisoning by the mineral acids and oxalic acid. As an enema, lime-water is useful in cases of ascarides in the lower part of the bowel.

Dose of Hydrate of Calcium:

Dog	3 to 10 grains.
Pig	5 to 20 ,,
Sheep	15 to 30 ,,
Horse	1 to 1½ drachms.
Ox	1 to 2 ,,

Dose of Lime-water, or Solution of Hydrate of Calcium:

Dog	2 to 6 fluid drachms.
Pig and Sheep	2 to 8 ,, ,,
Horse	2 fluid ounces.
Ox	3 ,, ,,

CALCII OXIDUM.

Oxide of Calcium.

Synonym.—Lime.

Mode of Preparation.—Oxide of calcium is obtained by heating chalk or limestone, so as to expel carbonic acid gas.

Description.—Lime exists in compact masses of a whitish colour. It readily absorbs water, and, when rather less than its weight of water is added, a piece swells and falls into powder, becoming very hot.

Tests.—The powder thus formed, when agitated with distilled water, gives, after filtration, a clear solution, possessing an alkaline reaction, and yielding a white precipitate with oxalate of ammonium. The powder obtained by slaking also dissolves, without much residue, in diluted hydrochloric acid.

Preparation.—Calcii Hydras.

Therapeutics.—Unslaked lime, when applied to raw surfaces, has irritant, desiccant, and caustic properties.

It is used in the preparation of the hydrate of calcium.

CALCII PHOSPHAS (B.).[1]

Phosphate of Calcium.

Formula.—$Ca_3(PO_4)_2$.

Mode of Preparation.—Take of

Bone Ash	4 ounces.
Hydrochloric Acid	6 fluid ounces.
Water	2 pints.
Solution of Ammonia	12 fluid ounces, or a sufficient quantity.
Distilled Water	a sufficient quantity.

Digest the bone-ash in the hydrochloric acid, diluted with a pint of water, until it is dissolved. Boil for a few minutes, filter, add the remainder of the water and the solution of ammonia, until the mixture acquires an alkaline reaction. Collect the precipitate on a calico filter, and wash it with boiling distilled water, as long as the liquid which passes through occasions a precipitate, when dropped into solution of nitrate of silver acidulated with nitric acid. Dry the washed product at a temperature not exceeding 100° C. It can also be produced by acting on calcium chloride with sodium phosphate.

Characters.—Phosphate of calcium is a light white amorphous powder, insoluble in water, but soluble in diluted nitric acid.

Tests.—The solution in nitric acid continues clear when a diluted solution of acetate of sodium is added in excess.

On the addition, however, of a little oxalate of ammonium or of perchloride of iron to the solution in nitric acid a white precipitate is formed.

The solution in nitric acid is only rendered slightly turbid by solution of nitrate of silver.

Preparation.– Pulvis Antimonialis.

Therapeutics.—Phosphate of lime is given in cases of rickets in young, badly nourished animals, and also in cases of scrofulous disease of the glands and joints. It has also proved useful in cases of chronic diarrhœa in young beasts and sheep, more especially with iron salts or vegetable tonics.

Dose.—

Man, Dog, and Sheep	5 to 10 grains.
Pig	10 to 30 ,,
Horse	1 to 2 drachms.
Ox	1½ to 2½ ,,

CALCII SULPHIDUM.[2]

Sulphide of Calcium.

Synonym.—Calx Sulphurata.

Mode of Preparation.—Mix thoroughly 7 ounces of sulphate of calcium in fine powder with 1 ounce of wood charcoal, also in fine powder, and ½ ounce of starch. Heat the mixture to redness in an earthen crucible, until the black

[1] In the United States Pharmacopœia the name is Calcii Phosphas Præcipitatus, which is a more exact one.

[2] In both the United States Pharmacopœia and the British Pharmacopœia it is called Calx Sulphurata, because it is a mixture, and contains calcium sulphate and carbon.

colour has disappeared. Cool, and at once place the whitish residue in a stoppered bottle.

Characters.—Sulphide of calcium should contain at least 50 per cent. of pure sulphide of calcium (CaS). As above prepared, it is a nearly white powder, with a smell like that of sulphide of hydrogen.

Therapeutics.—Sulphide of lime is very rarely given in veterinary practice. It is recommended in doses of ½ to 1 drachm in cases of purpura hæmorrhagica in horses; but the utility of this treatment seems somewhat dubious.

Dose.—

Man	¼ to 1 grain.
Dog	1 to 4 grains.
Pig	2 to 10 ,,
Horse	½ to 1 drachm.

CALENDULA (A.).

Calendula.

Description.—The florets of marigold, or *Calendula officinalis*, Linné (Nat. Ord., Compositæ), are about 12 millimetres in length, linear, and strap-like, delicately veined lengthwise, yellow or orange in colour. Above they are three-toothed, and the short hairy tube encloses the remains of a filiform style, ending in two elongated branches. The odour is heavy, taste bitter and saline.

Preparation.—Tinctura Calendulæ (used externally).

Composition.—Contains a *bitter principle* and *calendulin*.

Use.—The tincture is applied to sprains and bruises like tincture of arnica.

CALUMBÆ RADIX (A. and B.).[1]

Calumba Root.

Natural Order.—Menispermaceæ.

Description.—Calumba root, as spoken of in pharmacy, exists in irregular, flattish, circular, or somewhat oval dried slices, which have been cut transversely from the root of *Jateorrhiza calumba*. The slices are from about 1 inch to 2 inches or more in diameter, and from ⅛ to ½ an inch or more in thickness. The cortical portion is thick, covered by a wrinkled and irregular brownish-yellow coat, and separated from the central portion, which is concave on both surfaces, by a fine, dark-coloured line. The pieces have a grayish or greenish-yellow colour, a slight odour, and bitter taste. The pieces break readily and suddenly with a mealy

[1] In the United States Pharmacopœia it is called Calumba, and described as the root of *Jateorrhiza palmata* (Lamarck), Miers, and in the British Pharmacopœia as the root of *Jateorrhiza calumba*, Miers (B. and T., *Med. Pl.*, vol. i., plate 13).

fracture, and are easily powdered. The appearance of calumba root is very characteristic, and it can be detected almost at a glance.

Preparation.—Tinctura calumbæ ($2\frac{1}{2}$ ounces to 1 pint).

Therapeutics.—Calumba root is stomachic, bitter, and tonic. The powder is given to cattle and horses, and the extract is a useful basis for making pills for dogs. The tincture is a convenient form for prescribing cordial and tonic draughts for horses.

Dose.—

Dog	5 to 20 grains.
Pig	$\frac{1}{2}$ to 1 drachm.
Sheep	1 to 3 drachms.
Horse	$\frac{1}{4}$ to $\frac{3}{4}$ ounce.
Cattle	$\frac{3}{4}$ to $1\frac{1}{4}$ ounces.

CALX CHLORINATA (A. and B.).[1]

Chlorinated Lime.

Description.—Chlorinated lime is obtained by exposing slaked lime to the action of chlorine gas, as long as it is absorbed. It may be regarded as consisting of the hypochlorite and the chloride of calcium ($CaCl_2O_2$,$CaCl_2$), or as a direct compound of chlorine and lime.

Characters.—Chlorinated lime is a dull white powder with an odour of chlorine. It is partly soluble in water.

Tests.—An aqueous solution gives off chlorine copiously upon the addition of oxalic acid, and deposits at the same time oxalate of calcium.

Preparations.—Liquor Calcis Chlorinatæ (1 pound to 1 gallon of water, or 500 grammes to 5 litres). Chlorinated Lime is used in preparing Chloroform and Vapor Chlori.

Therapeutics.—Chlorinated lime is rarely given internally. Its action, when taken, is astringent, stimulant, and alterative, and it is antidotic to poisoning by sulphuretted hydrogen.

Externally applied, it has feeble antiseptic and marked deodorizing powers. The solution is therefore valuable as a dressing for foul-smelling wounds and abscesses, and it has also been used as a local application for grease.

The special use, however, of chlorinated lime is that which it possesses in virtue of its disinfectant and deodorant qualities. It owes these properties chiefly to the readiness with which it evolves free chlorine and hypochlorous acid, and partly to the free lime it contains. With this view it is sometimes prescribed in small and few doses in the later stages of tympanitis in cattle and sheep.

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[1] In the United States Pharmacopœia it is called Calx Chlorata, which should contain 35 per cent. of available chlorine. It should be kept in well-closed vessels in a cool and dry place.

As a ready method of disinfecting stables contaminated with the germs of infectious diseases, the powder or a solution will serve equally well. When it is desired to evolve chlorine more rapidly, it is customary to add sulphuric acid to a quantity of the powder placed in an earthenware pot or dish.

Dose.—*Dog* - - - - - - 1 to 5 grains.
Pig - - - - - - 5 to 20 ,,
Sheep - - - - - - 10 to 30 ,,
Horse - - - - - - ½ to 1 drachm.
Ox - - - - - - ½ to 1½ drachms.

CAMBOGIA (A. and B.).

Gamboge.

Natural Order.—Guttiferæ.

Description.—Gamboge is a gum-resin obtained from *Garcinia Hanburii*, Hook. f. (B. and T., *Med. Pl.*, vol. i., plate 33). As used in commerce, it occurs in cylindrical solid or hollow rolls, which are longitudinally striated on the surface, and either distinct or more or less agglutinated, forming masses. It breaks with a conchoidal fracture, and the surfaces exposed are opaque, smooth, glistening, and of a uniform reddish-yellow colour. When it is in powder, a bright yellow colour is presented. There is no odour, but the taste is very acrid. When rubbed with water, a yellow emulsion is formed, which is used as a paint in water-colour painting.

Tests.—Gamboge is completely dissolved by the successive action of alcohol (90 per cent.) and water.

An emulsion made with boiling water, and cooled, does not become green with solution of iodine, indicating the absence of more than a trace of starch. It should not leave more than 3 per cent. of ash after incineration.

Therapeutics.—Gamboge is a hydragogue cathartic resembling colocynth, but does not, like the latter, act as a direct cholagogue. It has in addition a diuretic effect. Gamboge is not given in equine or canine practice, its effect on horses and dogs being too violent and drastic. In ruminants, however, it is administered along with other purgative ingredients, more especially with sulphate of sodium or sulphate of magnesium. It possesses the advantage, when given with about half the usual dose of either of these saline purges, of having a rapid action.

Dose.—*Man* - - - - - - - ½ to 2 grains.
Sheep - - - - - - - 15 to 30 ,,
Horse - - - - - - - 2 to 4 drachms.
Ox - - - - - - - 3 to 6 ,,

CAMPHORA (A. and B.).

Camphor.

Natural Order.—Lauraceæ.

Description.—Camphor is a stearoptene, having the nature of a ketone, and the formula $C_{10}H_{16}O$, obtained from the wood of

Cinnamomum Camphora (Linné), Nees et Ebermaier (B. and T., *Med. Pl.*, vol. iii., plate 222). It is imported in the crude state, and is purified by sublimation. It occurs in solid crystalline masses, which are colourless or whitish and translucent. Numerous fissures are presented by large masses. It may also have the form of tablets or of powdery masses known as 'flowers of camphor.' Camphor is somewhat tough, but is readily powdered if moistened with rectified spirit, ether, or chloroform. The odour is powerful, penetrating, and characteristic. The taste is pungent and somewhat bitter, and is followed by a sensation of cold. Camphor is lighter than water, its specific gravity being 0·995, and therefore floats upon it. It burns readily with a bright smoky flame, which may be utilized for blackening paper for tracings. Even at the ordinary temperature of the air it volatilizes somewhat rapidly, and when heated it sublimes entirely. It is readily soluble in about 1 part of alcohol (90 per cent.), in $\frac{1}{4}$ part of chloroform, 4 parts of olive oil, highly soluble in ether, and only in 700 parts of water. If rubbed with hydrate of chloral, menthol, phenol, or thymol, it forms a fluid.

Therapeutics.—(*a*) *Externally.*—Camphor is slightly antiseptic, and stimulates the local circulation; but, after a temporary stimulation, it acts as a sedative on the nerves. Liniments containing the substance are used to subdue the pain of articular and muscular rheumatism, or for sprains and enlarged joints. For allaying the itching of chronic eczema and urticaria, an ointment made of 1 part of camphor, powdered with the aid of a little spirit, and then well mixed with 8 parts of lard, is useful.

(*b*) *Internally.*—It is stimulant to the digestive, circulatory, and nervous systems, diaphoretic, diuretic, antipyretic, and antiseptic. The drug relieves flatulence, and increases the power of the heart and the blood-pressure, though it may slow the pulse. It causes exhilaration, followed by depression. It enters the blood unchanged both from skin and from mucous surfaces, causing therein an increase of leucocytes, and it is excreted likewise unchanged by the lungs and skin, but as a complex product by the kidneys. In the tissues and organs some of it is unchanged, whilst the rest is combined with glucose. It has been used in cardiac and nervous prostration, especially that of typhoid and erysipelas, in poisoning by opium and other narcotics, and alcoholism; insanity, chorea, hysteria and hysterical vomiting, whooping-cough, and nervous disorders of a sexual origin; coryza, catarrh, and weakness of the respiratory system; fevers; meteorism, summer diarrhœa, and cholera. For diarrhœa it may be given as Rubini's solution (1 grain in each 2 minims of absolute alcohol) in about a 4-minim dose to a man every quarter of an hour for several times. For more obstinate cases in man and animals camphor may be given together with opium, chalk, vegetable astringents, and aromatics. A mixture containing camphor, bael fruit, opium, and a small dose of diluted nitro-hydrochloric acid may be tried; but other drugs—*e.g.*,

salicylate of bismuth, tannigen, etc., should not be lost sight of. Together with other remedies, camphor is useful for cough and spasmodic affections. For chronic cough in horses it may be given together with belladonna and opium. In cases of influenza in horses, 1 drachm of camphor, with 2 drachms of carbonate of ammonium and ½ ounce of spirit of chloroform in water, may be administered twice or thrice daily.

It is, however, well to note that under certain conditions of idiosyncrasy, or the like, camphor may cause rapid depression, failure of pulse, pallor, and unconsciousness. Large doses are always irritant, producing nausea and vomiting, confusion of mind and speech, peculiar gait and gestures, and, finally, unless efficient remedies be supplied, disturbed respiration, convulsions, coma, and death.

Dose.—*Man* - - - - - 2 to 5 grains.
Dog - - - - - 2 to 10 ,,
Pig - - - - - 5 to 20 ,,
Sheep - - - - - 7 to 25 ,,
Horse - - - - 1 to 2 drachms.
Ox - - - - - 1½ to 3 ,,

CAMPHORA MONOBROMATA (A.).

Monobromated Camphor.

Formula.—$C_{10}H_{15}BrO = 230{\cdot}42$.

Description.—This substance has the form of colourless prismatic needles or scales, with odour and taste of camphor, permanent in the air, and not decomposed by light, and with neutral reaction. It is nearly insoluble in water, but freely soluble in alcohol, ether, chloroform, hot benzin, fixed and volatile oils, and slightly soluble in glycerin. Also soluble without decomposition in cold strong sulphuric acid, forming a solution from which, when it is poured into water, the compound again separates in an unaltered form.

At 76° C. it melts, subliming at a little higher temperature, whilst at 274° C. it boils without decomposition, and at last volatilizes without residue.

Action.—Causes weakness, stupor, and sleep, retards the pulse and respiration, and reduces the temperature, and, if given for long, produces great emaciation. Contracts the vessels of the eye and the ear in the rabbit.

Uses.—Is less efficient as a sedative than the bromides. Has been used for insomnia, chorea, hysteria, and delirium tremens; but in large doses, like camphor, it produces convulsions. Its use is not, therefore, to be advised, except with great care.

Dose.—*Man* - - - - - - - 2 to 4 grains.
Dog - - - - - - - 2 to 10 ,,

CANNABIS INDICA (A. and B.).

Indian Hemp.

Natural Order.—Cannabinaceæ.

Description.—The dried flowering or fruiting tops of the female plants of *Cannabis Sativa*, Linné (B. and T., *Med. Pl.*,

vol. iv., plate 231), from which the resin has not been removed. The plant is grown in India, where it is known as Gunjah, or Ganji. Indian hemp consists of small more or less aggregated masses, from about 1½ to 2½ inches in length. The tops of one or more alternate branches bear the remains of the flowers and smaller leaves, with a few ripe fruits, all pressed together by resinous matter. It may be composed of straight, stiff, woody stems several inches long, surrounded by the branched flower-stalks. It is rough to the touch, very brittle, of a dusky-green colour, with scarcely any taste. The odour is faint, peculiar, and narcotic.

Composition.—It contains an amorphous resin; a glucoside, *cannabin;* an active principle, *cannabinon;* a volatile alkaloid, *cannabinine;* an alkaloid, *tetano-cannabine;* and a volatile oil, *cannabene.*

Preparations. — Extractum Cannabis Indicæ; Tinctura Cannabis Indicæ (24 grains of extract in 1 fluid ounce).

Therapeutics.—Indian hemp is a soporific, anodyne, and antispasmodic. It has properties similar to those of opium, and has been given in the treatment of tetanus in horses, along with other remedies. In tetanus it appears to be beneficial in relieving the spasms, but it probably is not of much efficacy in this disease. Tincture of Indian hemp is one of the ingredients of the compound tincture of chloroform and morphine, and is in this preparation largely used in veterinary practice for colic, inflammation of the bowels, and other diseases. In irritative fever, consequent upon wounds in connection with joints, it has a very favourable action. The extract is also sometimes added to cough balls for horses. If given in cases of chorea in dogs, the tincture or the extract is useful in allaying the spasms.

Dose of Tincture of Cannabis Indica:

Man and Dog	5 to 15 minims.
Pig	10 to 30 „
Horse	½ to 1¼ fluid ounces.

Dose of Extract of Cannabis Indica:

Man and Dog	¼ to 1 grain.
Pig	2 to 12 grains.
Horse	½ to 1 drachm.

CANTHARIDES (A. and B.).[1]

Natural Order.—Coleoptera.

Description.—The dried beetle *Cantharis vesicatoria*, Latr. (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table xviii., Figs. 1, 2, 3), is about ¾ inch to 1 inch long, and ¼ inch broad. It has two long elytra, or wing-sheaths, of a shining coppery-green colour, under which are two thin, brownish, transparent membranous wings. The odour is strong and disagreeable. The powder is grayish-brown, containing shining green particles.

Preparation.—Acetum Cantharidum (2 ounces to 1 pint); Tinctura Cantharidum; Tinctura Cantharidum Fortis; Unguentum Cantharidum; Unguentum Cantharidum Compositum.

Therapeutics.—Cantharides act as a rubefacient and vesicant when applied externally. The effects upon the nerves and vessels resemble those of mustard, but, while they are much less rapid, they are nevertheless more severe. Fly-blister is selected generally for counter-irritation, unless there be a special reason for avoiding it—*e.g.*, if it be necessary to prevent any chance of irritation of genital and urinary organs. Blisters are especially employed for controlling inflammation, promoting the absorption of morbid products, and allaying pain by, so to speak, diverting the apparent source of irritation. In acute pleurisy the application of a cantharides blister is used in the early stages, in order to arrest the inflammatory action and to abate the pain, and also in the stage of effusion to promote absorption of fluid. In pleurodynia, in acute bronchitis and subacute pneumonia, and in encephalitis, it is also ordered. By relieving the pain of acute articular rheumatism it is likewise serviceable in abating the suffering, and it is also used in cases of chronic rheumatism. In phlebitis the application of a cantharides blister proves very beneficial. In the treatment of enteritis and colic this drug is not indicated, the application of the hot pack or a mustard poultice having a more prompt and valuable action. For abscesses, where it is desired to promote suppuration; for inflamed conditions of bursæ, ligaments, tendons, joints and bones, where a smart agent is requisite, no remedy acts better.

Internally, cantharides irritate the mouth and stomach. Cantharidin, the active principle, enters the blood from the stomach,

[1] In the United States Pharmacopœia and British Pharmacopœia Cantharis, Cantharides, is the name given.

as also it does from a blistered surface. Small doses are diuretic. Large doses inflame the kidneys, and cause irritation of the genital organs. It thus acts as an aphrodisiac, but is not to be recommended for the purpose, as its other effects are likely to be harmful, and other drugs are more suitable—*e.g.*, Damiana and Yohimbin. In small doses the drug may be occasionally effectual in wasting diseases of horses and cattle due to functional derangement of the stomach, but much care should be taken in the employment of this drug.

Dose.—*Dog* - - - - - ¼ to 1 grain.
Pig - - - - - 1 to 3 grains.
Sheep - - - - - 1 to 4 „
Horse - - - - - 4 to 8 „
Ox - - - - - 5 to 10 „

CAOUTCHOUC (B).

Indiarubber.

Description.—The above is the prepared milk-juice of *Hevea brasiliensis*, Muell. Arg., and probably other species (Collins' Report on Caoutchouc, plate 1). It is known as pure Para Rubber.

Natural Order.—Sapotaceæ.

Characteristics.—It occurs in elastic pieces of variable thickness, brownish-black on the outside, and mottled with a pale tint on the inner surface. It is insoluble in water, ethylic alcohol, alkaline solutions, or diluted acids, but soluble in chloroform, oil of turpentine, bisulphide of carbon, benzol, and petroleum spirit. At 125° C. it melts, and after cooling it remains soft and adhesive. It has a characteristic odour, but is almost free from taste.

Uses.—Solution of Indiarubber is used in the preparation of Charta Sinapis, and as a vehicle for external applications. Indiarubber itself is employed for making instruments and appliances.

CAPSICI FRUCTUS (A. and B.).[1]

Capsicum Fruit.

Natural Order.—Solanaceæ.

Description.—The dried ripe fruit of *Capsicum Minimum*, Roxb. (Bentl. and Trim., *Med. Pl.*, vol. iii., plate 188), is from about ½ to ¾ inch long and ¼ inch in diameter. An inferior five-toothed calyx and long peduncle may be present. It is somewhat shrivelled, oblong-conical, obtuse, and composed of a smooth, shining, brittle, thin, translucent, leathery pericarp; dull orange-red in colour, enclosing about fifteen small, roundish or ovoid flat seeds, either free or attached to a thin red septum. The taste of both pericarp and seeds

[1] In the United States Pharmacopœia it is called Capsicum, and described as the fruit of *Capsicum fastigiatum*, Blume.

is intensely pungent, and the odour is peculiar and characteristic. There should be no more than 6 per cent. of ash after incineration.

Preparation.—Tinctura Capsici (24 grains to 1 fluid ounce).

Therapeutics.—Capsicum is a pungent stomachic, carminative, and stimulant, and is prescribed along with other tonics for debility, and also for increasing the appetite, and in cases of tympanitis to dispel flatulency.

Dose.—

Dog	½ to 2 grains.
Pig	1 to 5 ,,
Sheep	3 to 8 ,,
Horse	10 to 20 ,,
Ox	15 to 30 ,,

CARBO LIGNI (A. and B).

Wood Charcoal.

Description.—When wood is charred by exposure to a red heat, in the absence of air, wood charcoal is produced.

Wood charcoal occurs in black, brittle, porous, easily-powdered masses, without taste or smell. It is very light, free from gritty material, and has the form and texture of the wood from which it was prepared. When burned at a high temperature, with free access of air, it should leave no more than about 7½ per cent. of ash.

Therapeutics.—Charcoal is a deodorant and disinfectant. It absorbs and condenses many gases, as oxygen, ammonia, hydrogen sulphide, carbonic acid, and thus it is that it deprives foul emanations of their smell. It is not volatile, and thus it is not so valuable as sulphurous acid or chlorine as a disinfectant and deodorant. In the form of a poultice, or as a powder, it is useful in promoting a more healthy action in foul ulcers and unhealthy discharging surfaces.

When taken internally, charcoal absorbs gases in the stomach and checks fermentation, and thus it acts as a carminative in flatulence and dyspepsia. In the intestines likewise it absorbs gases, and, diminishing peristaltic action, is sometimes prescribed in diarrhœa. Charcoal, not being absorbed, has no specific action on the constitution. Animal charcoal is used as an antidote in cases of poisoning by opium, nux vomica, and aconite, with the alkaloids of which it combines, rendering them inert. In order to be effectual, it must be administered before the poison has had time to be absorbed. It has also been given in cases of poisoning by arsenic and hydrocyanic acid.

Dose of Wood Charcoal:

Dog	15 to 60 grains.
Man and Pig	60 to 100 ,,
Sheep	1 to 3 drachms.
Horse	3 to 10 ,,
Ox	4 to 12 ,,

CARBONIS BISULPHIDUM (A. and B.).[1]

Bisulphide of Carbon.

Synonym.—Disulphide of Carbon.

Mode of Preparation.—Bisulphide of Carbon, CS_2, results from the combination of its two elements, carbon and sulphur, at a high temperature, and must afterwards be condensed and purified.

Characteristics.—It is a clear liquid, highly refractive and without colour, but with a powerful odour, and a specific gravity of 1·2685, and a boiling-point of 46·5° C. Its solubility in water is very slight, but it is soluble in alcohol, ether, chloroform, and the fixed and volatile oils. At the ordinary temperature it quickly evaporates, and it is very inflammable, burning with a blue flame to form carbonic and sulphurous anhydrides.

Tests.—Its freedom from acidity should be proved by the fact of it not altering the colour of blue litmus solution or moistened litmus-paper. If allowed to evaporate in a glass vessel, no residue of sulphur or other substance should be left. If solution of acetate of lead be added, and the mixture shaken, there should be no blackening, which would be produced if sulphide of hydrogen were present.

Use.—Sometimes used as a solvent.

CARDAMOMI SEMINA (A. and B.).[2]

Cardamom Seeds.

Natural Order.—Zingiberaceæ.

Description.—Cardamom seeds are the dried ripe seeds of the Malabar Cardamom, *Elettaria Cardamomum*.[3] It is best to keep the seeds in their pericarps until they are required for use, when the pericarps must be rejected. The seeds, enclosed in a thin covering or aril, are about $\frac{1}{8}$ inch in length, breadth, and thickness, irregularly angular, transversely wrinkled, dark reddish-brown externally, whitish within. The odour is aromatic, and the taste warm and very aromatic. No more than 4 per cent. of ash should be yielded. The pericarps in which the seeds are enclosed vary from about $\frac{3}{8}$ inch long, and from about $\frac{1}{8}$ to $\frac{3}{8}$ inch broad. They are ovoid or

[1] In the United States Pharmacopœia it is called Carbonei Disulphidum, Carbon Disulphide. It should be preserved in well-stoppered bottles or in tin cans in a cool place, remote from lights or fire.

[2] In the United States Pharmacopœia it is called Cardamomum, Cardamom.

[3] The reference in British Pharmacopœia is Maton (B. and T., *Med. Pl.*, vol. iv., plate 267).

oblong, obtusely triangular, shortly beaked at the apex, rounded at the base, brownish-yellow, longitudinally striated, tasteless, and odourless.

Therapeutics.—Cardamoms are rarely given in veterinary practice. They have a carminative action allied to that of the peppers, and may be administered in the same doses as aniseeds, coriander, and fenugreek. The tincture is a convenient form in which to prescribe them in dogs.

Dose of Powdered Seeds :

Dog	5 to 20 grains.
Pig	10 to 60 ,,
Horse	2 to 5 drachms.

CARYOPHYLLUM (A. and B.).[1]

Clove.

Natural Order.—Myrtaceæ.

Description.—Cloves are the dried flower-buds of *Eugenia caryophyllata*.[2] They are about $\frac{5}{8}$ inch long, and consist of a dark-brown, wrinkled, sub-cylindrical, and somewhat angular calyx-tube, which tapers below, and is surmounted by four thick teeth, between which the four paler imbricated petals, enclosing the numerous stamens and style, are rolled up in the form of a ball. The odour is strong, fragrant, and spicy. The taste is very pungent and aromatic. Cloves contain *caryophylline*, and when indented with the nail emit oil. No more than 7 per cent. of ash should be yielded, when incinerated.

Therapeutics.—Oil of cloves is one of the aromatic volatile oils, and resembles turpentine in its action. It has stomachic, carminative, stimulant, anti-spasmodic and corrective properties.

In veterinary practice it is sometimes given with purgatives to prevent griping. Likewise it is given in colic in horses.

Dose of Powdered Cloves :

Dog	5 to 20 grains.
Pig	10 to 60 ,,
Horse	2 to 5 drachms.

Dose of Oil of Cloves :

Man and Dog	$\frac{1}{2}$ to 3 minims.
Pig	2 to 8 ,,
Horse	$\frac{1}{4}$ to 1 fluid drachm.

[1] In the United States Pharmacopœia it is called Caryophyllus, Cloves.

[2] Thunb. (B. and T., *Med. Pl.*, vol. ii., plate 112); or (United States Pharmacopœia) *Eugenia Aromatica* (Linné), O. Kuntze.

CASCARA SAGRADA.[1]

Synonyms.—Rhamni Purshiani Cortex; Sacred Bark.

Description.—The dried bark of *Rhamnus Purshianus*, D.C. (Sargent, *Silva*, vol. ii., plate 62), is supplied in the form of quilled, channelled, or nearly flat pieces, about 4 inches long, $\frac{3}{4}$ inch wide, and about $\frac{1}{16}$ inch thick. It has a smooth, purplish-brown cork, generally covered with patches of silvery lichen, which, when removed, leave a brownish-red hue. The inner surface is reddish, with faint transverse corrugations, and longitudinal striæ. It breaks off short, and the inner part of the fractured surface is fibrous. The bark has a peculiar odour, and very bitter taste.

Therapeutics.—Small doses are tonic, large doses aperient, larger cathartic and irritant. It is best to give a dose of about 10 or 15 minims of the liquid extract thrice daily, before meals, to men and dogs, if it be preferred to other aperients; but it is very bitter, and may also cause irritation, or even inflammation, if freely used.

CASCARILLA (A. and B.)

Natural Order.—Euphorbiaceæ.

Description.—The dried bark of *Croton Eluteria*[2] exists in quills, from 1 to 3 or more inches in length, and from $\frac{1}{6}$ to $\frac{1}{2}$ inch in diameter, or in small curved pieces.

The bark is covered with a dull brown, easily separable, corky layer, which is more or less coated with a silvery or grayish-white patch of lichen spotted with very small black dots. If this outer layer be stripped off, a brown layer with longitudinal and transverse furrows is disclosed. The fracture is brown, short, and resinous. The taste is warm and bitter. The odour is agreeably aromatic, more especially when warmed.

Therapeutics.—Cascarilla is an aromatic bitter stomachic.

It is a useful adjunct to tonic remedies, prescribed for debility or in convalescence from disease. The powder may be used, or the tincture, or infusion. For dogs the tincture is a useful preparation.

Dose.—Cascarilla Powder:

Dog - - - - -	5 to 30 grains.
Pig - - - - -	10 to 50 ,,
Sheep - - - - -	20 to 60 ,,
Horse - - - - -	2 to 5 drachms.
Ox - - - - -	4 to 8 ,,

[1] In the United States Pharmacopœia it is called Rhamnus Purshiana De Candolle (Nat. Ord., Rhamnaceæ).

[2] The reference is Croton Eluteria, J. J. Bennett (B. and T., *Med. Pl.*, vol. iv., plate 238).

CASTANEA (A.)

Description.—Leaves of the Chestnut, *Castanea dentata* (Marshall), Sudworth (Nat. Ord., Cupuliferæ), collected in September or October whilst green. They are about 20 centimetres in length, about 5 centimetres in width, petiolate, oblong, lanceolate, acuminate, mucronate, feather-veined, serrate, smooth. They have a slight smell and an astringent taste.

Preparation.—Extractum Castaneæ Fluidum, the dose of which for man is ½ to 1 fluid drachm.

Use.—For whooping-cough; but of doubtful value.

CATAPLASMA BELLADONNÆ.

Belladonna Poultice.

Mode of Preparation.—Mix with about 1,000 c.c. of boiling distilled water about 50 grammes extract of belladonna and about 500 grammes linseed meal.

CATAPLASMA CARBONIS.

Charcoal Poultice.

Mode of Preparation.—Take of

Wood Charcoal in powder -	½ ounce.
Linseed Meal - - -	3½ ounces.
Boiling Water - - -	10 fluid ounces.

Add the linseed meal to the boiling water. Stir well and then add half the charcoal, and finally sprinkle the rest of the charcoal on the surface of the poultice.

CATAPLASMA FURFURIS.

Bran Poultice.

Mode of Preparation.—Take of

Bran - - - - -	3 parts.
Linseed Meal - - -	1 part.
Boiling Water - - -	a sufficient quantity.

Mix the meal and the bran well together, and then add the boiling water, constantly and thoroughly stirring it.

Use.—Bran poultice causes slight relaxation of the vessels of the part to which it is applied, thereby allaying pain and inflammation.

CATAPLASMA LINI.

Linseed Poultice.

Mode of Preparation.—Take of

Linseed Meal - - -	2 parts.
Boiling Water - - -	5 fluid parts.

Gradually stir the two together, taking care that they are thoroughly mixed.

CATAPLASMA SINAPIS.

Mode of Preparation.—Take of

Mustard in powder - - -	2½ ounces.
Linseed Meal - - -	2½ ,,
Boiling Water Water - - -	of each a sufficient quantity.

Mix the mustard with 3 ounces of lukewarm water, and the linseed with about 7 ounces of boiling water. Mix and stir thoroughly. Boiling water, if added to mustard directly, would prevent the formation of the vesicating substance, sulphocyanide of allyl.

CATAPLASMA SODÆ CHLORINATÆ.

Chlorine Poultice.

Mode of Preparation.—Take of

Solution of Chlorinated Soda	1 fluid part.
Linseed Meal - - -	2 parts.
Boiling Water - - -	4 fluid parts.

Mix the linseed meal gradually with the boiling water, and add the solution of chlorinated soda, constantly stirring.

CATECHU (A. and B.).

Natural Order.—Cinchonaceæ.

Description.—Catechu is an extract of the leaves and young shoots of *Uncaria Gambier*, Roxb. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 139). It occurs in cubes or masses which vary in size, and are formed of more or less agglutinated cubes. The separate cubes are in extent about 1 cubic inch, deep reddish-

brown externally, pale cinnamon-brown internally, dry, breaking readily, with a dull, earthy fracture. The microscope reveals myriads of very small acicular crystals. The taste is at first bitter and very astringent, but subsequently sweetish. There is no odour. Catechu is nearly entirely soluble in boiling water, and about 70 per cent. should be soluble in alcohol (90 per cent.). The decoction, when cool, should not be rendered blue by iodine. No more than 5 per cent. of ash should be yielded.

Therapeutics.—Catechu has a very similar action to tannic acid, and it is prescribed internally for the same disorders. In diarrhœa it is especially useful, being usually combined with opium and ginger and chalk, or carbonate of magnesium.

Catechu is very seldom employed for external purposes, but is sometimes applied as an astringent to ulcers slow in healing.

Dose.—

Man and Dog	5 to 15 grains.
Pig	10 to 50 ,,
Calves	30 to 60 ,,
Sheep	40 to 90 ,,
Horse	1 to 3 drachms.
Ox	2 to 5 ,,

CAULOPHYLLUM (A.).

Caulophyllum.

Description.—The rhizome and roots of Blue Cohosh, *Caulophyllum thalictroides* (Linné), Michaux (Nat. Ord., Berberidaceæ). The rhizome has a horizontal growth, is about 10 centimetres in length, and about 8 millimetres thick, and is bent. On the upper surface are broad concave stem-scars and short, knotty branches. On the surface it is grayish-brown, whilst internally it is white, tough, and woody. The roots are numerous, tough, and matted, about 10 centimetres in length and 1 millimetre thick. There is no smell, but the taste is sweet, bitter, and acrid.

Composition.—Contains, like Senega and Quillaia and Sarsaparilla, the glucoside *Saponin*, and resins. Saponin seems to be identical with cyclamin, from *Cyclamen europæum*, and also with primulin from *Primula officinalis*. Digitonin from Digitalis seems to be a slightly different kind of saponin.

Uses.—Diuretic, antispasmodic, and emmenagogue.

Dose.—*Man* - - - - 1 to 5 grains in infusion.

CERA FLAVA (A. and B.).

Yellow Wax.

Description.—Yellow wax is prepared from the honey-comb of the hive bee, *Apis mellifica*, Linné (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table xxiv. Class, Insecta; Order, Hymenoptera). It has a smell like that of honey, is

firm, and breaks with a granular fracture, and is not unctuous to the touch. It should be readily and entirely soluble in hot oil of turpentine, and should not yield more than 3 per cent. to cold alcohol (90 per cent.), nor more than 50 per cent. to cold ether, and nothing to water or to a boiling solution of hydroxide of sodium, and these two last fluids, after being mixed with yellow wax and then filtered, should neither be turbid nor give a precipitate with hydrochloric acid, proving the absence of fatty acids, resin, and Japan wax. The specific gravity is about 0·965, and it melts at 63·2° C. In order to prove this, liquefy a few grains, and draw up a little of the fluid into a capillary tube. Fix a piece of the filled capillary tube to the bulb of a thermometer by thread, and then immerse the bulb and tube in a beaker of water and heat the water gently. At the moment when the opaque wax becomes transparent, note the temperature as indicated by the attached thermometer. The solidifying point is about 2½ degrees lower than the melting point. If 5 grammes beeswax be heated for fifteen minutes with 25 grammes sulphuric acid to 160° C., and water be added, no solid wax-like body (paraffin) should be separated. Boiling water in which yellow wax has been agitated should not when cooled be rendered blue by iodine, showing absence of starch.

Therapeutics.—Wax is used to increase the consistence of ointments. One part of yellow wax to 4 of benzoated lard, or to 2 or 3 parts of oil, according to the temperature of the air, will make an ointment of suitable consistency. Wax is rarely administered internally, but has been given to allay irritability in diarrhœa.

CETACEUM (A. and B.).

Spermaceti.

Description.—Spermaceti is a concrete fatty substance, which, mixed with oil, is obtained from the head of the Sperm Whale, *Physeter macrocephalus*, Linné (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table ix., Fig. 3. Class, Mammalia; Order, Cetacea). It is separated from the oil by filtration and pressure, and is afterwards purified. Spermaceti occurs in crystalline, pearly-white, glistening, translucent masses, having little taste or odour, and can be reduced to powder by the addition of a little rectified spirit. It is insoluble in water, and almost so in cold alcohol (90 per cent.), but soluble in ether, chloroform, or boiling alcohol (90 per cent.), and in fixed and volatile oils. It is slightly unctuous to the touch. The melting-point is about 48° C., and it can be tested as described in the case of yellow wax.

Test.—If it be boiled with alcohol (90 per cent.), and the mixture be cooled and filtered, the filtrate should not, if water be added, give a flocculent precipitate of stearic acid.

Therapeutics.—Spermaceti is used in the preparation of plasters and ointments.

CHELIDONIUM (A.).

Description.—The entire plant Celandine, *Chelidonium majus*, Linné (Nat. Ord., Papaveraceæ). Root is reddish-brown, has several heads, and is branching. The stem is about 50 centimetres in length, light green, and

hairy. The leaves are about 15 centimetres in length, thin, petiolate, the upper ones smaller and sessile. The flowers are in small, long-peduncled umbels, with two sepals and four yellow petals. The capsule has two valves and many seeds, and is linear. The fresh plant has a saffron-coloured milky juice, a disagreeable odour, and acrid taste.

Composition.—Contains two alkaloids, chelidonine and chelerythrine (probably identical with sanguinarine).

Action.—Chelidonine has a bitter taste, but little action. Chelerythrine does not cause tetanus, but paralysis and loss of reflex action.

Uses.—Fresh juice destroys corns and warts and lessens itching. In large doses internally it causes violent purging. Used in jaundice and as a tonic in phthisis and scrofula.

Dose.—*Man* - - - - - - - - 10 to 30 grains.

CHENOPODIUM (A.).

Description.—The fruit of American Wormseed, *Chenopodium Ambrosioides*, Linné, and variety *Anthelminticum*, Gray (Nat. Ord., Chenopodiaceæ). It is nearly 2 millimetres in diameter, of a depressed globular shape, glandular, of dull green or brown hue, with friable covering, and it contains a lenticular, obtusely-edged, glossy black seed. It has a turpentine-like smell and bitter, pungent taste.

Preparation.—Oleum Chenopodii, a volatile oil distilled from Chenopodium.

Use in Man.—To expel lumbricoid worms. If the powdered seeds are used, they should be mixed with an elixir. The oil can be given on a lump of sugar or in emulsion, about 3 to 5 minims being used.

Dose.—*Man* - - - - - - - - 10 to 40 grains.

CHIMAPHILA (A.).

Description.—The leaves of Pipsissewa, *Chimaphila umbellata* (Linné), Nuttall (Nat. Ord., Ericaceæ), are about 5 centimetres in length, oblanceolate, sharply serrate above, wedge-shaped near the base, coriaceous, smooth, and dark green on the upper surface, devoid of odour, but with an astringent and bitter taste.

Preparation.—Extractum Chimaphilæ Fluidum (dose for man, 1 fluid drachm).

Composition.—Contains tannin and several neutral principles.

Action.—Astringent and diuretic.

Use.—In urinary disorders and rheumatic pains.

Dose.—*Man* - - - - - - - - ½ to 1 drachm.

CHIRATA (A. and B.).

Chiretta.

Natural Order.—Gentianaceæ.

Description.—The entire dried plant, *Swertia Chirata*,

Hamilton (B. and T., *Med. Pl.*, vol. iii., plate 183), collected in Northern India when flowering.

The *root* is about 2½ inches long, and usually unbranched.

The *stem* is 3 feet or more long, rounded below, and above slightly quadrangular, branched dichotomously, smooth, and orange-brown or purplish. Except at the lower part, the stem consists of a thin woody ring, enclosing a large and continuous and easily separable yellow pith.

The *branches* are slender, long, and decussate.

The *leaves* are opposite, glabrous, entire ovate, with three to seven ribs.

The *flowers* are small, numerous, and panicled.

The *fruits* are superior, bicarpellary, and unilocular.

Chiretta has no odour, but every part of the plant has a very bitter taste.

Therapeutics.—Chiretta is an aromatic bitter, having properties similar to those of gentian. Of the tincture and infusion the doses are the same as of those of gentian.

Doses.—Infusion:

Dog - - -	½ to 1 fluid ounce.
Pig - - -	1 to 1½ fluid ounces.
Horse - - -	5 to 8 ,,

Tincture:

Dog - - -	½ to 1 drachm.
Pig - - -	1 to 2 drachms.
Horse - - -	4 to 12 ,,

CHLORALIS HYDRAS (A.[1] and B.).

Hydrate of Chloral.

Mode of Preparation.—Chloral Hydrate, or, according to the United States Pharmacopœia, Trichloraldehyde or Chloral with one molecule of water, $C_2HCl_3O + H_2O$, or according to the British Pharmacopœia trichlorethylidene glycol, $CCl_3{\cdot}CH{\cdot}(OH)_2$, is prepared from chloral, an oily liquid produced by the action of dry chlorine gas on ethylic alcohol.[2] It is purified by means of distillation, first from sulphuric acid, and afterwards from a small

[1] Called Chloral in the United States Pharmacopœia.

[2] The reaction may be thus represented:

$$C_2H_6O + 4Cl_2 = 5HCl + C_2HCl_3O.$$

quantity of lime. It is finally converted into hydrate of chloral by the addition of water, and should be kept in a cool, dark place.

Characters.—Hydrate of chloral exists in the form of whitish or colourless monoclinic crystalline plates, which do not deliquesce on exposure to air. It has a pungent but not an acrid odour and a bitter taste. If heated gently, it fuses, forming a colourless transparent liquid, which, as it cools, begins to solidify at about 48·9° C. When introduced into a test-tube together with pieces of broken glass, hydrate of chloral boils at about 95·5° C., and at a slightly higher temperature it volatilizes on platinum foil without residue. It is soluble in less than its own weight of distilled water, alcohol (90 per cent.), or ether, and in four times its weight of chloroform.

Tests.—An aqueous solution is neutral, or but slightly acid to test-paper. If alkalis be added, chloroform is set free.

A solution in chloroform, when agitated with sulphuric acid, does not become coloured (absence of certain organic impurities). An aqueous solution should not yield a precipitate with solution of nitrate of silver (absence of free chlorides).

Action.—When administered in medium doses chloral hydrate causes sleep. This is said to be partly owing to its direct action on the nervous structure of the brain, and partly to the anæmia which soon succeeds the temporary congestion induced in this organ. Our own opinion leads us to attribute the soporific effects of chloral more especially to the former of the two above causes, and rather also to congestion of the central organ of the nervous system than to anæmia, since in cases where small animals have been killed after several rather large doses of chloral the cerebral structures appeared rather congested than anæmic. Large doses of chloral induce profound sleep, which passes into coma. The number of the pulse-beats is reduced by this drug, or they are rendered very weak and rapid, and the temperature of the animal falls.

At first the pupils contract and afterwards dilate. It is, however, not always possible to detect any contraction, when the drug is administered in medicinal doses.

Chloral hydrate induces great muscular relaxation, and after poisonous doses the animal dies from arrest of respiration or paralysis of the heart. Some physiologists maintain that chloral produces hyperæsthesia, but this is denied by others. In large doses, at any rate, anæsthesia is caused. The paralysis and loss

of reflex action seem to be due to the direct action of the agent upon the spinal cord, for the motor nerves and muscles themselves are not affected by it. Moreover, in a chloralized animal direct irritation of the spinal cord produces less active contraction than in animals not under the influence of chloral.

The blood-pressure is markedly lowered by large doses of chloral; the heart is weakened, and by poisonous doses is arrested in diastole. The frequency of the breathing is diminished, owing to the action of the drug on the respiratory centre in the medulla oblongata.

Uses.—Being a powerful hypnotic, chloral hydrate is administered to soothe the cerebral hemispheres, allay excitement and irritability, and induce sleep. It is administered in a large variety of diseases among animals—*e.g.*, nervous spasmodic affections, such as chorea and epilepsy, in asthma and paroxysmal coughing, bronchitis, and spasmodic colic. In tetanus in horses it alleviates the spasms, and thus acts as a valuable adjuvant in the treatment of this dread malady, its beneficial action being much enhanced by giving nicotine or tobacco at the same time. It is given in the treatment of tetanus as a hypodermic injection or by the mouth. In puerperal convulsions, in parturient apoplexy, encephalitis, and hydrophobia, it is administered with benefit, and is recommended by Dun in muco-enteritis of cart-horses. As an antidote to strychnine-poisoning, chloral hydrate is the most efficacious of remedies. It is also antidotic to physostigmine.

Externally, chloral allays irritability of the skin. One part in twelve of water may be used for this purpose.

Dose.—

Man	5 to 20 grains.
Dog	5 to 25 ,,
Pig	15 to 60 ,,
Sheep	20 to 90 ,,
Horse	2 to 5 drachms.
Ox	2 to 8 ,,

When administered hypodermically, half of the above doses will suffice.

CHLOROFORMUM (A. and B.).

Chloroform.

Mode of Preparation. — Chloroform is a liquid composed of trichloromethane, $CHCl_3$, with enough absolute alcohol to yield a fluid with specific gravity not less than 1·49, and not higher than 1·495. It is prepared by distilling alcohol with chlorinated lime and slaked lime, washing the distillate with sulphuric acid, and redistilling from slaked lime and chloride of calcium. The alcohol probably first becomes reduced to aldehyde. From the aldehyde, chloral is formed, and this is broken up by the caustic lime into formate of calcium and chloroform.

Characteristics.—Chloroform is a limpid, colourless liquid, boiling at 61° C., of an agreeable ethereal odour, and sweet taste. It dissolves in alcohol and ether in all proportions, and in water to the extent of 1 volume to 200. The specific gravity is 1·4925. It should not be coloured by agitation with sulphuric acid, and after evaporation should leave no residue and no unpleasant odour.

If 20 c.c. be poured on a large piece of filter-paper laid on a warm plate, the chloroform should evaporate without giving any odour other than its own. (1) If 40 c.c. of water and 20 c.c. chloroform be shaken together, and the latter be then allowed to subside, and the former be poured into another test-tube, it should have no action on litmus, should not yield any colour with 1 c.c. solution of iodide of cadmium, and 0·2 c.c. mucilage of starch (no free chlorine present), and another portion should yield no more than a slight trace of chloride of silver with 0·4 c.c. solution of argentic nitrate. (2) Again, if 10 c.c. sulphuric acid be shaken with 100 c.c. chloroform for twenty minutes, and left for fifteen minutes, both the acid and the chloroform should be transparent and almost devoid of colour. If, then, 2 c.c. be taken from the sulphuric acid and 5 c.c. water added, it should still be transparent and almost colourless, but possess an agreeable smell. (3) If further diluted with 10 c.c. of water, and stirred with a glass rod, it should retain those same qualities, and if 0·4 c.c. solution of silver nitrate be added, there should only be a slightly diminished transparency. (4) Again, if 50 c.c. water be shaken with 25 c.c. chloroform previously treated with sulphuric acid as

above described, it should only produce a slight diminution of transparency with solution of nitrate of silver. The above four tests prove that the products of the decomposition of chloroform are not present. There is no residue on evaporation.

Therapeutics.—When applied externally, chloroform has a local anæsthetic effect, depressing the terminations of the sensory nerves, and causing a sense of coldness. It thus reduces sensibility and allays pain.

As a general anæsthetic, chloroform, administered in the form of vapour mixed with air, is, *par excellence*, the agent to be employed for inducing insensibility in horses. For dogs and cats it is not so suitable, as, even when care is taken in its administration, a fatal result has sometimes followed its inhalation. A mixture of 1 part of chloroform and two of ether is best for these animals, and may be employed with safety when the necessary precautions are taken.

Chloroform, when administered by inhalation, at first powerfully stimulates the nervous system. The cerebral hemispheres are first aroused, and the muscular centres are likewise excited, and severe struggles are often made. The medulla oblongata is then acted upon, the circulatory and respiratory centres in the floor of the fourth ventricle being stimulated. The number of the pulse and of the respirations is increased, and the blood-pressure is augmented. Then follows the stage of depression. Sensation is lost, pain is not felt, the function of the above-mentioned structures being to a great extent in abeyance. Reflex excitability is first diminished, and then lost. The number of the pulse falls, and the beats lose force, while the respiratory movements become slower and stertorous. When administered carefully, there is scarcely any risk attending the inhalation of chloroform in healthy horses. It is necessary, however, to feel the pulse at regular intervals, owing to the effect the agent has in reducing the blood-pressure. Mr. D. Gresswell used chloroform for many years in almost all serious operations on the horse, and never recorded ill effects attending or following its administration. From 2 to 4 ounces of chloroform is generally effectual in producing anæsthesia in horses and cattle. For horses, 2 ounces of the agent may be poured in the nosebag, which may then be adjusted. An amount of 1 ounce, followed by ½ ounce doses, may then be added at intervals, as may be necessary. In some cases it is found that 6 ounces are not too much to render

anæsthesia complete. In the dog and cat it is best not to allow food for three or four hours prior to administering chloroform. It is best given to the smaller animals on a piece of lint or sponge held near the nostrils. If chloroform be given after the second stage, or stage of depression terminating in complete anæsthesia, there is great danger of death from loss of all reflex excitability of the cord and medulla. The respiratory centre loses its irritability, and breathing ceases, while, from failure of the cardiac centre, the heart stops in diastole, and the blood-pressure falls. Death results either from failure of the heart or respiratory mechanism, or both. It is in the second stage, which is generally induced in four or five minutes, that the operator performs his work. There is no danger in maintaining this condition for an hour to an hour and a half, provided that due supervision be not neglected. If the pulse shows any sign of failing, or the breathing becomes slow or shallow, the administration of the drug should be suspended. Cold water should be dashed upon the head, the tongue drawn forward out of the mouth, and artificial respiration must be resorted to. The hypodermic injection of strychnine is also needful in severe cases.

Besides being used for causing anæsthesia for painful operations in animals, chloroform is advised in the case of malpresentations in the mare. Similarly in bitches, cows, and ewes, this agent has been inhaled to relax the rigid os uteri (Dun). In the reduction of hernia it is likewise sometimes indicated.

Chloroform, when administered by the mouth, acts as a carminative in dispelling flatulence and easing pain in dyspepsia and colic, and is frequently given in a small dose as an antispasmodic and sedative. It has also some power as an antiseptic in arresting the development of fungoid growths in vegetable infusions. For epilepsy and chorea in dogs, it may be given by the mouth, or may be inhaled. In enteritis and peritonitis it is given in horses to ease the acute agony. In these maladies it is, perhaps, best given by the mouth, and may be advantageously combined with opium or tincture of aconite. In acute rheumatism, asthma, and spasmodic coughing, it likewise is often given with benefit. In cases of spasmodic colic in the horse, a draught of 1 drachm of chloroform and 1½ ounces of laudanum, with 1 ounce of tincture of pimento, is a useful mixture.

As an external application, the drug is not largely used, cocaine, eucaine, ether, and other substances being more efficacious as

local anæsthetics. When applied locally with extract of belladonna, or aconite, or opium, or other anodyne, chloroform may be, however, useful in abating local pains of a neuralgic or rheumatic character.

Dose.—By inhalation as a general anæsthetic:

Dog	2 to 6	fluid drachms.
Pig	½ to 1½	fluid ounces.
Sheep	½ to 2	,, ,,
Horse	3 to 6	,, ,,
Ox	3 to 7	,, ,,

As an internal remedy:

Man, *Dog*	1 to 5	minims.
Pig	4 to 20	,,
Sheep	7 to 30	,,
Horse	1 to 1½	fluid drachms.
Ox	1 to 2	,, ,,

CHONDRUS (A.).

Description.—Irish Moss, or Carragheen, *Chondrus Crispus*, Stackhouse, and *Gigartina mamillosa*, J. Agardh (Class, Algæ). It is yellowish or white, horny, translucent, and many times forked. When softened in water, it becomes cartilaginous. Segments vary in shape, and may be wedge-shaped or linear; at the apex emarginate or two-lobed. It has a seaweed odour and a mucilaginous, saline taste. If 1 part be boiled for ten minutes with 30 parts of water, a solution results which gelatinizes when cool, and is not made blue by addition of iodine, proving the absence of starch.

Use.—In bronchial and catarrhal conditions as a demulcent.

Dose.—*Man* - - - - - - - 2 to 4 drachms.

CHRYSAROBINUM (A. and B.).

Chrysarobin.

Synonyms.—Araroba or Goa Powder.

Natural Order.—Leguminosæ.

Mode of Preparation.—It is a substance (medullary matter) met with in cavities of the trunk and branches of the tree *Audira Araroba*, Aginar (Nat. Ord., Leguminosæ). The crude material is a brownish powder, and should be freed from particles of wood, extracting with hot chloroform, filtering, evaporating to

dryness, and powdering. It is chiefly a definite chemical body known as chrysarobin, but also contains a variable amount of chrysophanic acid.

Characteristics.—When purified by solvents, it is a yellow, minutely crystalline powder devoid of smell and taste. It is totally soluble in hot chloroform, almost completely in hot alcohol (90 per cent.), partly soluble in petroleum spirit, but only to a small extent in water; partly soluble also in solution of potassium hydroxide, forming a brownish-red solution, which is fluorescent, and becomes carmine-coloured by absorption of oxygen from the air. It is also soluble in sulphuric acid, forming a yellowish-red solution. If heated in air, it melts, gives off yellow fumes which sublime, and on ignition should leave only 1 per cent. of ash.

Actions and Uses.—Chrysarobin, which is prepared from Araroba, stimulates the skin, and destroys vegetable organisms which may be growing on it, staining the latter purplish, and used in the form of ointment it is very efficacious in some forms of ringworm, and in scaly diseases such as psoriasis and pityriasis. It is excreted by the kidneys, causing the urine to be yellow. When used over a large surface, or in too great quantity, it may cause vomiting, purging, and fever.

CINCHONÆ RUBRÆ CORTEX (A.[1] and B.).

Red Cinchona Bark.

Description.—Red cinchona bark is the dried bark of the stem and branches of cultivated plants of *Cinchona succirubra*, Pavon (Nat. Ord., Rubiaceæ. B. and T., *Med. Pl.*, vol. ii., plate 142). It exists in quills or more or less incurved pieces, coated with what is called the periderm. These may be a few inches or more than a foot in length. The bark is from about $\frac{1}{10}$ to $\frac{1}{4}$ inch thick, or rarely more. The outer surface is more or less rough from longitudinal furrows and ridges, or transverse cracks, annular fissures, and warts. It is reddish-brown, or brownish in colour. The inner surface is brick-red or deep reddish-brown, irregularly and coarsely striated. The fracture is rather close and fibrous in the smaller quills, and finely fibrous in the larger ones. When the bark is pulverized, the powder is

[1] Called in the United States Pharmacopœia Cinchona Rubra, Red Cinchona.

brownish or reddish-brown. There is no marked odour. The taste is bitter and slightly astringent. The bark should yield about $5\frac{1}{2}$ per cent. of alkaloids in all, of which not less than half should consist of quinine and cinchonidine.

Therapeutics.—The physiological action of the cinchona barks will be discussed under quinine, the most important alkaloid. Cinchona bark, owing to its being much cheaper than its alkaloidal salts, is more extensively employed in animal than human practice. It has tonic, antipyretic, antiperiodic, and antiseptic properties. In debility, anæmia, and during recovery from exhausting diseases, the powdered bark is largely given, and may advantageously be combined with small doses of diluted hydrochloric or diluted nitro-hydrochloric acid freely diluted with water. On account of its antipyretic property, the bark is given for reducing the temperature in fevers, but for this purpose one of its alkaloidal salts is usually preferred. When the temperature is very high, salicylate of sodium is often more suitable, as being more rapid in action. On account of its antiseptic properties, the bark is given to animals afflicted with strangles, scarlet fever, purpura hæmorrhagica, and pyæmia. On account of its antiperiodic action, it is given in ague, malarial fever, and recurrent ophthalmia of horses. For dogs the liquid extract of cinchona is an admirable preparation; but the sulphate of quinine is still better adapted, as cinchonine may cause vomiting in them. For chorea in dogs, the bark or its liquid extract, or the sulphate of quinine, is beneficial.

Dose.—

Dog - - -	15 grains to 1 drachm.
Pig - - -	$\frac{1}{2}$ to 2 drachms.
Sheep - - -	1 to $2\frac{1}{2}$,,
Horse - - -	2 to 5 ,,
Ox - - - -	$\frac{1}{2}$ to $1\frac{1}{2}$ ounces.

CINCHONIDINÆ SULPHAS (A.).

Sulphate of Cinchonidine.

Formula.—$(C_{20}H_{24}N_2O)_2.H_2SO_4.3H_2O$, or, according to the United States Pharmacopœia, $(C_{19}H_{22}N_2O)_2H_2SO_4+3H_2O$.

Mode of Preparation.—Sulphate of cinchonidine is the sulphate of an alkaloid, cinchonidine, existing in the bark of various species of Cinchona. The salt may be obtained from the mother-liquors of the crystallization of sulphate of quinine by further concentration, and purified by crystallization from alcohol, and finally from hot water.

Characters.—It exists in colourless silky crystals which are usually acicular. At 15° C. it is almost insoluble in ether, but soluble in 1,316 parts of chloroform, 70 parts of water, 66 of alcohol, 8 of boiling alcohol, 1·42 of boiling water, and the presence of sulphates of other cinchona alkaloids increases its solubility in ether and chloroform.

Tests.—An aqueous solution has a bitter taste and a neutral or faintly alkaline reaction, turns a ray of polarized light to the left, and when acidified is not distinctly fluorescent. Like all other sulphates, a solution of it gives a white precipitate with solution of chloride of barium, and also yields a white precipitate with solution of potassio-tartrate of sodium. Sulphate of cinchonidine dissolves in pure sulphuric acid to form a faintly yellow solution, which undergoes no apparent change when gently warmed. When the salt is ignited in the air, no ash remains.

Therapeutics.—Sulphate of cinchonidine may be given for the same maladies and in the same doses as sulphate of quinine, for which it is often substituted in treating animals.

Dose.—*Dog* - - - - - - 1 to 5 grains.
Pig - - - - - - 2 to 10 ,,
Horse - - - - - - 10 to 40 ,,

CINCHONINA (A.).

Cinchonine.

Formula.—$C_{19}H_{22}N_2O = 292{\cdot}05$.

Description.—Cinchonine is an alkaloid prepared from the bark of various species of Cinchona. It has the form of white lustrous prisms or needles, and is odourless, and, at first, nearly tasteless, soon gives a bitter after-taste, and is permanent in the air. It is soluble at 15° C. in 3,760 parts of water, and in 3,500 parts of boiling water, in 116 parts of alcohol, and in 26·5 parts of boiling alcohol, also in 526 parts of ether and 163 parts of chloroform.

If heated to 240° C. the crystals fuse together, melting at 258° C., to form a brown liquid. When ignited they consume, leaving no residue.

If placed on moist red litmus, it turns it blue. If it be dissolved in a diluted acid, and excess of solution of ammonia be added, cinchonine will be precipitated. A solution of cinchonine in diluted sulphuric acid (1 in 1,000) should not give more than a faint blue fluorescence (due to quinine or quinidine), and it should not cause more than a faint yellow hue to concentrated sulphuric acid (due to readily carbonizable organic impurities).

CINCHONINÆ SULPHAS (A.).

Sulphate of Cinchonine.

Formula.—$(C_{19}H_{22}N_2O)_2,H_2SO_4,2H_2O$. The difference between sulphate of cinchonidine and sulphate of cinchonine is that the former has 3 and the latter only 2 molecules of water.

Description.—Sulphate of cinchonine is the sulphate of an alkaloid contained in the bark of various species of Cinchona and Remijia.

Mode of Preparation.—The sulphate of cinchonine may be obtained from the mother-liquors of the crystallization of the sulphates of quinine, cinchonidine, and quinidine, by precipitating the alkaloid with caustic soda, washing with spirit until it is free from other alkaloids, dissolving in sulphuric acid, and, after purifying the solution with animal charcoal, allowing to crystallize.

Characters.—Sulphate of cinchonine exists in the form of hard, colourless, short prismatic crystals, possessing a vitreous lustre.

Tests.—At 15° C. it is nearly insoluble in ether and ammonia water, but soluble in 78 parts of chloroform, 66 of water, 13·59 of boiling water, 10 of alcohol, and in 3·25 of boiling alcohol, and readily in diluted acids. An aqueous solution has a bitter taste, a neutral or faintly alkaline reaction, and turns a ray of polarized light to the right. When acidified the solution is not fluorescent. Like all sulphates, it gives a white precipitate with chloride of barium. It is soluble in pure sulphuric acid without change of colour, and the solution undergoes no apparent alteration when gently warmed. When it has been ignited in air, no ash remains.

Therapeutics.—The sulphate of cinchonine is often substituted for quinine in veterinary practice. The medicinal properties and doses are the same. Being more nauseous, it is not suitable for dogs.

Dose.—*Pig* - - - - - - 4 to 12 grains.
Horse - - - - - - ½ to 1 drachm.

CINNAMOMI CORTEX (A.[1] and B.).

Cinnamon Bark.

Natural Order.—Lauraceæ.

Description.—Cinnamon bark is the dried inner bark of shoots from the truncated stocks of the cultivated cinnamon-tree, *Cinnamomum zeylanicum*, Breyn (B. and T., *Med. Pl.*, vol. iii., plate 224. Nat. Ord., Lauraceæ). It is imported from Ceylon, and hence known in commerce as Ceylon Cinnamon. Cinnamon bark occurs in closely-rolled quills, which are about ⅜ inch in diameter, and contain several smaller quills or pieces. It is thin, brittle, splintery, moderately pliable, dull light yellowish-brown on the outer surface, and marked by little scars or holes and faint shining wavy lines. Internally it is of a darker brown colour. The odour is fragrant, the taste warm, sweet, very agreeable, and aromatic. It is used to impart a fragrant and pleasant taste.

[1] The United States Pharmacopœia endorses three cinnamon plants—viz., *Cinnamomum cassia* (Chinese Cinnamon), Saigon Cinnamon, and also *Cinnamomum zeylanicum* (Ceylon Cinnamon), which last is the same as that of the British Pharmacopœia.

Tests.—A decoction when cool is not coloured by iodine.

Therapeutics.—Cinnamon has a similar action, and is used for the same purposes as other aromatics. It contains tannic acid, and is therefore also astringent.

Dose.—*Dog* - - - - 5 to 20 grains.
Pig - - - - 10 grains to 1 drachm.
Horse - - - - 1 to 3 drachms.

COCÆ FOLIA (A.[1] and B.).

Coca Leaves.

Natural Order.—Erythroxylaceæ.

Description.—The dried leaves of *Erythroxylum Coca*, Lamarck, and varieties (*Bot. Mag.*, plate 7,334; *Pharm. Jour.*, third series, vol. xxii., p. 818, plates). They are shortly stalked, oval, or lanceolate leaves, of varying thickness. Those imported from Bolivia are 1½ to 3 inches in length, and from 1 to 1½ inches in breadth, entire, usually blunt and emarginate, green above, somewhat paler beneath, and quite smooth. The midrib is prominent, and from it run numerous faint, freely anastomosing lateral veins. On each side of the midrib on the under surface a curved line extends from the base to the apex of the leaf. As a rule, the leaves sold are more or less broken, and frequently yellowish-green, yellowish-brown, or brown, and sometimes, though rarely, the curved lines are indistinguishable. There should be no signs of mildew. The odour is faintly tea-like, and is especially marked when the leaves are bruised. The taste is somewhat bitter and aromatic and then numbing. Peruvian leaves are smaller, narrower, and more fragile, pale green, and have not a marked ridge above the midrib on the upper surface, nor such distinct curved lines on both sides of it on the under surface.

Therapeutics.—An infusion of the leaves has been given in the convalescent stages of influenza in horses, and as a general tonic after debilitating diseases.

[1] Called Coca in the United States Pharmacopœia.

COCAINA (B.).

Cocaine.

Description.—Cocaine is an alkaloid having the formula $C_{17}H_{21}NO_4$, and is obtained from the leaves of *Erythroxylum Coca* and its varieties.

Characteristics.—It has the form of colourless monoclinic prisms. The taste is bitter, and a tingling and numb sensation ensues. It melts at about 97° C. It is insoluble in glycerin and nearly so in water, but soluble in ½ part of chloroform, 4 parts of ether, 10 parts of alcohol (90 per cent.), 12 parts of olive oil, and 14 parts of oil of turpentine.

Tests.—If to an aqueous solution a little hydrochloric acid be added, hydrochloride of cocaine is formed. If nitric acid be added to an aqueous solution, the absence of chlorides or sulphates should be capable of proof.

COCAINÆ HYDROCHLORIDUM (A.[1] and B.).

Hydrochloride of Cocaine.

Formula.—$C_{17}H_{21}NO_4,HCl$.

Description.—Hydrochloride of cocaine is the salt of an alkaloid obtained from the leaves of *Erythroxylum Coca* (Lam.) and its varieties.

Mode of Preparation.—To obtain it, ether is agitated with an aqueous solution of an acidulated aqueous extract, made alkaline with carbonate of sodium. The ethereal liquid is separated and evaporated, and the product is purified by treating it as before with acidulated water, carbonate of sodium, and ether; decolourizing, and finally neutralizing with hydrochloric acid, and recrystallizing.

Characters.—Hydrochloride of cocaine exists in the form of nearly colourless acicular crystals, or as a crystalline powder, melting at 183° C.

Tests.—It is readily soluble in half its weight of cold water, and four times its weight of alcohol (90 per cent.) or of glycerin. It is insoluble in olive oil and nearly so in ether. An aqueous solution is clear and colourless, neutral in reaction to litmus, has a bitter taste, gives a yellow precipitate with chloride of gold,

[1] Called in the United States Pharmacopœia Cocainæ Hydrochloras, as in former edition of the British Pharmacopœia.

and a white precipitate with carbonate of ammonium, soluble in excess of the reagent. When applied to the tongue, an aqueous solution produces a tingling sensation, followed by numbness. An aqueous solution likewise dilates the pupil of the eye. The salt dissolves in cold concentrated acids, forming solutions devoid of colour. On the other hand, strong sulphuric acid chars it, producing a pleasant smell and a crystalline sublimate, benzoic acid. The aqueous solution yields little or no cloudiness with chloride of barium or oxalate of ammonium.

With solution of chloride of gold it yields a yellow precipitate, a white one with solution of carbonate of ammonium or with borax; with solution of potassium hydroxide a white precipitate soluble in alcohol or ether; with solution of picric acid a yellow one, which after standing is crystalline; with test solution of perchloride of mercury, and a little hydrochloric acid, a white one soluble in hot water.

If a few drops of nitric acid be added, and the mixture be evaporated to dryness, and a drop of alcoholic solution of potassium hydroxide added, an odour resembling peppermint is to be detected. If to an aqueous solution of at least 1 per cent., excess of potassium permanganate solution be added, a copious red precipitate, not changing colour within an hour, is given, and this proves that cinnamyl cocaine and cocamine, or other substances derivable from cocaine, are not present.

If dried for twenty minutes at 97·8° C., it should lose no more than 1 per cent. of water, and if heated to redness in air, should burn without leaving a residue.

Therapeutics.—Coca leaves are very seldom used, but the salts of cocaine are of great value as local anæsthetics for producing insensibility in operations on the eyes and other parts. The physiological action of coca and its alkaloid is thus summed up by Dr. Bennet: (1) In small doses, not ending fatally, cocaine causes partial loss of sensibility; (2) in doses which are subsequently fatal it produces, prior to death, general loss of sensibility; (3) it destroys the excitability of the posterior columns of the cord, and paralyzes the entire system of the peripheral sensory nerves, but the anterior columns and the peripheral motor nerves remain intact; (4) it induces spontaneous convulsions, but, unlike those caused by strychnine, they are not excited by peripheral irritation owing to paralysis of the sensory nerves; (5) the nerve-endings in the skin and mucous membranes are rendered in-

excitable, apart from any action the drug has upon the nerve-centres. Cocaine is a mydriatic; it slightly raises the temperature and quickens the pulse and respiration. A few drops of a 2 to 4 per cent. solution, when placed upon the cornea, produce insensibility after the lapse of a few minutes. Similar effects are produced on the throat, ear, mouth, larynx, trachea, urethra, rectum, and tongue. Cut surfaces and open sores are similarly rendered not sensitive.

For the eye an aqueous solution of hydrochloride of cocaine of the strength of 2 to 4 per cent. of the alkaloid is employed, while a 4 to 20 per cent. solution may be used for other parts. Of the weak solutions it is necessary to repeat the application at intervals of three to five minutes or so. The effect begins in about three minutes, increases from ten to twenty minutes, and generally disappears within half an hour.

Siegmund Moritz says that the bitter taste of cocaine may be covered by saccharine, thereby preventing profuse salivation in intra-laryngeal and pharyngeal operations.

Eucaine *β* causes salivation because of dilatation of blood-vessels, and the anæsthesia does not last so long. Therefore it is not so good as cocaine, and it also causes more bleeding from the produced hyperæmia; but it is suitable for removal of single growths, or before the use of the galvano-cautery on the turbinated bones.

Cocaine diminishes the swelling of the mucous membrane temporarily, whilst eucaine increases it, and therefore makes it easier to get a snare round the part to be removed. Eucaine solutions keep well, and can be boiled, and thus sterilized, without decomposition. Anæsthesia caused either by cocaine or eucaine disappears in from three to ten minutes, and may even be followed by a period of hyperæsthesia.

For operations on the eyes of horses and dogs local anæsthetics are of immense value—*e.g.*, in entropium, ectropium, and pterygium, as well as in wounds of the eyelid. For extracting foreign bodies from the eye, they are of great service in men, in horses, and other animals, and cocaine or eucaine may be applied before puncturing the cornea for the *Filaria oculi*.

Dose.—*Man* - - - - $\frac{1}{5}$ to $\frac{1}{2}$ grain.
Dog - - - - $\frac{1}{8}$ to 1 ,,
Pig - - - - $\frac{1}{4}$ to 2 grains.
Horse - - - - 2 to 10 ,,

COCCUS (A. and B.).

Cochineal.

Class.—Insecta. **Order.**—Hemiptera.

Description.—The fecundated female insect [*Coccus*] *Cacti*, Linn. (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table xxvi.), reared on *Nopalea coccinellifera*, Salm-Dyck (*Mart. Fl. Bras.*, vol. iv., part ii., table lx.), and on other species of Nopalea, dried. The insect is about $\frac{1}{5}$ inch in length, somewhat oval in outline, flat or concave on its under, and convex on its upper, surface, transversely wrinkled, purplish-black or purplish-gray in colour, and easily reduced to a dark red or puce-coloured powder. When macerated in water no insoluble powder is separated. If ignited with free access of air, not much more than 6 per cent. of ash remains.

Use.—It is used for colouring.

CODEINA (A. and B.).

Codeine.

Description.—An alkaloid prepared from opium or morphine. Its formula is $C_{17}H_{18}(CH_3)NO_3,H_2O$; but the United States Pharmacopœia gives it as $C_{18}H_{21}NO_3 + H_2O$.

Characteristics and Tests.—Codeine has the form of nearly colourless trimetric crystals, is soluble in 80 parts of water or solution of ammonia, and easily in alcohol, chloroform, or in diluted acids, also in 30 parts of ether. An aqueous solution has an alkaline reaction and a bitter taste. It is also soluble in excess of sulphuric acid, yielding a solution devoid of colour, and if to a small amount of this solution 2 drops of ammonium molybdate solution, or of ferric chloride, or of potassium ferricyanide, be added, a blue colour is produced, and this turns red and then orange if a trace of diluted nitric acid be added.

If heated to redness in the air no ash is left.

If moistened with nitric acid the resulting liquid is yellow, but not red.

A 2 per cent. solution in water with a few drops of hydrochloric acid yields with potassium hydroxide, but not with ammonia, a white precipitate.

If to a saturated aqueous solution with a few drops of hydro-

chloric acid a little ferric chloride and potassium ferricyanide solutions be added, only a dull green gradually and no blue colour should be given, thus showing that morphine and other impurities are not present.

Uses.—It excites the cord more than morphine, and depresses the convolutions less, so that muscular tremors may supervene. Codeine in ½-grain doses, carefully and gradually increased until 20 grains or more may be taken daily, reduces the sugar in cases of diabetes. It is also used to relieve abdominal pains, and, as the syrup of codeine, to allay cough.

Dose.—

Dog	¼ to 1 grain.
Man	¼ to 2 grains.
Pig	2 to 6 ,,
Horse	10 to 40 ,,

CODEINÆ PHOSPHAS (B.).

Phosphate of Codeine.

Description and Formula.—The above is the phosphate of an alkaloid which is obtained from opium or from morphine. Its formula is thus: $(C_{17}H_{18}(CH_3)NO_3,H_3PO_4)_2,3H_2O$.

Characteristics.—Phosphate of codeine has the form of white crystals, having a slightly bitter taste, soluble in water, and much less markedly in alcohol.

Tests.—An aqueous solution (5 per cent.) has a feeble acid reaction, and if solution of hydroxide of potassium be added a whitish precipitate is produced, which, however, is not caused by solution of ammonia. It gives the ordinary tests for codeine and for phosphates. If dried at 100° C., it loses its 3 molecules of water of crystallization, and at a higher temperature is converted into a yellow-brown liquid. Chlorides and sulphates should be absent, and also morphine, which last, if present, imparts a blue colour to test solution of ferric chloride.

Dose.—*Man* ¼ to 2 grains.

COLCHICI CORMUS (A.[1] and B.).

Colchicum Corm.

Natural Order.—Melanthaceæ.

Description. — The fresh corm of the plant, *Colchicum autumnale*,[2] collected about the end of June or the beginning of July, and the same stripped of its coats, sliced transversely, and dried at a temperature not exceeding 65·5° C. The fresh corm is about 1½ inches long and 1 inch broad, somewhat conical, flattened on one side, when there is a new corm in process of development, and rounded on the other. It is covered with an outer thin brown membranous coat, and an inner reddish-yellow one. Internally the corm is white and solid, and when it is cut it yields a milky juice of a bitter taste and disagreeable odour. The dried slices are about $\frac{1}{10}$ or $\frac{1}{8}$ inch thick, yellowish at their circumference, indented on one side and convex on the other, so that the shape is reniform. The surfaces are firm, white, and amylaceous. The pieces break readily with a short fracture. The taste is bitter, but there is no odour.

Dose.—Powdered colchicum corm :

Man - - - -	2 to 5 grains.
Dog - - - -	2 to 6 ,,
Pig - - - -	5 to 10 ,,
Sheep - - -	10 to 20 ,,
Horse - - -	½ to 1½ drachms.
Ox - - - -	1 to 2 ,,

COLCHICI SEMINA.

Colchicum Seeds.

Natural Order.—Melanthaceæ.

Description.—The seeds of the plant *Colchicum autumnale*, collected when fully ripe—that is, generally about the end of July or beginning of August. The seeds, which should be carefully dried, are about the size of white mustard-seed—that is, about $\frac{1}{10}$ inch in diameter—subglobular in shape, slightly pitted, reddish-

[1] The United States Pharmacopœia name is Colchici Radix, Colchicum Root.

[2] The reference is Linn (B. and T., *Med. Pl.*, vol. iv., plate 288).

brown, somewhat rough, very hard and difficult to powder. They possess no odour, but have a bitter and acrid taste.

Therapeutics.—Colchicum is a gastro-intestinal irritant and cholagogue. Its active principle, colchicine, affects chiefly the central nervous system, large doses causing loss of sensibility and consciousness, and diminishing reflex excitability. The respiratory centre is depressed in activity, death occurring through asphyxia. The heart's action also is weakened. Perspiration is induced, and the kidneys become congested, the amount of urine being diminished, while the solid constituents are probably increased.

Colchicum in the form of tincture was given by Mr. D. Gresswell in lymphangitis in horses with great benefit. In chronic rheumatism and rheumatic affections it is also of value. In periodic ophthalmia of horses it is a remedy not to be despised.

Dose.—Powdered colchicum seeds or corm:

Dog	- - -	2 to 6	grains.
Pig	- - -	3 to 12	,,
Sheep	- - -	17 to 20	,,
Horse	- - -	½ to 1	drachm.
Ox	- - -	1 to 2	drachms.

Tincture of colchicum seeds (preferable to above):

Man	- - -	5 to 15	minims.
Dog	- - -	10 to 30	,,
Pig	- - -	½ to 1½	fluid drachms.
Horse	- - -	½ to 1	fluid ounce.

COLLODIUM (A. and B.).

Collodion.

Mode of Preparation.—Mix 360 c.c. of ether and 120 c.c. of alcohol (90 per cent.), and add 10 grammes of pyroxylin. Set the mixture aside for a few days, and if there is any sediment found, decant the clear solution. Preserve the collodion in a well-corked bottle.

Characters.—Collodion is a colourless, highly inflammable liquid of syrupy thickness. It possesses an ethereal odour, and it dries rapidly on exposure to the air, leaving a thin transparent film, which is insoluble in water or rectified spirit.

Preparation.—Collodium Flexile.

Uses.—Collodion is sometimes used to form a covering over slight wounds, causing their edges to adhere together. The ether evaporates, and after several applications with a brush the film becomes thick enough for the purpose.

COLLODIUM FLEXILE (A. and B.).

Flexible Collodion.

Mode of Preparation.—Mix together 480 c.c. of collodion, 20 grammes of Canada balsam, and 10 grammes of castor oil. Preserve the flexible collodion which is formed in a well-corked bottle.

Uses.—Flexible collodion gives a stronger support to wounds than the preceding preparation.

COLOCYNTHIDIS PULPA (A.[1] and B.).

Colocynth Pulp.

Natural Order.—Cucurbitaceæ.

Description.—Colocynth pulp consists of the dried peeled fruit, freed from seeds, of *Citrullus Colocynthis*, Schrad. (B. and T., *Med. Pl.*, vol. ii., plate 114). As imported, colocynth pulp usually presents the appearance of fragments of broken balls. It is whitish, very light, spongy, and tough. The broken-up pulp freed from seeds should alone be used. The pulp possesses no odour, but has an intensely bitter taste. When dried at 100° C. and burnt in air, it leaves at least 9 per cent. of ash (absence of seeds).

Test.—The powder should not be coloured blue by iodine. If it is treated with ether and then the ether is evaporated, only a trace of fixed oil should be left.

Therapeutics.—Colocynth acts as a hydragogue purgative.

Dose of Colocynth Pulp:

Dog	- - - -	2 to 10 grains.
Pig	- - - -	4 to 15 ,,
Horse	- - - -	½ to 1½ drachms.

CONFECTIO ROSÆ GALLICÆ (B.).[2]

Confection of Roses.

Natural Order.—Rosaceæ.

Mode of Preparation.—Beat 1 part by weight of fresh red-rose petals to a pulp in a stone mortar, add 3 parts of sugar, and rub the rose-pulp and the sugar well together.

[1] In the United States Pharmacopœia it is called Colocynthis, Colocynth.

[2] In the United States Pharmacopœia one is directed to prepare Confection of Rose by rubbing 80 grammes Red Rose in No. 60 powder, with 160 c.c. stronger Rose-water previously heated to 65° C., then adding 640 grammes sugar and 120 grammes clarified honey, and mixing thoroughly.

Therapeutics.—The confection of roses is sometimes used in the preparation of pills, for which purpose it is well adapted.

CONII FOLIA (B.).

Hemlock Leaves.

Natural Order.—Umbelliferæ.

Description.—The fresh leaves and young branches of *Conium maculatum*, Linné (B. and T., *Med. Pl.*, vol. ii., plate 118), gathered from wild British plants when the fruit begins to form. The leaves are more or less divided in a pinnate manner. The lower leaves are decompound, and sometimes 2 feet in length, glabrous, and arising from a smooth stem, which is marked with dark purple spots, and by clasping petioles of varying lengths, those of the lower leaves being hollow. The odour is strong and very disagreeable, like that of mice. Even cats mistake the smell, as one may find to his chagrin if a cat chance to gain access to unprotected samples of drugs. If the leaves are rubbed with solution of hydroxide of potassium the odour is still stronger.

Dose.—*Dog* - - - - 4 to 10 grains.
Pig - - - - 10 to 25 ,,
Horse - - - 1 to 4 drachms.

CONII FRUCTUS (A. and B.).

Hemlock Fruit.

Natural Order.—Umbelliferæ.

Description.—The fruit of the plant *Conium maculatum*, Linn. (B. and T., *Med. Pl.*, vol. ii., plate 118), gathered when fully developed, but while still green and unripe, and carefully dried. The fruit is about $\frac{1}{8}$ inch long, and nearly the same in breadth, broadly ovoid, somewhat compressed laterally, and crowned by the depressed stylopod. The fruit is of a dull greenish-gray. As generally met with, the mericarps are separated. Each mericarp presents five prominent more or less crenated ridges, with the furrows smooth and without evident vittæ. If reduced to powder and rubbed with solution of hydroxide of potassium, the fruit gives out a very strong and disagreeable odour.

Action.—The experiments and observations of Paul Guttmann on rabbits show that conium causes gradual paralysis of the

voluntary muscles, and then of the muscles of respiration. The paralysis first begins in the extremities, then affects the anterior muscles and those of the trunk, and lastly those of respiration. This paralysis is not due to the action of the drug upon the muscles themselves, for it has been shown that the irritability of muscles, through which blood poisoned with conine has been permitted to flow, is as great as that of muscles of the same animal protected from the action of the poisoned blood by ligation of the bloodvessels. Nor does conium paralyze by its effect on the cord itself, for if a limb is protected from the influence of the poisoned blood by ligation of both its artery and vein, and the animal (frog) is thus poisoned and thoroughly paralyzed by conium, the ligatured limb can still manifest powerful movements. Conium thus acts on the nerves, and it has been shown by Guttmann that it affects the peripheral ends of the motor nerves earlier than the trunk. The sensory nerves are not affected, and thus conine paralyzes solely by its action on the motor nerves. Dr. Harley's investigations lead him to the conclusion that conium is a depressant of the motor tract of the cord, and of the motor ganglia of the brain. There is much difference of opinion as to its action on the heart.

Uses.—Conium is useful in spasmodic affections of a nervous character, such as chorea and epilepsy, and also in spasmodic cough. For tetanus in horses it has had a thorough trial, but any beneficial action in this disease is but temporary, and it has consequently almost ceased to be prescribed for this malady. In cases of recurrent ophthalmia conium is said to act well in abating the pain, and is advantageously combined with cinchona bark or its alkaloids. Likewise, conium is sometimes prescribed in neuralgic affections.

Externally, it is sometimes used to abate pain in rheumatism, especially of the muscular variety. It is also a valuable adjunct to cough-mixtures.

Dose of Tincture of Conium:

Dog	- - -	7 to 35	minims.
Man	- - -	½ to 1	fluid drachm.
Pig	- - -	½ to 1½	,, drachms.
Horse	- - -	1 to 2	,, ounces.
Ox	- - -	1 to 2½	,, ,,

Dose of Succus Conii :

Dog	- - -	½ to 1½ fluid drachms.
Man	- - -	1 to 2 ,, ,,
Pig	- - -	1 to 5 ,, ,,
Sheep	- - -	¼ to 1 ,, ounce.
Horse	- - -	2 to 6 ,, ounces.
Ox	- - -	3 to 9 ,, ,,

Dose of Extract of Conium :

Dog	- - -	1 to 5 grains.
Pig	- - -	2 to 10 ,,
Horse	- - -	1 to 2 drachms.
Ox	- - -	1 to 3 ,,

The solid extract is not now officinal, but the United States Pharmacopœia has a good fluid extract, which we mention later. The Succus is perhaps the best form and most reliable.

CONVALLARIA (A.).

Synonym.—Lily of the Valley.

Description.—The parts used are the rhizome and roots of *Convallaria majalis*, Linné (Nat Ord., Liliaceæ). The rhizome grows horizontally, and is branched, about 3 millimetres in thickness, cylindrical, wrinkled, rather white, with a few circular scars. At the joint are about nine long thin roots. It breaks, leaving a fibrous white surface. The odour is pleasant, taste sweet, bitter, and acrid.

Preparations :

Extractum Convallariæ Fluidum.

Dose.—*Man* - - - - - 2 to 10 minims.

Tinctura Convallariæ.

Dose.—*Man* - - - - - 5 to 30 minims.

Convallamarin.

Dose.—*Man* - - - - - ½ to 2 grains.

Composition.—The flowers and stem contain two glucosides, convallarin, which is soluble in alcohol, but not in water, and convallamarin, which is soluble in both fluids.

Action.—Convallamarin has effect like that of digitalis on the heart, but not so good, although it is said to have no deleterious action. It is also a decided diuretic. Convallarin is purgative and irritant, and its use is avoided.

Uses.—An infusion of the whole plant is used in Russia for cardiac dropsy.

COPAIBA (A. and B.).

Natural Order.—Leguminosæ.

Description.—Copaiba is the oleo-resin obtained by cutting deeply or boring into the trunk of *Copaifera Lansdorfii* (Desfontaines), O. Kuntze (B. and T., *Med. Pl.*, vol. ii., plate 93), and other species of Copaifera. It is a more or less viscid liquid, and generally transparent. Some varieties are opalescent, and now and again slightly fluorescent. The colour may vary from light yellow to pale golden-brown. Copaiba has a peculiar aromatic odour which is very characteristic, and a persistent acrid, somewhat bitter taste. The average specific gravity of copaiba is 0·9545. If a small quantity is heated until all volatile oil is removed, a residue is left, which when cold is hard, and generally easily rubbed to powder, thereby indicating the absence of fixed oil. The oil volatilized during the operation does not smell of turpentine. Copaiba is almost entirely soluble in absolute alcohol, and in four times its bulk of petroleum spirit. In the latter case a filmy deposit is left on standing.

The volatile oil should amount to 40 per cent., should rotate the plane of a ray of polarized light about 31 degrees to the left (absence of African Copaiba), and should not boil under 250° C.

If 0·2 c.c. copaiba be dissolved in 4 c.c. carbon bisulphide, and 0·1 c.c. of a cooled mixture of equal parts of nitric and sulphuric acids be added, a transitory violet colour is not yielded (absence of gurjun balsam). The same can be proved by adding 0·4 c.c. copaiba to 50 c.c. glacial acetic acid with 0·4 c.c. nitric acid, when a reddish or purple colour should not be produced.

Therapeutics.—Copaiba is excreted by the kidneys, and, being carried on with the urine, it has a stimulant and disinfectant action on the whole genito-urinary tract. The mucous secretion of the bronchi is increased, and the drug then acts as an expectorant. It is also diuretic. Copaiba is prescribed after the first stage of gonorrhœa is over.

Dose.—

Dog	- - -	10 minims to 1 fluid drachm.
Man	- - -	20 ,, ,,
Horse	- - -	½ to 1 fluid ounce.
Ox	- - -	1 to 2 ,, ounces.

Dose of Oleum Copaibæ:

Dog	- - -	2 to 15 minims.
Man	- - -	5 to 20 ,,

CORIANDRI FRUCTUS (A.[1] and B.).

Coriander Fruit.

Description.—The dried ripe fruit of *Coriandrum sativum*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 133). Nat. Ord., Umbelliferæ.

Characteristics.—It is nearly globular, about 5 millimetres in diameter ($\frac{1}{5}$ inch), brownish-yellow, and glabrous. The two mericarps are usually closely united, and crowned by the calyx, teeth, and stylopod. Primary ridges are wavy and slight, the secondary ridges straight and more marked. The transverse section shows two vittæ on the commissure of each mericarp. It has an aromatic odour and pleasant taste.

Uses.—To disguise the tastes of senna and rhubarb, as in the preparations Confection, Compound Tincture, and Syrup of Senna (which last contains the oil), and in the Compound Tincture and Syrup of Rhubarb.

Dose.—Powdered Coriander Fruit:

Dog	15 to 30 grains.
Pig	$\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
Horse	$\frac{1}{2}$ to 1 ounce.

CREOSOTUM (A. and B.).

Creosote.

Description.—Creosote, a product of the distillation of wood tar, is a highly refractive, liquid, colourless, or yellowish mixture of guaiacol, creosol, and other phenols. It possesses a strong empyreumatic odour and acrid taste. It is neutral or only faintly acid to litmus. It is dissolved by 150 parts of water at ordinary temperature and in less of hot water, but freely by alcohol, ether, chloroform, glycerin, and glacial acetic acid. The specific gravity is 1·079. It distils at about 210° C.

Tests.—Creosote does not coagulate albumin.

If it is dropped on a white filtering paper and exposed to a temperature of 100° C., no translucent stain is left (absence of less volatile liquids).

It turns the plane of polarization of a ray of polarized light to the left.

It is not solidified by the cold produced by a mixture of hydrochloric acid and sulphate of sodium.

It is miscible with an equal volume of collodion without production of any precipitate or gelatinization, and, when shaken with 5 times its bulk of ammonia solution, its volume should not be appreciably less (showing the absence of phenol).

[1] The United States Pharmacopœia designation is Coriandrum, Coriander.

A ½ per cent. aqueous solution, or a 1 per cent. solution in alcohol (90 per cent.), with a drop of diluted neutral solution of ferric chloride, attains a green colour which rapidly changes to a reddish-brown, and, unless the mixture is very much diluted, a reddish-brown precipitate is produced.

Therapeutics.—The action of creosote is very similar to that of carbolic acid. Its vapour inhaled in chronic bronchitis and disease of the lungs has a beneficial action. Internally, creosote has been given for farcy in horses, and as an addition to mixtures for diarrhœa. Externally, it is employed in some skin diseases, especially those caused by an animal parasite. In scabies or mange, the ointment proves destructive to the acarus; but sulphur ointment may be regarded as preferable for this disorder. In psoriasis also it has proved of some benefit.

In combination with other remedies, it has been successfully given in cases of chronic cough, and also as a tonic.

Dose.—

Dog	½ to 3	minims.
Man	1 to 5	,,
Pig	2 to 10	,,
Sheep	5 to 15	,,
Horse	10 to 30	,,
Ox	20 to 45	,,

CROCUS (A. and B.).

Saffron.

Description.—The dried stigmas and tops of the styles of *Crocus sativus*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 274). Nat. Ord., Irideæ.

Characteristics.—Each portion is about 1 inch (25 millimetres) in length, and consists of three red stigmas, thick and tubular above, jagged or notched at the upper ends, and joined below to the top of the yellow style. Flexible and unctuous to the touch, odour aromatic, taste aromatic and bitter. If rubbed on a wet surface, it leaves a deep orange tint. If placed in warm water, it colours it orange, becomes paler itself, and deposits no white or coloured powder. Burnt with free access of air, it should not deflagrate (absence of nitrates), and yields 7 per cent. of ash. Dried at 100° C., it should not lose more than 12 5 per cent. of moisture. The most common impurities are marigold and safflower petals, chalk, nitrates, and coloured powders. The absence of oil can be shown by pressing between folds of white filter-paper, when no oily stain should be left.

Composition.—Contains polychroite, an orange-red glucoside which yields a red colouring-matter, crocin, and also a volatile oil, $C_{10}H_{16}$.

Preparation.—Tinctura Croci, containing 1 of Saffron to 20 of Alcohol (60 per cent.), and prepared by maceration.

It is contained in Dec. Aloes Co. and Tinct. Cinch. Co.

Crocus is chiefly used as a colouring and flavouring agent.

Uses.—By Oriental therapeutists a more important beneficial action has been claimed—viz., that it enlivens the mental faculties; but this may be considered somewhat dubious.

Dose of Tinctura Croci.—*Man* - - - - about 10 minims.

CUBEBA (A. and B.[1]).

Cubebs.

Natural Order.—Piperaceæ.

Description.—The dried unripe full-grown fruit of *Piper Cubeba*, Linné filius (*Kew Bulletin*, December, 1887, p. 3), is globular, about $\frac{1}{6}$ inch in diameter, black or brown in colour, greatly wrinkled. Below, the fruit tapers into a round thin stalk about $1\frac{1}{2}$ times as long as the fruit itself, continuous with, and firmly attached to, the pericarp. Beneath the thin and brittle shrivelled skin is a hard brown smooth shell, in which the single seed is contained in the fruit, attached at the base, if mature; but in commercial specimens the seed is generally so slightly developed that the pericarp is nearly empty. The taste is warm, aromatic, and somewhat bitter. The odour is peculiar and strong.

Test.—A decoction, when cold, is coloured bright indigo-blue by solution of iodine. The crushed fruit added to sulphuric acid turns it crimson.

Therapeutics.—Small doses of cubebs are stomachic and carminative. In large doses it is a gastro-intestinal irritant. In its action cubebs resembles copaiba, stimulating and disinfecting the genito-urinary passages, and promoting expectoration. It is prescribed in gonorrhœa, chronic bladder affections, as an aromatic in indigestion and loss of appetite, and also in chronic bronchitis.

Dose.—

Man and Dog - - -	$\frac{1}{2}$ to 1 drachm.
Pig - - - -	$\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
Sheep - - - -	1 to 2 ,,
Horse - - - -	$1\frac{1}{2}$ to 4 ,,
Ox - - - - -	$\frac{1}{2}$ to 1 ounce.

[1] Cubebæ Fructus is the name in the British Pharmacopœia.

CUPRI SULPHAS (A. and B.).

Sulphate of Copper.

Formula.—$CuSO_4,5H_2O$.

Mode of Preparation.—Sulphate of copper may be obtained by heating sulphuric acid and copper together, dissolving the soluble product in hot water, and evaporating the solution, until crystallization takes place on cooling, or by dissolving black oxide of copper in hot diluted sulphuric acid, filtering, evaporating, and crystallizing.

Characters.—Sulphate of copper is a blue salt, and occurs in oblique triclinic prismatic crystals, which are soluble in 3·5 parts of cold water, forming a pale-blue solution, which strongly reddens litmus, very soluble in glycerin, and nearly insoluble in alcohol.

Tests.—An aqueous solution gives with chloride of barium a white precipitate insoluble in hydrochloric acid, and with solution of ferrocyanide of potassium a maroon-red precipitate.

If an aqueous solution of the salt be mixed with twice its volume of solution of chlorine, and solution of ammonia be added, the precipitate which is first formed by the ammonia will be dissolved by a further sufficient addition of it, and a violet-blue solution will be produced, leaving little or nothing undissolved. Lead, arsenium, zinc, and aluminium should be absent, and only a mere trace of iron is permissible.

Therapeutics.—Internally, sulphate of copper is astringent, tonic, and antiseptic. If about 5 to 10 grains be given to a man or a dog, or about 2½ to a cat, it acts as a direct emetic. For diarrhœa and dysentery, sulphate of copper in small doses is often prescribed along with opium and vegetable astringents. It is also given in melæna, and to horses as an anthelmintic, followed by a full dose of aloes. As an emetic it is suitable, when the stomach is to be rapidly evacuated of its contents. For nervous affections, such as chorea, it has been used with advantage in dogs. Sulphate of copper is best given soon after a meal, but its administration cannot be long tolerated. An aqueous solution of the salt is applied locally as an antiseptic and caustic for foot rot, sinuous channels, and protuberant granulations, and as a stimulant or astringent to ulcerated surfaces, in order to contract the bloodvessels and arrest discharge. For astringent purposes a weak solution may be used as an injection into the vagina or urethra, and as a lotion in chronic ophthalmia.

Dose.—As an astringent and tonic:

Man and Dog - -	¼ to 2 grains.
Pig - - - -	4 to 10 ,,
Sheep - - - -	15 to 25 ,,
Horse - - - -	½ to 1½ drachms.
Cattle - - - -	½ to 1½ ,,

As an emetic:

Man and Dog - -	5 to 10 grains.
Pig - - - -	10 to 25 ,,

CUSSO (A. and B.).

Kousso.

Natural Order.—Rosaceæ.

Description.—Kousso consists of the dried panicles of the female or pistillate flowers of the plant *Brayera anthelmintica*, Kunth (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 102). Kousso exists in compressed clusters, or more or less cylindrical rolls, about 1½ feet in length. The panicles may, however, be broken up into small fragments. The colour is light-brown, or reddish in the case of the female flowers. The odour is slight and tea-like, the taste bitter, acrid, and not very pleasant. The panicles are branched, zigzag, more or less covered with hairs and glands, and with a large sheathing bract at the base of every branch. The flowers are numerous, small, shortly stalked, unisexual. There are two roundish membranous veiny bracts at the base of each flower. The bracts are brownish-yellow in the male and tinged with red in the female flowers. The calyx is hairy externally, possesses reddish veins, and is divided into ten segments in two alternating whorls, the inner of which is curved inwards over the young fruit and shrivelled.

Therapeutics.—Kousso is an anthelmintic, rapidly killing tape-worms. For dogs it is used occasionally for this purpose. The best method of using it is probably in the form of a concentrated infusion taken two or three times at intervals during the day, the animal only being allowed to take liquid during the time. On the following day a full dose of jalap or other purgative should be given.

Dose.—

Man and Dog - - -	¼ to ½ ounce.
Pig - - - - -	½ to 1 ,,
Horse - - - - -	2 to 7 ounces.

DECOCTA (A.).

Decoctions.

Mode of Preparation. — Unless otherwise ordered, take 50 grammes of the substance and place it in a suitable vessel provided with a cover, pour upon it 1,000 c.c. of cold water, cover it up carefully, and boil for fifteen minutes. Next, let it cool to about 40° C., express, strain the expressed fluid, and pass sufficient cold water through the strainer to make the product measure 1,000 c.c.

Note by way of caution that the strength of decoctions of powerful drugs should be specially prescribed.

DECOCTUM PAPAVERIS.

Decoction of Poppy.

Natural Order.—The Poppy belongs to the Papaveraceæ.

Mode of Preparation. — Boil 2 ounces of bruised poppy capsules with 1½ pints of distilled water for ten minutes in a covered vessel. Then strain, and pour as much distilled water over the contents of the strainer as will make the strained product measure a pint.

Use.—Decoction of poppy is only used externally to assuage pain.

DIGITALIS FOLIA (A. and B.).

Digitalis or Foxglove Leaves.

Natural Order.—Scrophulariaceæ.

Description.—The leaves of the plant, *Digitalis Purpurea*, Linn. (B. and T., *Med. Pl.*, vol. iii., plate 195), the purple Foxglove, should be collected from wild British plants of the second year's growth, when about two-thirds of the flowers are expanded, and then carefully dried. They vary from 4 to 12 or more inches in length, and may be as much as 5 or 6 inches broad. The petiole or stalk is winged on both sides for a varying length. The lamina or blade of the leaf is ovate or ovate-lanceolate, subacute, crenate, and somewhat wrinkled. The upper surface is slightly hairy and dull green, and shows the veins markedly, while the under surface is paler and downy. The taste is very bitter and unpleasant, and the odour is faint, agreeable, and tea-like.

Composition and Action.—Digitalis contains five glucosides: digitalein, digitoxin, digitonin, digitalin, and digitin. They are all oxidizable, and yield carbonic acid and water. Four of these actively influence the body, and whilst three have similar actions, the fourth is antagonistic to the other three.

W. H. Porter says the various preparations of digitalis differ widely; that the cumulative action is due to its contracting the arterioles, and shutting off nutrition. Digitalis is dangerous, and has a limited range of use in lesions of the mitral valve, and even that is only for a short time. It is beneficial as a diuretic in man and animals only when there are low arterial tension and engorgement of the kidney; for it actually diminishes the excretion of the normal kidney, and lessens its metabolic activity. L. Neber advises the use of an infusion of ½ drachm of fresh English leaves to 6 ounces of water.

Arnold and Wood say that both digitalin and digitoxin produce the full effects of tincture of digitalis on the circulation. All three drugs stimulate the cardio-inhibitory mechanism both centrally and peripherally. The slowing of the heart thereby produced can be prevented by injection of atropine, and not entirely by cutting the vagi. All three cause a rise of blood-pressure, due to constriction of bloodvessels, and increase in the force of the heart-beat. If the latter is not sufficient, the blood-pressure may fall. Toxic doses cause a great increase in the pulse-rate, and a sudden rise in the blood-pressure. This is due to paralysis of the cardio-inhibitory mechanism, as is proved by stimulation of the vagus, which, after administration of them, does not retard the pulse-rate.

Very large doses cause sudden stoppage of the heart in diastole, which is due to a direct paralysis of the cardiac muscle, and not to excessive vagus stimulation, as is proved by its not being prevented by previous paralysis of the inhibitory mechanism by atropine, and the vagi are always paralyzed in the later stages of poisoning.

The actions of digitalin, digitoxin, and tincture of digitalis are very similar. Experiments on dogs show that ¼ grain digitalin equals about 16 minims of the tincture of digitalis.

Wenzel and Von Starck report good results with ¼ to ¾ milligramme of digitoxin several times a day; but it is too irritant for human beings, upsetting the stomach, or, if injected, causing abscesses, and is also very insoluble and slowly absorbed.

J. W. England speaks well of the *tincture of fat-free digitalis*, made by exhausting freshly-ground digitalis leaves with purified petroleum benzine, drying thoroughly in air, percolating with diluted alcohol, and neutralizing the percolate with solution of ammonia. The primary effects occurred in fifteen minutes and the maximum in forty-five, while with the official tincture the periods were respectively thirty and sixty minutes, the duration of the action being the same—thirty minutes. The reduction in pulse-work done was a little greater with the new tincture, whether given orally or hypodermically, and it was more quickly absorbed than the official tincture.

Whilst the chief effects of digitalis occur in thirty to sixty minutes, those of digitoxin do not appear until from six to thirty-six hours.

The chief effect of digitalis is upon the organs of circulation. In the first stage of its action the veins are emptied, and the arteries filled. This effect is brought about by the stimulation of the vagus, on the heart and medulla oblongata, and, in consequence of the stimulation of the ganglia in the heart, the beats are strengthened. The blood-pressure rises from this cause and from stimulation of the vaso-motor centre and vaso motor nerves. The diastole being lengthened, the ventricles have more time to fill, and they contract with additional force. In the second stage the water of the urine is increased, owing to depression of the vaso-motor mechanism of the renal arteries. In the third stage the circulation begins to lose force, and lastly death occurs through its failure. The temperature is raised a little at first, and is then lowered, owing to the increased circulation through the skin.

Uses.—The especial use of digitalis is in certain conditions of functional and organic diseases of the heart. The cases where its administration is indicated are those in which the circulatory power fails, the pulse being felt to be small, weak, and irregular, the veins being distended, and difficulty of breathing, with congestion of the lungs and general dropsy and hæmorrhage, perhaps supervening. It is of value when carefully used in cases of disease of the mitral and tricuspid valves, in dilatation of the left ventricle, and also in hypertrophy of the left ventricle, in those instances in which the pulse becomes feeble and small in volume. In pure hypertrophy aconite may be more suitable. Digitalis is contra-indicated in acute diseases of the heart. In chronic

disease of the aortic valves, digitalis must not be given in the early stages, as it prolongs the diastole, and thus permits greater influx of blood. In the later stages it is sometimes beneficial. In functional or nervous palpitation with debility small doses are valuable. Also when the tumultuous action is dependent upon overwork, digitalis is indicated. It is also administered as a cardiac stimulant in horses with acute pneumonia, and in pericarditis after abatement of the acute symptoms, and in cases of thick and broken wind. It may be given as a cardiac tonic for the debility following distemper in dogs. When digitalis is administered, it is necessary to watch its effect carefully, as it may cause intermittence of the pulse, and it can only be given with benefit for a short period.

Doses of powdered Digitalis Leaves:

Man	½ to 2 grains.
Dog	1 to 3 ,,
Pig	2 to 8 ,,
Sheep	4 to 15 ,,
Horse	10 grains to 1 drachm.
Ox	20 ,, 1 ,,

DIONIN.

Therapeutics.—Bloch says that its power of relieving pain is very great, and gives it in doses of $\frac{5}{9}$ grain, either subcutaneously or by the mouth; Fromme that it is useful for morphine habit; Heinrich that the solutions, being neutral, cause no pain and no irritation when injected, and for morphine-takers $\frac{1}{3}$ more than the dose of morphine may generally be given; Heim that it is better for sleep than codeine; Higier of Warsaw, that it is beneficial for chronic severe cough, whether of advanced pulmonary tuberculosis, chronic bronchitis with emphysema or bronchial asthma, that it gave quiet sleep, eased the cough, the dyspnœa, and the expectoration; Schroder that it produces similar effects to those of corresponding doses of morphine without the bad effects of the latter; Krijewski that $1\frac{1}{5}$ grain in twenty-four hours, and usually even $\frac{1}{3}$ to $\frac{2}{3}$ grain, would suffice; A. Darier, Paris, that it will relieve for many hours the most acute ocular pain in iritis, coroneal ulcer, and glaucoma. He used it in 5 per cent. solution, instilled into the conjunctival sac or injected beneath the conjunctiva, or by placing it in the form

of powder on the same. A 10 per cent. solution will not keep. It at first causes severe pain and œdema of the part it is applied to, and Daxenberger says this was continued for even thirty-six hours in two cases. A. Graefe says it is useful in all affections of the cornea (except keratitis due to sarcoma), in conjunctival catarrh, and disease of the cornea and vitreous; also with atropine in iritis, irido-cyclitis, and chorio-retinitis. It stimulates the lymph circulation, and thus influences the nutrition of the eye. It, however, causes temporary conjunctivitis and chemosis, until tolerance to the drug occurs. This inflammation and pain are the only injurious effects.

DORMIOL.

Composition.—Dormiol, or amylene chloral, is a combination of one molecule of chloral with one of amylene hydrate. The full name of the compound is di-methyl-ethyl-carbinol chloral—*i.e.*, it is chloral with the addition of certain ethereal radicles. This addition in the case of some substances, and especially in that of the sulphonals, causes an augmentation of the hypnotic qualities.

Characteristics.—It is a colourless, oily fluid, having a smell like that of menthol or camphor, and a peculiar cool, fresh taste.

Therapeutics.—About 24 per cent. more chloral in the form of dormiol can be taken than of the simple drug itself, owing to the slower disunion of the preparation (Fuchs and Koch). It is also more powerfully hypnotic and less toxic. Its action is rapid, and the sleep produced by it is calm and free from nightmare, and not followed by nausea or headache. The narcosis is not so deep as to cause danger from accumulation of mucus in the bronchial tubes. Patients suffering from pulmonary tuberculosis can wake sufficiently to cough and expectorate and soon fall asleep again. It is preferable to chloral, and especially to sulphonal and trional, which cause headache and heaviness the next day. In patients suffering from intractable insomnia, owing to neurasthenia, hysteria, and other mental disorders, or alcoholism, about $7\frac{1}{2}$ minims of dormiol, and even as much as 18 in exceptional cases, brought about a night's rest. In one case even 54 minims was taken in twenty-four hours.

The drug is useful in senile insomnia, as well as in the sleeplessness of chronic disease; also in arterio-sclerosis. It is not injurious, does not cause habituation or cumulative action, is

safer, and has a longer action than some other hypnotics. MM. Besancon and Dumont hold that no disorder of the circulation or respiration is to be apprehended even after large doses (45 to 60 grains); that no erythema is produced, as it commonly is by chloral; and that from 10 to 60 grains may be given in water and syrup. Or it may be given in capsules containing about 6 minims. Others also speak well of the drug—*e.g.*, Schultze, of Andernach. In some cases, however, it has not succeeded so well.

Dose.—*Man* - - - - 6 to 36 minims.

DULCAMARA (A.).

Dulcamara.

Description.—The young branches of Dulcamara, or Bittersweet, *Solanum Dulcamara*, Linné (Nat. Ord., Solanaceæ). They are about 5 millimetres in thickness, cylindrical, angular, striated lengthwise, warty, generally hollow in the centre, and cut into short pieces. The bark is thin and of a light greenish-brown colour externally, marked with alternate leaf-scars, and internally green. It possesses only a slight odour, and the taste is at first bitter and then sweet.

Preparation.—Extractum Dulcamara Fluidum, of which the dose for man is 1 fluid drachm.

Composition.—Dulcamara contains two amorphous bitter alkaloids, viz., *solanine*, and a less amount of *dulcamarine*, and also sugar.

Action.—Solanine paralyzes the central nervous system, retards the heart and respiration, lessens sensibility, and causes death with convulsions. In warm-blooded animals it causes a constant fall of temperature, and has no effect on the pupil. In man it induces weakness, difficult breathing, nausea, vomiting, drowsiness without true sleep. It exerts no action on the pupil, bowels, kidneys, or skin.

Uses.—In scaly skin diseases it is given, together with antimony; also in bronchial catarrh, asthma, and whooping-cough.

ELATERINUM (A. and B.).

Elaterin.

Description.—Elaterin, whose formula is $C_{20}H_{28}O_5 = 345{\cdot}6$, is the active principle of Elaterium.

Characteristics.—It exists in the form of small hexagonal white scales, odourless, but with bitter taste. Elaterin is almost entirely soluble in water, sparingly in alcohol (90 per cent.), and readily in chloroform, neutral in reaction to litmus. If it be heated with access of air, it first melts, and then burns, leaving

no residue. It is soluble in melted phenol, forming a solution which, if sulphuric acid be added to it, becomes crimson, and then soon afterwards scarlet. It is not precipitated from alcoholic solution by solution of tannic acid, mercuric chloride (T. S.), or solution of platinic chloride (absence of alkaloids).

Actions and Uses.—Elaterin acts very much like colocynth, as a gastro-intestinal irritant; but it is much more violent. Even in doses of $\frac{1}{40}$ to $\frac{1}{10}$ grain given to a man, numerous very watery motions, with griping and great depression, are caused. It is used in cases of dropsy and uræmia as a hydragogue purgative, sometimes in cerebral cases, and very rarely in obstinate constipation. Great care in its employment is necessary, and the drug should not be employed, if there be inflammation or catarrh of stomach or of bowels.

Dose.—*Man* - - - - $\frac{1}{40}$ to $\frac{1}{10}$ grain.
Dog - - - - $\frac{1}{20}$ to $\frac{1}{10}$ „
Pig - - - - 1 to 2 grains.
Horse - - - - 3 to 20 „

ELATERIUM (B.).

Elaterium.

Description.—Elaterium is a sediment from the juice of the fruit of *Ecballium Elaterium*, A. Richard (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 115). It occurs in light, friable, opaque cakes, about 2·5 millimetres thick, of a grayish-green hue, breaking with a finely granular fracture. The smell is faint, tea-like, and the taste is bitter and acrid. Carbonates and starch should be absent. With boiling alcohol 0·5 per cent. should dissolve. If chloroform be made to act upon it, the solution evaporated, the remains washed with ether, and all three processes be repeated so as to further purify, about 22·5 per cent. of the previous body, elaterin, should be produced.

Dose.—*Man* - - - - $\frac{1}{10}$ to $\frac{1}{2}$ grain.

EMPLASTRUM PICIS (B.).[1]

Pitch Plaster.

Mode of Preparation.—Take of

Burgundy Pitch, 26 parts ;
Frankincense, 13 parts ;
Resin, 4½ parts ;
Yellow Beeswax, 4½ parts ;
Olive Oil, 2 fluid parts ;
Water, 2 fluid parts.

Melt together the frankincense, Burgundy pitch, resin, and wax ; add the oil and the water, and then, with constant stirring, evaporate to a proper consistence.

ENEMATA.

Enemas or Clysters.

Enemas or clysters serve several useful purposes. Simple enemas of tepid water or of soap and water are commonly injected with the view of promoting the peristaltic action of the intestines, and also by their softening action on the hardened fæces. They are also of value in diminishing spasm of the bowels in colic in horses. One may inject 1 to 2 gallons or more of fluid for this purpose into the rectum of the horse. In the dog, ½ to 1 pint is the usual amount necessary. In cases of invagination or intussusception of the bowels, the copious injection of tepid water is of great service. Medicated clysters are employed in cases of tetanus, sore throat, and other diseases in which it is not feasible to administer medicines by the mouth, and also in those instances where it is desired to exert a local action on the bowel. When the enema is to be retained, from 1 to 2 pints is in most instances sufficient for one injection in the horse. In the dog, about 4 ounces will be sufficient. Before introducing a medicated clyster into the horse, it is customary to remove the fæces in the rectum. The enema of aloes is useful

[1] The United States Pharmacopœia Emplastrum Picis Burgundicæ may be made by melting together 800 parts by weight of Burgundy pitch and 150 of yellow wax, then adding 50 grammes of olive oil, and stirring constantly until the mixture thickens.

for injecting into the rectum in constipation in horses, and the simple enema injected for this condition is sometimes followed by one of aloes. The enema of turpentine, or of aloes, or of perchloride of iron, is useful for the removal of worms. The enema of opium serves not only for the absorption of the drug into the system, but also for its local action in allaying irritation, spasm in diarrhœa and dysentery, and also in soothing excitation of the genito-urinary organs. The enema of tobacco is useful in horses in cases of lock-jaw, and also for the removal of worms. Nutritive clysters are given in those cases where food is not taken by the animal, from inability or disinclination or disease.

ENEMA ALOES.

Enema of Aloes.

Mode of Preparation.—Take of

Aloes, 4 drachms;
Carbonate of Potassium, 30 grains;
Mucilage of Starch, 1 pint.

Mix and rub together.

ENEMA OPII.

Enema of Opium.

Mode of Preparation.—Mix together 1 fluid part of tincture of opium with 32 fluid parts of mucilage of starch.

ENEMA TABACI.

Enema of Tobacco.

Infuse 2 drachms of tobacco in a pint of boiling water for half an hour, and strain.

ENEMA TEREBINTHINÆ.

Enema of Turpentine.

Mix together 1 fluid part of oil of turpentine and 15 fluid parts of mucilage of starch.

ERGOTA (A. and B.).

Ergot.

Description.—Ergot itself belongs to the Fungi ; the rye grass on which it is parasitic to the Graminaceæ. Ergot is the sclerotium of *Claviceps purpurea* (Fries), Tulasne (class Fungi), produced between the pales, and replacing the grain of *Secale cereale*, the Rye, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 303). Nat. Ord., Gramineæ. It is subcylindrical and obscurely triangular in shape, and tapers towards the ends. It is generally arched or curved, and from $\frac{1}{3}$ inch to about $1\frac{1}{2}$ inches in length. There is at about the middle of each of the three sides a longitudinal furrow, more marked on that side which is concave, and often irregularly cracked, which may be said to appear to be the base of the triangle, or, rather, the elongated pyramid, to which the sclerotium may be compared. Externally ergot is of a violet-purple colour, and within it is white or pinkish-white. It easily snaps off short. The odour is peculiar and unpleasant, more especially if the powder be triturated with solution of hydroxide of potassium. The taste is mawkish and rancid. Ergot should not be musty. If kept, and especially if exposed to moisture, its quality soon becomes inferior.

Action.—The structures more especially acted upon by ergot are the circulatory and respiratory organs, the central nervous system, intestines, and uterus. Under its influence the arteries become contracted, the blood-pressure rises, and the pulse is reduced in frequency. The respiratory movements are diminished, the peristaltic action of the intestines is exalted, and the spinal cord is affected, owing to the contraction of its vessels. Ergot stimulates and contracts involuntary muscle fibre of the arteries and of the uterus. This organ becomes anæmic and contracted, and this is more especially marked if the animal be pregnant, and still more so if parturition has commenced. It has been shown that ergot owes its effects on the uterus and bowels chiefly to sphacelinic acid, and possibly to cornutine, though its action is not thoroughly known, and certainly not to ergotinic acid, which causes a slight dilatation of the vessels. If ergotized meal be used as a diet, gangrene may result, and this condition can be produced by giving sphacelinic acid to animals.

Uses.—Ergot is chiefly used as a hæmostatic in controlling

hæmorrhage, more especially that occurring after birth of the fœtus. The hypodermic injection of ergotin is of great efficacy in controlling sudden post-partum hæmorrhage, and is much to be preferred to the administration of the drug by the mouth, on account of the greater rapidity of the action by the former method. As an ecbolic, ergot or ergotin may in suitable cases be employed in cases of uterine inertia, where no obstruction or malformation of the mother or fœtus contra-indicates its administration. It is also given in those cases where the placenta is retained.

Ergotin is recommended by Mr. Briggs in cases of parturient apoplexy in cattle, and it may be given in doses of 25 to 30 grains. In *small doses* ergot may arrest threatened abortion by imparting tone to a relaxed uterus. In purpura hæmorrhagica in horses ergot is often given along with other remedies.

Dose of Ergota:

Dog	¼ to ½ drachm.
Man	⅓ to 1 ,,
Pig	½ to 1 ,,
Sheep	½ to 1 ,,
Horse	¼ to 1 ounce.
Ox	½ to 1 ,,

These doses may be repeated at intervals of an hour or less.

Ergot is generally given in veterinary practice as infusion, tincture, liquid extract, or ammoniated liquor. The doses of the two latter preparations are the same as that of the powdered ergot.

Of ergotin the dose for cattle is about 20 grains; horse, 15; pig, 2 to 6; dog, ½ to 3 grains.

EUCALYPTI GUMMI (B.).[1]

Eucalyptus Gum.

Description. — A red exudation or gum from the bark of *Eucalyptus rostrata*, Schlecht. (Mueller, *Eucalyptographia*), and some other species of Eucalyptus (Nat. Ord., Myrtaceæ) imported from Australia.

[1] In the United States Pharmacopœia it is the leaves of *Eucalyptus globulus* (Labillardière), collected from the older parts of the tree, which are official, and the preparation Extractum Eucalypti Fluidum is made from it.

Characteristics and Tests. — Occurs in grains or small masses, and thin fragments are transparent and red. It is tough and has a very astringent taste, and when chewed it sticks to the teeth and makes the saliva red. Cold water dissolves about 85 per cent., and the solution is neutral. It is nearly totally soluble in alcohol (90 per cent.).

Composition. — It contains kino-tannic acid, catechin, and pyrocatechin. As an impurity Australian kino may be present. It is very resinous, and only slightly soluble in water.

Actions and Uses.—Oil of Eucalyptus is a strong antiseptic. Internally it acts like Oil of Turpentine, to which it is in other respects similar. It has an antipyretic and antiperiodic action like that of Quinine, and has been tried in cases of ague, typhoid fever, septicæmia, and pneumonia in mankind. It has also been used in pyelitis, cystitis, bronchitis, dilated bronchi, and asthma. The kidneys and lungs excrete it, and the odour can be detected in the breath and urine. Red Gum is astringent, and used in cases of diarrhœa.

Dose of the Gum :

Man - - - -	2 to 5 grains.

Dose of the Oil of Eucalyptus :

Man - - - -	½ to 3 minims
Dog - - - -	1 to 8 ,,
Pig - - - -	3 to 10 ,,
Horse - - - -	½ to 1½ fluid drachms.

EUONYMI CORTEX (A.[1] and B.).

Euonymus Bark.

Description.—The bark of the root of *Euonymus atropurpureus*, Jacquin (Nat. Ord., Celastrineæ. Sargent, *Silva*, vol. ii., table liii.).

Characteristics.—It occurs in quilled or curved pieces from 2 to 5 millimetres thick. The outer layer is a soft friable cork of a light gray colour marked with darker patches. The inner surface is pale yellowish-white and smooth. The fracture is short, and the broken surface yellowish. The odour is faint, taste mucilaginous, and then bitter and acrid.

Actions and Uses.—Euonymus stimulates the liver and acts as a cholagogue and cathartic.

[1] In the United States Pharmacopœia the name is Euonymus.

Preparation.—Extractum Euonymi Siccum. It is sometimes called Euonymin, and is an alcoholic extract incorporated with Calcium Phosphate.

Dose.—*Man* - - - - 1 to 2 grains.

EUPATORIUM (A.).

Eupatorium.

Synonym.—Thoroughwort.

Description. — The leaves and flowering tops of *Eupatorium perfoliatum*, Linné (Nat. Ord., Compositæ). The odour is aromatic and the taste astringent.

Preparation.—Extractum Eupatorii Fluidum.

Composition.—Contains a volatile oil and a bitter glucoside, *eupatorin*.

Uses.—It is given as a tonic for dyspepsia, and a diaphoretic at the beginning of a cold or an attack of rheumatism. In large doses it is a purgative and emetic, and thus used is efficacious in causing the ejection of tape-worm. It may be given as an infusion, or the liquid extract mixed with hot water can be employed.

Dose.—*Man* - - - - - - 15 to 30 minims.

EXTRACTUM ACONITI (A.).

Extract of Aconite.

Mode of Preparation.—Moisten 1,000 grammes of aconite in No. 60 powder with 400 c.c. of alcohol (41 per cent.), pack firmly in a cylindrical percolator, and pour on more alcohol, so as to leave a fluid layer above the solid. When drops begin to flow, close the lower orifice, and leave the percolator closely covered up for two days. Then let it go on again, and gradually add alcohol, until 3,000 c.c. are obtained. Reserve the first 900 c.c. of the percolate, evaporate the rest in a porcelain capsule at no higher heat than 50° C. to 100 c.c., add the 900 c.c. set aside, and evaporate at or below the same temperature until a suitable consistence is engendered.

Dose.—*Man and Dog* - - $\frac{1}{10}$ to $\frac{1}{4}$ grain.
Pig - - - - $\frac{1}{5}$ to $\frac{1}{2}$,,
Sheep - - - - $\frac{1}{3}$ to $\frac{3}{4}$,,
Horse - - - - 1 to 3 grains.
Ox - - - - $1\frac{1}{2}$ to 4 ,,

EXTRACTUM ANTHEMIDIS (B.).

Extract of Chamomile.

Mode of Preparation.—Boil 1 pound of chamomile flowers with 1 gallon of distilled water until the volume is reduced to one half. Strain, press, and filter. Evaporate the liquid by a water-bath until the extract is of a suitable consistence for forming pills, and add towards the end of the process 15 minims of oil of chamomile.

Dose.—

Man, *Dog*	2 to 8 grains.
Pig	4 to 15 ,,
Horse	½ to 1 drachm.

EXTRACTUM BELÆ LIQUIDUM.

Liquid Extract of Bael.

Mode of Preparation.—Macerate 1 pound of bael fruit for twelve hours in 4 pints of distilled water, and pour off the clear fluid. Repeat the maceration a second and third time for one hour in 8 pints of water. Press the marc, mix the fluids, and filter through flannel. Evaporate until only 13 fluid ounces are left, cool, and then add 3 fluid ounces of alcohol (90 per cent.).

Dose.—

Horse	2 to 4 fluid ounces.
Foal	1 to 2 ,, ,,
Ox	3 to 6 ,, ,,
Calf	1 to 3 ,, ,,

EXTRACTUM BELLADONNÆ ALCOHOLICUM (B.).[1]

Alcoholic Extract of Belladonna.

Description.—This extract contains 1 per cent. of the alkaloids of belladonna root. Evaporate 50 c.c. liquid extract of belladonna in a counterpoised basin on a water-bath to a firm

[1] There are in the United States Pharmacopœia an Alcoholic Extract of Belladonna leaves, and also a Fluid Extract of Belladonna root, which latter is similar to the British Pharmacopœia Liquid Extract of Belladonna which comes next.

extract and weigh the residue. If the weight = x grammes for each 50 c.c. of the liquid extract add $37{\cdot}5 - x$ grammes milk sugar. Evaporate 1,000 c.c. liquid extract of belladonna to a thin syrupy consistency, add to it 20 ($37{\cdot}5 - x$ grammes) milk sugar, and continue the evaporation until the product weighs 750 grammes.

Dose—*Man* - - - - $\frac{1}{4}$ to 1 grain.
Dog - - - - $\frac{1}{4}$ to 1 ,,
Pig - - - - $\frac{1}{2}$ to 2 grains.
Horse - - - - 4 to 15 ,,

EXTRACTUM BELLADONNÆ LIQUIDUM (B.).

Liquid Extract of Belladonna.

Description.—The above-named preparation is a liquid extract containing $\frac{3}{4}$ grain of the alkaloids of Belladonna Root in 110 minims, or 0·75 gramme in 100 c.c.

EXTRACTUM BELLADONNÆ VIRIDE (B.).

Green Extract of Belladonna.

Mode of Preparation.—Bruise in a mortar 112 pounds of the fresh leaves and young branches of *Atropa Belladonna*, and press out the juice. Heat it gradually to 54·4° C., and separate the green colouring matter by a calico filter. Heat the strained liquor to 93·3° C. to coagulate the albumin, and again filter. Evaporate the filtrate by a water-bath to the consistence of a thin syrup. Add to it the green colouring matter previously separated and passed through a hair-sieve, and, stirring the whole together thoroughly, continue the evaporation at a temperature not exceeding 60° C., until the extract is of a suitable consistence for forming pills.

Dose.—*Man* - - - - $\frac{1}{4}$ to 1 grain.
Dog - - - - $\frac{1}{2}$ to 4 grains.
Pig - - - - 1 to 6 ,,
Sheep - - - - 5 to 25 ,,
Horse - - - - $\frac{1}{2}$ to $1\frac{1}{2}$ drachms.
Ox - - - - 1 to 2 ,,

EXTRACTUM CANNABIS INDICÆ (A.[1] and B.).

Extract of Indian Hemp.

Mode of Preparation.—Exhaust coarsely powdered Indian hemp with alcohol (90 per cent.) by percolation, and evaporate the percolate to a soft consistence.

Dose.—*Man* - - - - ¼ to 1 grain.
Dog - - - - ½ to 3 grains.
Pig - - - - 1 to 12 ,,
Horse - - - - 1 to 1½ drachms.

EXTRACTUM CINCHONÆ LIQUIDUM (B.).[2]

Liquid Extract of Cinchona.

Mode of Preparation.—Take of

Red Cinchona Bark, in No. 60 powder, 20 ounces;
Hydrochloric Acid, 5 fluid drachms;
Glycerine, 2½ fluid ounces;
Alcohol (90 per cent.), a sufficient quantity;
Distilled Water, a sufficient quantity.

Mix with 5 pints of distilled water the acid and glycerine, and add the bark. Macerate, with frequent stirring, in a covered vessel for forty-eight hours; transfer to a percolator, and when the fluid ceases to pass, and the contents of the percolator have been properly packed, continue the percolation with water until 15 pints of liquid have passed, or until that which passes ceases to give a precipitate with an excess of solution of potassium

[1] The United States Pharmacopœia gives more full directions.

[2] The corresponding Fluid Extract of Cinchona of the United States Pharmacopœia is made by mixing 800 c.c. of alcohol with 200 c.c. of glycerine, moistening 1,000 grammes cinchona in No. 60 powder with 350 c.c. of the above mixture, packing firmly in a cylindrical percolator, and pouring on the rest of the menstruum. When the liquid drops from the percolator, the lower orifice is closed, the percolator covered and left for two days. Then the percolation is allowed to proceed, and when the liquid in the percolator has gone from the surface, gradually pour on a mixture of 800 c.c. alcohol and 200 c.c. water, and continue percolation. Reserve the first 750 c.c. of the percolate. Evaporate the rest to a soft extract, and dissolve it in the reserved portion, and add enough of a similar mixture of eight parts by volume of alcohol to two of water to make the product up to 1,000 c.c.

hydroxide. Evaporate the percolated liquid in a porcelain or enamelled iron vessel at a temperature not exceeding 82·2° C., until it is reduced to 20 fluid ounces.

Then ascertain the alkaloidal strength of the liquid, and then evaporate it or dilute it so that every fluid part containing 5 grammes of alkaloids in all may be brought to the volume of 85 c.c. Then add to each such fluid part 12·5 c.c. of the alcohol, and finally adjust the volume to 100 c.c. by the addition of distilled water, so that 100 c.c. contains 5 grammes of the alkaloids, or 110 minims contains 5 grains.

Dose.—*Man* - - - - 5 to 15 minims.
Dog - - - - 5 to 30 ,,
Pig - - - - 10 to 60 ,,
Horse - - - - 1 to 4 fluid drachms.

EXTRACTUM CONII (A.).

Extract of Conium.

Mode of Preparation.—Mix 20 c.c. of acetic acid with 980 c.c. of diluted alcohol; moisten 1,000 grammes of conium in No. 40 powder with 300 c.c. of the mixture, pack firmly in a cylindrical percolator, and add more of the above fluid to leave a layer above the solid. When dropping begins, close the lower orifice, closely cover the percolator, and set it aside for two days. Let the percolation then go on, gradually adding diluted alcohol, until 3,000 c.c. have been collected. Reserve the first 900 c.c., and evaporate the rest in a porcelain capsule at no higher than 50° C. to 100 c.c., mix this with the reserved portion, and evaporate at or below the same heat to a pilular consistence.

Dose.—*Dog* - - - - $\frac{1}{4}$ to 1 grain.
Pig - - - - 1 to 3 grains.
Sheep - - - - $1\frac{1}{2}$ to 4 ,,
Horse - - - - 5 to 15 ,,
Ox - - - - 10 to 20 ,,

EXTRACTUM CONII FLUIDUM (A.).

Fluid Extract of Conium.

Mode of Preparation.—Make a mixture of 20 c.c. acetic acid with 980 c.c. diluted alcohol. Add to 1,000 grammes conium in No. 40 powder 300 c.c. of this mixture, pack firmly in

a cylindrical percolator, add sufficient additional quantity of the mixture to leave some of it above the powder. When the fluid begins to drop from the percolator, close its lower opening and its upper orifice securely, and leave for two days. Then let the percolation go on, and add more diluted alcohol by degrees, until the conium is exhausted. The first 900 c.c. which come through should be set aside. The rest should be evaporated in a porcelain capsule at 50° C. to a soft extract, which should then be dissolved in the reserved 900 c.c., and sufficient alcohol should be added to make up to 1,000 c.c.

Dose.—*Dog* - - - - 1 to 4 minims.
Pig - - - - 4 to 12 ,,
Sheep - - - - 5 to 15 ,,
Horse - - - - ½ to 1 fluid drachm.
Ox - - - - 1 to 1½ ,, drachms.

EXTRACTUM ERGOTÆ (B.).[1]

Extract of Ergot.

Synonym.—Ergotin.

Mode of Preparation.—Moisten 1,000 grammes ergot in No. 40 powder with 500 c.c. alcohol (60 per cent.), pack in a percolator, and percolate until exhaustion of ergot. Evaporate the percolate to 250 c.c., add 250 c.c. distilled water, and filter when cold, washing the residue with more distilled water. Add 47 c.c. diluted hydrochloric acid to the filtrate and leave for twenty-four hours, filter, wash the residue with distilled water until the washings give no acid reaction, adding the washings to the filtrate, and also 20 grammes sodium carbonate, and finally evaporate to a soft extract.

Dose.—*Man* - - - - 2 to 8 grains.
Horse - - - - 10 to 20 ,,
Cattle - - - - 20 to 30 ,,

Preparation.—Injectio Ergotæ Hypodermica.

[1] The Extract of Ergot of the United States Pharmacopœia is made by evaporation of the fluid extract of the same Pharmacopœia in a porcelain capsule on a water-bath, at a temperature not higher than 50° C., constantly stirring until it is of pilular consistence.

EXTRACTUM ERGOTÆ LIQUIDUM (B.).[1]

Liquid Extract of Ergot.

Mode of Preparation.—Digest 400 grammes crushed ergot in 2,000 c.c. of distilled water for twelve hours. Draw off the infusion, and repeat the digestion with 1,000 c.c. of distilled water. Press out, strain, and evaporate the liquids by means of a water-bath to 280 c.c., and, when cold, add 150 c.c. alcohol (90 per cent.). Allow the mixture to stand for an hour to coagulate the albumin, and then filter. The product should measure 400 c.c.

Dose.—

Dog	7 to 20	minims.
Man	10 to 30	,,
Pig	15 to 45	,,
Sheep	½ to 1	fluid drachm.
Horse	2 to 5	,, drachms.
Ox	½ to 1	,, ounce.

EXTRACTUM EUONYMI (A.).

Extract of Euonymus.

Mode of Preparation.—Mix 600 c.c. alcohol with 300 c.c. water, and moisten 1,000 grammes euonymus in No. 30 powder with 400 c.c. of the mixture, pack it firmly in a cylindrical percolator, add sufficient menstruum to saturate the powder and leave some above it. When the liquid drops from the percolator, close the lower orifice, cover the percolator closely, and leave for two days. Allow the percolation to go on, gradually add the same mixture of alcohol and water as before, until 3,000 c.c. of tincture are obtained. Distil off the alcohol by a water-bath,

[1] The Fluid Extract of Ergot is prepared thus: Mix 20 c.c. acetic acid with 980 c.c. diluted alcohol (about 41 per cent. by weight), and moisten 1,000 grammes ergot, recently ground, and in No. 60 powder, with 300 c.c. of the mixture, pack it firmly in a cylindrical percolator, and add enough of the mixture to saturate the powder and leave a stratum above it. When the liquid drops from the percolator, close the lower orifice, closely cover the percolator and leave it for two days. Allow the percolation to go on, gradually adding more alcohol. Reserve the first 850 c.c. of the percolate, and evaporate the remainder in a porcelain capsule, at no higher than 50° C., to a soft extract. Dissolve this in the reserved portion, and add sufficient diluted alcohol to make 1,000 c.c. (U.S.P.)

place the remainder in a porcelain capsule, and evaporate on a water-bath to a suitable consistence.

EXTRACTUM EUONYMI SICCUM (B.).

Dry Extract of Euonymus.

Mode of Preparation.—Moisten 1,000 grammes (20 ounces) of euonymus bark in No. 20 powder with 500 c.c. (10 fluid ounces) of alcohol (45 per cent.), pack in a percolator, pour on more alcohol until the euonymus is exhausted, collect the fluid, allow the alcohol to evaporate, dry the residue thoroughly, and then powder it and mix it with one-fourth of its weight of phosphate of calcium, and dry and powder until satisfactory, and then transfer to a well-closed bottle.

Dose.—*Man* - - - - - 1 to 2 grains.

EXTRACTUM FILICIS LIQUIDUM (B.).

Liquid Extract of Male Fern.

Mode of Preparation.—Closely pack 2 pounds of Male Fern rhizome in No. 20 powder into a percolator, and exhaust it by passing 4 pints or more of ether slowly through it, until it passes through without colour. Let the ether evaporate on a water-bath, or recover it by distillation, and preserve the oily extract.

Dose.—*Dog and Cat* - - - 10 to 60 minims.
Sheep - - - - 30 to 60 ,,
Man - - - - 45 to 90 ,,
Pig - - - - ½ to 2 fluid drachms.
Horse - - - - 2 to 7 ,, ,,
Ox - - - - 4 to 9 ,, ,,

EXTRACTUM GELSEMII FLUIDUM (A.).

Fluid Extract of Gelsemium.

Mode of Preparation.—Moisten 1,000 grammes of gelsemium in No. 60 powder with 300 c.c. of alcohol, and pack firmly in a cylindrical percolator, add sufficient alcohol to saturate the powder, and leave a quantity above it. When the liquid begins to drop from the percolator, close the lower orifice, closely cover the percolator, and macerate for two days. Then let the percolation go on, gradually adding alcohol until the gelsemium

is exhausted. Place apart the first 900 c.c. of percolate, and evaporate the rest which comes over afterwards to a soft extract. Dissolve this extract in the 900 c.c. reserved, and add sufficient alcohol to make the final product measure 1,000 c.c.

Actions and Uses.—Gelsemium depresses the motor part of the cord, producing paralysis, and sensory depression and anæsthesia afterwards. If applied to the eye, the pupil is dilated; but if the drug be given internally, it is contracted, and the ocular and levator palpebræ muscles are paralyzed by the medium of the third or oculo-motor nerve. Large doses cause depression of the heart, failure of respiration, and death by asphyxia. The skin is stimulated. It has been given in tetanus, asthma, whooping-cough, but chiefly in facial neuralgia and sick headache (megrim) in mankind. It certainly has a wonderful effect in alleviating, and sometimes curing, the latter, as the writer can personally testify from a varied experience; but it is well not to rely upon it alone, for it acts better when used in co-operation with other drugs—*e.g.*, quinine, phenacetin, and citrate of caffeine, all in small doses. Gelsemium possesses, however, its own peculiar action, just as guaiacum does in certain forms of rheumatism.

Dose.—*Man and Dog* - - - 5 to 15 minims.
Horse - - - - 1 to 2 fluid drachms.

EXTRACTUM GENTIANÆ (B.).

Extract of Gentian.

Mode of Preparation.—Infuse gentian root sliced in ten times its weight of boiling distilled water for two hours, boil for fifteen minutes, pour off, press, and strain. Then evaporate the liquor by a water-bath until the extract is of a suitable consistence for forming pills.

Dose.—*Man* - - - - 2 to 8 grains.
Dog - - - - 2 to 10 ,,
Pig - - - - 5 to 20 ,,
Horse - - - - 1 to 3 drachms.
Ox - - - - 1½ to 5 ,,

EXTRACTUM GENTIANÆ (A.).

Extract of Gentian.

Mode of Preparation.—Moisten 1,000 grammes gentian in No. 20 powder with 400 c.c. water, and leave for one day; pack

it in a conical percolator, and gradually pour water on it, until the infusion is very weak. Boil the liquid to three-quarters of its bulk, strain, and by a water-bath evaporate to a pilular consistence.

EXTRACTUM GLYCYRRHIZÆ LIQUIDUM (B.).[1]

Liquid Extract of Liquorice.

Mode of Preparation.—Mix 1,000 grammes (20 ounces) of liquorice root in No. 20 powder with 2½ litres (2½ pints) of distilled water, set aside for one day, strain, and press. To the pressed marc add 2½ litres (2½ pints) of distilled water, set aside for 6 hours, strain, and press. Mix the two resulting strained liquids, heat to 100° C., strain through flannel, evaporate until the fluid has acquired, when cold, a specific gravity of 1·2, add to this one-fourth of its volume of alcohol (90 per cent.), let the mixture stand for twelve hours, and filter.

Actions and Uses.—Liquorice increases the flow of saliva and mucus, and is used for sore throat and cough. As it possesses the power of disguising and covering the taste of nearly every drug, however bitter and nasty it may be, and as children are often very partial to Spanish juice, as also, indeed, are adults, it is an exceedingly valuable flavouring agent, for, by the aid of it, one may be successful with children in cases requiring the use of unpalatable drugs.

Dose.—

Man and Dog	¼ to 1	fluid drachm.
Pig	½ to 2	,, drachms.
Horse	1 to 6	,, ,,

If used for flavouring, smaller amounts may suffice.

EXTRACTUM HYOSCYAMI VIRIDE (B.).[2]

Green Extract of Hyoscyamus.

Mode of Preparation.—Press out from fresh leaves, flowering tops, and young branches of *Hyoscyamus niger* (Linn.) the juice,

[1] The United States Pharmacopœia has three Extracts of Liquorice: Extractum Glycyrrhizæ, Extractum Glycyrrhizæ Fluidum, and Extractum Glycyrrhizæ Purum. The above British Pharmacopœia Extract suffices for nearly all purposes.

[2] The United States Pharmacopœia has Extractum Hyoscyami and Extractum H. Fluidum.

and heat it gradually to 54·4° C., remove the green colouring matter by a calico filter, heat the strained fluid to 93·3° C., filter. Evaporate the filtrate to a thin syrupy state, add to it the green colouring matter after it has been passed through a hair-sieve. Stir the mixture, and evaporate at 60° C. to a soft extract.

Dose.—

Man	2 to 8 grains.
Dog	2 to 10 ,,
Pig	5 to 15 ,,
Sheep	5 to 20 ,,
Horse	1 to 2 drachms.
Ox	1 to 3 ,,

EXTRACTUM IPECACUANHÆ LIQUIDUM (B.).[1]

Liquid Extract of Ipecacuanha.

Description.—A liquid extract containing about 2¼ grains of the alkaloids of ipecacuanha root in 110 minims, or about 2·25 grammes in 100 c.c.

Mode of Preparation.—Moisten 800 grammes of ipecacuanha root in No. 20 powder with 300 c.c. of alcohol (90 per cent.). Pack firmly in a percolator, add more alcohol, and, when drops fall through, close the lower orifice, and set aside for one day. Allow percolation of 675 c.c., and reserve that part. Let the process continue until it is nearly exhausted, mix 80 grammes of calcium hydroxide with the marc and leave for one day, and let the percolation go on until it ceases. Distil off the alcohol from the two last quantities collected, and finally dissolve the remaining extract in the reserved portion.

Dose.—As expectorant :

Man	½ to 2 minims.

As emetic :

Man	about 17½ minims.

EXTRACTUM JABORANDI LIQUIDUM (B.).

Liquid Extract of Jaborandi.

Mode of Preparation.—Moisten 1,000 grammes (20 ounces) of jaborandi leaves in No. 20 powder with 500 c.c. (10 fluid

[1] The United States Pharmacopœia has Extractum Ipecacuanhæ Fluidum.

ounces) of alcohol (45 per cent.). Pack in a percolator, and set aside for twelve hours, then percolate with the menstruum, collecting and reserving 850 c.c. (17 fluid ounces) of percolate. Continue percolation until $2\frac{1}{2}$ litres more (or 50 fluid ounces) of percolate is obtained. Distil the latter so as to recover the alcohol, evaporate the residual aqueous liquid to the consistence of a soft extract, adding it to the reserved percolate. To the product add enough alcohol to produce 1,000 c.c. of liquid extract (or 20 fluid ounces).

Dose.—*Dog* - - - - 2 to 5 minims.
Pig - - - - 4 to 10 ,,
Man - - - - 5 to 15 ,,
Horse - - - - 15 to 30 ,,

EXTRACTUM JALAPÆ (B.).[1]

Extract of Jalap.

Mode of Preparation.—Macerate 1 pound of jalap in coarse powder in 4 pints of alcohol (90 per cent.) for seven days, press out the tincture, filter, remove the alcohol by distillation, leaving a soft extract. Macerate the residue of the jalap in 1 gallon of distilled water for four hours, express, strain through flannel, evaporate to a soft extract. Mix the two extracts, and evaporate at a temperature not higher than 60° C. to a firm extract.

Dose.—*Man* - - - - 2 to 8 grains.
Dog - - - - 10 to 30 ,,
Pig - - - - $\frac{1}{2}$ to 1 drachm.

EXTRACTUM KRAMERIÆ (A.[2] and B.).

Extract of Krameria.

Mode of Preparation.—Macerate coarsely-powdered krameria root in twice its weight of distilled water for twenty-four hours.

[1] The Extract of Jalap of the United States Pharmacopœia is made in a similar manner.

[2] The Extractum Krameriæ Fluidum of the United States Pharmacopœia, made with 1,000 grammes of Krameria in No. 30 powder, 100 c.c. of Glycerine, and enough Diluted Alcohol to make by the percolation process 1,000 grammes, is a better preparation.

Pack in a percolator, and percolate with more distilled water, until the root is exhausted. Evaporate the liquid to dryness.

Dose.—*Dog* - - - - 2 to 10 grains.
Man - - - - 5 to 15 ,,
Pig - - - - 5 to 20 ,,
Horse - - - - 1 to 1½ drachms.

EXTRACTUM LEPTANDRÆ (A.).

Extract of Leptandra.

Mode of Preparation.—Mix 750 c.c. of alcohol with 250 c.c. of water, and moisten 1,000 grammes of leptandra in No. 40 powder with 400 c.c. of the mixture of alcohol and water. Pack firmly in a cylindrical percolator, and add sufficient menstruum to saturate the powder and leave a quantity above it. When the fluid begins to drop from the lower orifice, close it firmly, cover the percolator closely, and macerate for two days. Then let the percolation go on, gradually adding menstruum mixed in the same proportion as previously, until the leptandra is exhausted. Distil the alcohol off by a water-bath, and evaporate the residue on a water-bath to a consistence suitable for pills.

Preparation.—Pilulæ Catharticæ Vegetabiles.

Use.—As a cathartic in bilious or costive conditions.

Dose.—*Man* - - - - 2 to 4 grains.

EXTRACTUM NUCIS VOMICÆ (B.).[1]

Extract of Nux Vomica.

Description.—The extract contains 5 per cent. of strychnine.

Mode of Preparation. — Find the amount of milk-sugar required for 500 c.c. of the liquid extract thus:—Evaporate 50 c.c. liquid extract of nux vomica in a counterpoised dish on a water-bath to a firm extract, and weigh. The difference between this weight and 15 grammes multiplied by 10 is the weight of milk-sugar required for the remaining 500 c.c. liquid extract of nux vomica. Now distil off the alcohol from 500 c.c. liquid extract of nux vomica, and add the amount of milk-sugar as above found necessary, mix, and evaporate to a firm extract, which should weigh 150 grammes.

[1] The Extract of Nux Vomica of the United States Pharmacopœia is made differently.

Dose.—*Cat* - - - - $\frac{1}{100}$ grain.
Dog - - - - $\frac{1}{80}$ to $\frac{1}{40}$ grain.
Man - - - - $\frac{1}{4}$ to 1 ,,
Pig - - - - $\frac{1}{2}$ to $1\frac{1}{4}$ grains.
Sheep - - - - 1 to 2 ,,
Horse - - - - 4 to 8 ,,
Ox - - - - 5 to 10 ,,

EXTRACTUM NUCIS VOMICÆ LIQUIDUM (B.).[1]

Liquid Extract of Nux Vomica.

Description.—A liquid extract containing $1\frac{1}{2}$ grains of strychnine in 110 minims, or 1·5 grammes in 100 c.c.

Mode of Preparation.—Moisten 500 grammes of nux vomica in No. 20 powder with 250 c.c. of alcohol (70 per cent.), leave in a covered vessel for six hours, and then firmly pack in a percolator. Pour on more alcohol, so as to leave a layer of it above the powder. When the liquid flows through, close the lower aperture, set aside for one day, let slow percolation continue, adding more alcohol, until 375 c.c. can be reserved. Change the receiver, and let 1,875 c.c. of alcohol be added by degrees. Press the marc, add the expressed liquid to the weaker portion of the percolate, distil off the alcohol, evaporate the remainder to 31 c.c., and then add 93 c.c. of alcohol (90 per cent.). Add this to the reserved portion, leave for 1 day, pour off the clear liquid, and filter the rest.

Dose.—*Man* - - - - 1 to 3 minims.

EXTRACTUM OPII (B.).[2]

Extract of Opium.

Mode of Preparation. — Macerate 1 pound of opium in 2 pints of distilled water for twenty-four hours, and express the liquid. Thoroughly mix the residue of the opium with 2 pints of water, macerate again for twenty-four hours, and express. Repeat the operation a third time. Mix the liquids, strain through

[1] The corresponding Fluid Extract of Nux Vomica of the United States Pharmacopœia is prepared with Acetic Acid and Alcohol, but is of the same strength, so that 100 c.c. contain 1·5 grammes total alkaloids.

[2] Extract of Opium of the United States Pharmacopœia is made differently, with Sugar of Milk and Water.

flannel, and evaporate by a water-bath until the product weighs ½ pound. Extract of opium should contain about 20 per cent. of morphine, and in order to obtain it of proper strength, stronger and weaker extracts may be mixed, or stronger extracts may be diluted with distilled water or with milk-sugar.

Preparation.—Extractum Opii Liquidum (¾ ounce in 1 pint).

Dose.—

Man	¼ to 1 grain.
Dog	½ to 1 ,,
Pig	1 to 8 grains.
Horse	20 grains to 1 drachm.

EXTRACTUM OPII LIQUIDUM (B.).

Liquid Extract of Opium.

Strength.—This contains in 110 minims, ¾ grain of morphine; 100 c.c., 0·75 gramme of morphine.

Mode of Preparation.—Mix 18·75 grammes of extract of opium with 400 c.c. of distilled water, stir often for one hour, add 100 c.c. of alcohol (90 per cent.), leave for one day in a cool place, filter. There should be 500 c.c., and the specific gravity should be about 0·990.

Dose.—*Man* - - - - 5 to 30 minims.

EXTRACTUM PHYSOSTIGMATIS (B.).[1]

Extract of Calabar Bean.

Mode of Preparation.—Mix 1,000 gramems of Calabar bean in No. 40 powder with 1,250 c.c. alcohol (90 per cent.) in a vessel, and leave it closed for two days, shaking now and again, then place the mixture in a percolator, and add when necessary more alcohol up to 5 litres in all, take out the marc and press it, and add the liquid expressed to the percolate, filter, distil off the greater part of the alcohol, and then place the residue in a counterpoised basin, and evaporate until it becomes a soft mass, weigh, add three times its weight of milk-sugar, and mix well.

Dose.—

Dog	1/16 to ¼ grain.
Pig	⅛ to ½ ,,
Man	¼ to 1 ,,
Horse	1 to 2 grains.
Ox	1 to 3 ,,

[1] The United States Pharmacopœia Extract is not the same.

EXTRACTUM QUASSIÆ (A.).

Extract of Quassia.

Mode of Preparation.—Moisten 1,000 grammes of quassia in No. 20 powder with 400 c.c. of water, pack firmly in a conical percolator, and gradually pour water on it until what passes is only slightly bitter. Boil the liquid to three-quarters of its bulk, strain, and finally evaporate by means of a water-bath to a consistence suitable for pills.

Dose.—*Dog* - - - - 2 to 10 grains.
Pig - - - - 4 to 10 ,,
Horse - - - - 1 to 1½ drachms.

EXTRACTUM SCOPARII FLUIDUM (A.).

Fluid Extract of Scoparius.

Mode of Preparation.—Moisten 1,000 grammes of scoparius in No. 60 powder with 350 c.c. of diluted alcohol, pack closely in a cylindrical percolator, and add enough diluted alcohol to saturate the powder and leave a quantity above it. When the liquid begins to drop from the lower orifice close it, cover the percolator, and macerate for two days. Then allow the percolation to go on, gradually adding diluted alcohol, until the scoparius is exhausted. Reserve the first 850 c.c. of the percolate, evaporate the remainder to a soft extract, and then dissolve it in the reserved portion, finally adding sufficient diluted alcohol to make 1,000 c.c. in all.

EXTRACTUM STILLINGIÆ FLUIDUM (A.).

Fluid Extract of Stillingia.

Mode of Preparation.—Moisten 1,000 grammes of stillingia in No. 40 powder with 300 c.c. of diluted alcohol, and pack closely in a cylindrical percolator, add sufficient of the menstruum to saturate the powder and leave a quantity above it. When the liquid begins to drop, close the orifice, cover the percolator, and macerate for two days. Then allow the percolation to go on, gradually adding more menstruum, until the stillingia is exhausted. Place aside the first 850 c.c. of percolate, and evaporate the rest to a soft extract, then dissolve the latter in the reserved portion, and add more menstruum to make 1,000 c.c. in all.

FERRI ARSENAS (B.).

Arsenate of Iron.

Chemical Composition.—The formula of Arsenate of iron is—

$$Fe_3(AsO_4)_2,6H_2O;$$

but the salt generally contains some ferric arsenate and some iron oxide.

Mode of Preparation.—Take of

Sulphate of Iron, 20¾ ounces;
Arsenate of Sodium dried at 148·9° C., 26½ ounces;
Bicarbonate of Sodium, 4½ ounces;
Boiling Distilled Water, a sufficient quantity.

Dissolve the arsenate of sodium in about 5 pints, and the sulphate of iron in about 6 pints of the water, mix the two solutions, adding the bicarbonate of sodium dissolved in a little distilled water. Stir thoroughly. Collect the white precipitate on a calico filter, and wash until the washings cease to be affected by a diluted solution of chloride of barium. Squeeze the washed precipitate between folds of strong linen in a screw-press, and dry it on porous bricks in a warm air-chamber, the temperature of which does not exceed 37·8° C.

Characters.—Arsenate of iron is a tasteless, amorphous powder of a greenish colour.

Tests.—It is insoluble in water, but readily soluble in hydrochloric acid. The solution in hydrochloric acid gives a copious light-blue precipitate with ferrocyanide of potassium, and a still more abundant one of a deeper colour with ferricyanide of potassium. A small quantity, boiled with excess of hydrate of sodium and filtered, gives, when exactly neutralized by nitric acid, a brick-red precipitate on the addition of solution of nitrate of silver. The solution in hydrochloric acid, when diluted, gives no precipitate with chloride of barium.

Therapeutics.—Arsenate of iron combines the properties of its two elements, and is prescribed with other remedies as a tonic and alterative in horses.

Dose.—*Man* - - - - - - - $\frac{1}{16}$ to $\frac{1}{4}$ grain.
Horse - - - - - - - 5 to 10 grains.

FERRI CARBONAS SACCHARATUS (A.[1] and B.).

Saccharated Carbonate of Iron.

Chemical Composition.—Saccharated carbonate of iron consists of ferrous oxycarbonate, $xFeCO_3yFe(OH)_2$, mixed with some peroxide of iron and sugar. The carbonate, if reckoned as anhydrous, forms about one-third of the mixture.

Mode of Preparation.—Take of

Sulphate of Iron, 2 ounces;
Carbonate of Ammonium, 1¼ ounces;
Boiling Distilled Water, 2 gallons;
Refined Sugar, 1 ounce.

Dissolve the sulphate of iron and the carbonate of ammonium each in half a gallon of boiling distilled water, and add the former to the latter solution

[1] The United States Pharmacopœia preparation is made differently,

with brisk stirring in a deep cylindrical vessel, which must then be covered as accurately as possible. Set the mixture by for twenty-four hours, and from the precipitate which has subsided separate the supernatant solution by a siphon. Add 1½ gallons of boiling distilled water, stir well, and, after subsidence, again remove the clear solution. Collect the resulting carbonate on a calico filter, subject it to expression, and rub it with 1 ounce of refined sugar in a porcelain mortar. Finally, dry the mixture at a temperature not exceeding 100° C.

Characters.—Saccharated carbonate of iron consists of small coherent lumps, or powder of a brownish colour, with a sweet and characteristic taste of iron.

Tests.—It dissolves, like other carbonates, with effervescence in warm hydrochloric acid diluted with half its volume of water, and the solution should give but a very slight precipitate with chloride of barium.

Therapeutics.—The saccharated carbonate of iron is often prescribed for dogs, for which it is a very suitable preparation.

Dose.—*Dog*	- - - - -	3 to 10 grains.
Pig	- - - - -	5 to 20 ,,
Man	- - - - -	7 to 25 ,,
Horse	- - - - -	1 to 2 drachms.

FERRI ET AMMONII CITRAS (A. and B.).[1]

Citrate of Iron and Ammonium.

Mode of Preparation.—Take of

Solution of Persulphate of Iron, 10 fluid ounces (or a sufficiency);

Solution of Ammonia, 23 fluid ounces (or a sufficiency);

Citric Acid, 4 ounces;

Distilled Water, a sufficiency.

Mix 16 fluid ounces of the solution of ammonia with 2 pints of distilled water, and to this add gradually the solution of persulphate of iron, previously diluted with 2 pints of distilled water, stirring them constantly and well, and taking care that ammonia is, even finally, in slight excess, as indicated by the odour. Let the mixture stand for two hours, and stir occasionally. Then put it on a calico filter, and when the liquid has drained away, wash the precipitated ferric hydroxide with distilled water until that which passes through the filter ceases to give a precipitate with chloride of barium. Dissolve the citric acid in 4 ounces of distilled water, submit the solution to the heat of a water-bath, add the ferric hydroxide, and stir them well together, until nearly the whole of the hydroxide has dissolved, or until the citric acid is

[1] The United States Pharmacopœia preparation is made differently

saturated with ferric hydroxide, a little more of which, if necessary, may be prepared and added. Let the solution cool, and then add 5½ fluid ounces of solution of ammonia. Filter through flannel, adding a little more distilled water if necessary. Evaporate to the consistence of syrup, maintaining the presence of a very slight excess of ammonia, and dry in thin layers on flat porcelain or glass plates at a temperature not exceeding 37·8° C. Remove the dry salt in flakes, and preserve in a stoppered bottle.

Characters.—Citrate of iron and ammonium exists in thin transparent scales of a deep red colour. Its taste is slightly sweetish and astringent.

Tests.—It feebly reddens blue litmus, is soluble in half its weight of water, and almost insoluble in alcohol (90 per cent.).

When heated with solution of potassium or sodium hydroxide, like all salts of ammonium, it evolves the gas ammonia, and deposits ferric hydroxide. The alkaline solution from which the iron has thus separated does not, when slightly supersaturated with acetic acid, give any crystalline deposit, thus indicating the absence of tartrate.

When incinerated with free exposure to air, it leaves about 31·5 per cent. of peroxide of iron, which is not alkaline, thus showing that fixed alkali is absent.

Therapeutics.—The citrate of iron and ammonium is a very useful form in which to prescribe iron, especially to human beings, horses, and dogs.

Dose.—

Dog - - - -	3 to 10 grains.
Man - - - -	5 to 10 ,,
Pig - - - -	5 to 20 ,,
Horse - - - -	1 to 2 drachms.

FERRI ET QUININÆ CITRAS (A.[1] and B.).

Citrate of Iron and Quinine.

Mode of Preparation.—Ferric hydrate, freshly prepared by precipitating a solution of persulphate of iron by ammonia, is dissolved in solution of citric acid. Quinine is then precipitated from a solution of sulphate of quinine in a little diluted sulphuric acid, by means of ammonia. The quinine thus prepared is added to the solution of ferric hydrate in citric acid, and the mixture is

[1] The United States Pharmacopœia gives a different mode of preparation.

exposed to the heat of a water-bath, until the quinine is dissolved. The solution of the double citrate which is formed is then evaporated in thin layers on porcelain or glass plates, just as in the case of the ammonio-citrate of iron.

Characters.—Citrate of iron and quinine exists in the form of thin scales of a greenish-golden-yellow colour. It is slightly deliquescent, and entirely soluble in cold water. The taste is bitter, like quinine, and also chalybeate.

Tests.—The solution is very slightly acid.

With solution of hydrate of sodium a reddish-brown precipitate is formed, with solution of ammonia a white precipitate, with ferrocyanide and with ferricyanide of potassium a blue, and with tannic acid a grayish-black. When the salt is burned with exposure to air, it leaves a residue which, when moistened with water, is not alkaline in reaction.

Doses of Citrate of Iron and Quinine:

Dog	3 to 10 grains.
Man	5 to 10 ,,
Pig	5 to 20 ,,
Horse	1 to 2 drachms.

FERRI PEROXIDUM HYDRATUM (A.).[1]

Hydrated Peroxide of Iron.

Formula.—Fe_2O_3,H_2O, or $Fe_2O_2(HO)_2$.

Mix 4 fluid ounces of solution of persulphate of iron with a pint of distilled water, and add this diluted solution gradually to 33 fluid ounces of solution of hydrate of sodium, stirring them constantly and briskly. Let the mixture stand for two hours, stirring occasionally, and then put it on a calico filter. When the liquid has drained away, wash the precipitated ferric hydrate with distilled water, until the washings cease to give a precipitate with chloride of barium. Dry the peroxide at a temperature not exceeding 100° C., until it ceases to lose weight, and then reduce it to a fine powder.

Characters.—Hydrated peroxide of iron is a reddish-brown, tasteless, and non-magnetic powder.

Tests.—It dissolves completely with the aid of heat in hydrochloric acid, diluted with half its volume of water. The solution in hydrochloric acid gives a copious blue precipitate with ferrocyanide of potassium, but none with the ferricyanide of the same metal. If heated to dull redness in a test-tube, hydrated peroxide of iron yields about 10 per cent. of moisture.

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[1] The United States Pharmacopœia gives Ferri Oxidum Hydratum, Ferric Hydrate, $Fe_2(OH)_6$, and the mode of preparation is by acting on 100 c.c. of Solution of Ferric Sulphate with 110 c.c. of Ammonia Water, and water.

Therapeutics.—Hydrated peroxide of iron is prescribed in cases of acute arsenical poisoning, against which it has valuable antidotic properties, forming with arsenious acid an almost insoluble compound (a basic arsenite).

Dose.—*Man and Dog* - - - - 5 to 30 grains.
Pig - - - - - - 15 grains to 1 drachm.
Horse - - - - - 2 drachms to 1 ounce.
The dose may be repeated at intervals of a quarter of an hour.

FERRI PHOSPHAS (B).[1]

Phosphate of Iron.

Chemical Composition.—Hydrous ferrous phosphate, $Fe_3(PO_4)_2 8H_2O$, must be present to the extent of at least 47 per cent. Ferric phosphate and some oxide are also generally present in the powder.

Mode of Preparation.—Dissolve 3 ounces of sulphate of iron in 30 ounces of boiling distilled water, and also $2\frac{3}{4}$ ounces of phosphate of sodium in 30 ounces of boiling distilled water. When both solutions have cooled to about 46° C., add the latter to the former solution, at the same time adding an aqueous solution of $\frac{3}{4}$ ounce of bicarbonate of sodium. Mix the three solutions thoroughly, transfer the precipitate which is formed to a calico filter, and wash it with hot distilled water, until the filtrate ceases to give a precipitate with solution of chloride of barium, thereby proving that no sulphate is left, mixed with the phosphate of iron. Finally, dry the precipitated phosphate of iron at a temperature not higher than 48·9° C.

Character.—Phosphate of iron is a slate-blue amorphous powder.

Tests.—It is insoluble in water, but soluble in hydrochloric acid, forming proto-chloride and perchloride of iron, etc. This solution gives a blue precipitate with both the ferrocyanide and the ferricyanide of potassium. The precipitate produced by ferricyanide should be the most abundant, proving that ferrous phosphate is in excess of the ferric phosphate. When phosphate of iron is treated with tartaric acid and an excess of ammonia, and finally with a solution of ammonio-sulphate of magnesium, a crystalline precipitate of phosphate of magnesium is produced. When the salt is boiled in hydrochloric acid, together with a strip of pure copper, no dark deposit should form on the copper (absence of mercury and arsenic).

Preparation.—Syrupus Ferri Phosphatis.

Therapeutics.—The syrup of phosphate of iron is a very useful preparation for rickets, debility, and in recovery from distemper and other diseases.

Dose.—*Dog* - - - - - 3 to 10 grains.
Man - - - - - 5 to 10 ,,
Pig - - - - - 5 to 20 ,,
Horse - - - - - 1 to 2 drachms.

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[1] In the United States Pharmacopœia are: Ferri Phosphas Solubilis and Ferri Pyrophosphas Solubilis; but the modes of preparation are not the same in either case as that of the above British Pharmacopœia phosphate.

FERRI SULPHAS (A. and B.).

Sulphate of Iron.

Formula.—$FeSO_4,7H_2O$.

Mode of Preparation.—Pour 1½ pints of distilled water on 4 ounces of pure iron wire in a porcelain dish, add 4 fluid ounces of diluted sulphuric acid, and when the evolution of the gas hydrogen has nearly ceased, boil for ten minutes. Filter through filtering-paper, and, after the lapse of twenty-four hours, separate the crystals which will have been deposited from the solution. Dry them on filtering-paper placed on porous bricks, and preserve in a stoppered bottle.

Characters.—Sulphate of iron exists in oblique rhombic prisms, which are of a pale-green colour, and possess a styptic taste.

Tests.—The salt is insoluble in alcohol (90 per cent.), but soluble in less than two parts of water, giving a clear solution, thereby proving the absence of oxysulphate.

The aqueous solution is clear, gives a white precipitate with chloride of barium, a blue one with ferricyanide of potassium, a white or generally rather a light-blue one with ferrocyanide of potassium, and no precipitate with sulphide of hydrogen, proving absence of ferric compounds; and no copper, zinc, potassium, sodium, or ammonium should be present.

Therapeutics.—Sulphate of iron is largely employed. It has powerful hæmatinic properties, and consequently proves of great value in anæmia and debility in all classes of patients. Having greater astringent properties than the citrate, it is especially suitable for cases of anæmia accompanied by diarrhœa, and for this reason also it is often prescribed in dysentery. It is rather liable to cause gastric disturbance, more especially if given in the form of a ball, and for this reason the citrate or tartrate are often preferred. As a general tonic, however, it is largely employed in debility depending upon a large diversity of causes. As a vermicide for horses, it is given by the mouth, or as an injection into the rectum. One drachm of the salt administered daily acts beneficially in destroying ascarides. The bowels should be kept open by combining with the iron salt a small dose of aloes.

Owing to the liability to cause gastric derangement, it is advisable not to continue the administration of sulphate of iron longer than eight or nine days.

Externally, sulphate of iron has stimulant and astringent properties, and is employed as a powder or in solution.

Dose.—

Man	1 to 5	grains.
Dog	2 to 10	,,
Sheep	5 to 15	,,
Pig	5 to 20	,,
Horse	1 to 2	drachms.
Ox	1½ to 3	,,

FERRI SULPHAS EXSICCATUS (A. and B.).[1]

Dried Sulphate of Iron.

Formula.—$FeSO_4,7H_2O$.

Mode of Preparation.—Expose sulphate of iron in a porcelain or iron dish to a temperature of 100° C., stirring now and again until aqueous vapour is no longer given off. Reduce the residue, which should weigh about 60 per cent. of the amount first taken, to a fine powder, and preserve it in a stoppered bottle.

Characteristic.—It is a nearly white powder, which is capable of being entirely but slowly dissolved in water.

Dose.—The dose of the dried sulphate is about half of the sulphate.

FERRUM (A. and B.).

Iron.

Description.—The symbol is Fe, and the atomic weight 55·6. For the preparation of the iodide, the sulphate, and the granulated sulphate, annealed iron wire, of about No. 35 wire-gauge (diameter about 0·005 inch), and wrought-iron nails, both of which are non-resilient and free from oxide, should be used.

FERRUM REDACTUM (A. and B.).

Reduced Iron.

Composition.—Reduced iron is a fine powder, and contains at least 75 per cent. of metallic iron, mixed with a variable amount of oxide of iron.

Mode of Preparation.—Add to 1 fluid part of strong solution of perchloride of iron, 5 fluid parts of water. Pour the mixture

[1] The only difference between the British and American preparation is that the former retains only 60 and the latter about 64½ per cent. of the original salt.

into sufficient solution of ammonia diluted with 5 volumes of water, that the whole, after stirring, may still have a distinct odour of ammonia. Wash the ferric hydroxide which is precipitated, until the washings give no precipitate with solution of nitrate of silver. Dry the precipitate, and introduce it into an iron tube, confining it to the middle part of the tube by plugs of asbestos. Raise the tube by means of a furnace to a strong but not bright-red heat, and then cause pure hydrogen to traverse it. This gas is made by acting on zinc with sulphuric acid diluted with eight times its volume of water, and is rendered quite dry by being made to pass firstly through sulphuric acid, which absorbs water, and then through a tube 18 inches long, packed with small fragments of chloride of calcium. The farther end of the iron tube must be connected by a cork with a bent tube which dips under water. When the hydrogen passes through the water at about the same rate that it passes through the sulphuric acid, the furnace should be allowed to cool down to the temperature of the atmosphere, the passage of hydrogen being still continued. The reduced iron, thus prepared by reduction of ferric hydrate, heated to dull redness, by passing dry hydrogen over it, is then removed, and placed in a dry and well-stoppered bottle.

Characters.—Reduced iron is a fine grayish-black powder, strongly attracted by a magnet. When rubbed firmly in a mortar it exhibits metallic streaks.

Tests.—Reduced iron dissolves in hydrochloric acid, setting free the hydrogen of the acid, and uniting with the chlorine, and not giving off any sulphide of hydrogen. The chloride thus formed gives a light-blue precipitate with ferrocyanide of potassium.

Dose.—

Man and Dog - -	1 to 5 grains.
Pig - - - -	15 to 20 ,,
Sheep - - - -	15 to 30 ,,
Horse - - - -	½ to 1 drachm.
Ox - - - -	1 to 2½ drachms.

Therapeutics of Iron and its Salts.—The chief amount of iron is in the hæmoglobin. A man of 70 kilogrammes, or 140 pounds, contains about 3·2 grammes of iron, and of this about 2·55 grammes occur in the blood. An adult excretes about 1 milligramme of iron in the urine daily, and more by the intestine, even in starvation.

A nursing infant takes in daily 0·0033 gramme of iron.

Iron salts enter the circulation as chloride, into which it is converted in the stomach, and alkaline albuminate, into which it is converted in the duodenum, and then combine with the hæmoglobin of the red blood cells. The unabsorbed portion, which is the largest, is excreted as the sulphide. Their special therapeutic value is due to their hæmatinic properties, in virtue of which the number of the red blood corpuscles is increased. In anæmia, therefore, iron is the most important of all medicinal agents. The tonic action of the salts of iron is indirect, being due to the increase in the number of the red cells, and the consequent greater capacity of the blood for absorbing and distributing oxygen throughout the system. As iron passes out of the body, it has an astringent effect. Most of its salts cause constipation, and the more astringent ones, such as the perchloride, pernitrate, and sulphate, have been administered with the object of checking diarrhœa and dysentery in animals. It is important not to give iron in constipated states of the bowels unless it be combined with a purgative, such as aloes or Epsom salts. Iron is only excreted in small quantities by the kidneys. Hæmorrhage from these organs and from the bladder is controlled by iron; passive hæmorrhages also, from the uterus and other mucous surfaces, are arrested, showing a remote hæmostatic power. It has also remote astringent properties, rendering it of value in chronic discharges from the mucous surfaces, and in leucorrhœa especially it is very beneficial.

Reduced iron, saccharated carbonate of iron, dialyzed iron, and the moist peroxide of iron have but little, whilst the sulphate, the solution of the perchloride, and the solution of the pernitrate have great, astringent powers, being therefore especially indicated where the hæmostatic and astringent action are required internally or externally. The citrate and the acetate of iron are the least constipating, and the mildest of the preparations of iron.

Arsenate of iron is given when it is desired to act on the liver or skin; iodide of iron in scrofulous diseases; phosphate of iron in cases of disease of the bones, such as rickets in dogs.

Externally, the persalts of iron have hæmostatic or styptic properties, and are used for that purpose. The strong solution of the perchloride is injected, when mixed with 3 to 6 parts of water, into the uterus, to arrest post-partum hæmorrhage. For this purpose perhaps tincture of iodine is in some cases better,

because iron sometimes causes the formation of clots, which may enter the bloodvessels and cause a fatal issue, or perhaps paralysis. Cotton-wool soaked in a solution of the same strength is also used to stop bleeding from wounds. When a weak solution of a persalt of iron is injected into the rectum, it destroys any worms which may be present. Finally, it should be borne in mind that, unless given with care and caution, the salts of iron are apt to be injurious, and may do much harm. As a rule, they should be given after meals. If arsenic has been taken, a dose of common salt or bicarbonate of sodium should be given, and then repeated doses of 1 fluid ounce of dialyzed iron, diluted with water.

FERRI VALERIANAS (A.).

Valerianate of Iron.

Description and Properties.—It is a dark, brick-red, amorphous powder, with odour of valerianic acid, and an astringent taste. It should be kept in small, well-stoppered bottles, in a cool and dark place. Its chemical composition may slightly vary. Insoluble in cold water, but readily soluble in alcohol. Decomposed by boiling water, the valerianic acid being set free and the ferric hydrate left. If slowly heated, the acid is set free without fusion; but if rapidly heated, it fuses and gives off inflammable vapours smelling of butyric acid, and on complete ignition a residue of ferric oxide is left. The stronger acids decompose it, setting free the valerianic acid.

Dose.—*Dog* - - - - - - 2 to 10 grains.
Pig - - - - - - 5 to 20 ,,
Horse - - - - - - ½ to 2½ drachms.

FILIX MAS (B.).[1]

Male Fern.

Natural Order.—Filices.

Description.—The rhizome, with the persistent bases of the petioles of the plant *Aspidium Filix-mas*, Swartz (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 300), should be collected late in the autumn, divested of its scales, roots, and all dead portions, and carefully and gently dried at a low temperature. It should not be used if more than a year old.

Characters.—The rhizome itself varies from 3 to 6 inches or more in length, and ¾ inch to 1 inch in diameter; but covered as it is by the hard, curved, dark brown bases of the petioles, which have many brown membranous scales on them, it is apparently 2 or more inches broad. Externally it is brown, internally

[1] The United States Pharmacopœia name is Aspidium.

yellowish-white or green. The odour is feeble but disagreeable. The taste is sweetish and astringent at first, but subsequently bitter and nauseous.

Preparation.—Extractum Filicis Liquidum.

Therapeutics.—Male fern is an anthelmintic, and is one of the most effectual remedies for tape-worms, especially in dogs. Its use should be followed by the administration of a purgative, and it should be given to the animal fasting. The powder is very bulky, and it is therefore not nearly so suitable as the liquid extract.

Dose.—Powdered Male Fern:

Lamb	1 to 2 drachms.
Cat	1 to 3 ,,
Dog	2 to 6 ,,
Pig	½ to 1½ ounces.
Horse	4 to 10 ,,
Ox	6 to 12 ,,

Liquid extract:

Man	¾ to 1½ fluid drachms.
Dog	¼ to ½ ,, drachm.
Pig	½ to 2 ,, drachms.
Horse	½ to 1½ fluid ounces.

FORMIC ALDEHYDE.

Chemical Composition.—This gas is an oxide of methylene, CH_2O. It is soluble in 2½ parts of water, forming *formalin*. If the solution be evaporated beyond the point of saturation, the composition becomes $C_3H_6O_3$, paraform, a white crystalline substance, the molecule of which has 12 atoms instead of 4.

If paraform be treated in an open vessel it vaporizes; but the vapour on cooling deposits crystalline paraform by sublimation.

When formaldehyde is heated in an open vessel, formic aldehyde (germicidal) is given off vaporized; but upon the sides of the container, by slow evaporation, paraform is deposited. Paraform can be got from formaldehyde by synthesis or analysis; but it has different properties.

Action and Uses.—A. A. Young says, although formaldehyde was discovered as early as 1863, formalin was until recently used only for hardening pathological specimens for the microscope. It makes the outlines clear and strong. Solutions of 1 to 100,000

destroy the less resistant germs, while the more resistant are killed by solutions of 1 in 1,000 ; and this strength does not affect the human skin, nor mucus, nor albumin.

For disinfecting purposes Trillat's, Novy's, Kinyoun's, and Schering's apparatuses are useful. Or an ordinary can of the kind used for filling coal-oil lamps, with a 3-feet piece of rubber tubing attached, having an end-tube of brass small enough to go through a keyhole, may be placed on a tripod, and strong heat applied, so as to cause rapid vaporization. The 40 per cent. solution should be mixed with an equal volume of saturated solution of boric acid, or a 2 per cent. solution of borax, chloride of calcium, or chloride of sodium, to prevent polymerization. For each 1,000 cubic feet about 20 ounces are necessary, and afterwards the room should be closed for at least eight hours. The room and furniture should have been previously scrubbed with a solution of formaldehyde, and clothes should be soaked in it for twenty-four hours.

For a patient's room a mixture of equal parts of 40 per cent. solution of formaldehyde and alcohol, with a few drops of oil of lavender, may be sprinkled on the floor. Rosenberg mixes menthol with formaldehyde, calling it holzinol. F. Alba and A. Rondelli say that formic aldehyde disinfection should always be followed by bichloride of mercury and steam disinfection. Allow ten hours for disinfection, and twenty-four for escape of the vapour, which may be neutralized with ammonia.

A. C. Jordon advises the preparation of a fresh mixture of 1½ to 5 minims of formalin with 2 fluid drachms of pure glycerin, for throat, mouth, skin, and for urethra. In follicular tonsillitis in early stage, a 2 to 4 per cent. solution of formic aldehyde in glycerin is a specific, causing, however, a little soreness for a few hours. For about threequarters of an hour after the treatment the patient should not drink, and he should have a gargle of chlorate of potassium. In diphtheria, if all the membrane can be treated, success results ; but as a rule some of it is inaccessible to a brush. In scarlet fever, too, a 2 per cent. solution is good as an application to the throat, as also in aphthous stomatitis, in which it can be followed up with Glycerinum Acidi Borici. In ulcerative stomatitis a mixture of 1 per cent. formic aldehyde, 2 per cent. β-eucaine, and 2 per cent. iodine, in glycerin, is very useful, coupled with chlorate of potassium internally.

In gangrenous stomatitis a 4 per cent. solution in glycerin

may be tried. For tuberculous ulcers of pharynx, mouth, tongue, and lips which are tender it is not so suitable.

Skin.—In tinea tonsurans, clean the affected area with turpentine, and then with soft soap and water to remove grease; then soak a piece of lint in a 4 per cent. solution in glycerin, and rub it well in. If there be much inflammation, leave the lint on for a few hours, protected by a layer of wool.

As a urethral injection, 1½ drachms of 1 per cent. solution in glycerin, though it cured a case of gonorrhœa, left pain and difficulty in micturition, due to swelling of the mucous membrane.

It has been used for pulmonary tubercle.

Amyloform is a white powder, made by acting on starch with formaldehyde. It is insoluble in most media, and is not poisonous, used as a dusting-powder.

Dextroform occurs by action of formaldehyde on dextrin. It is soluble in water and glycerin. A 10 to 20 per cent. solution is used for gonorrhœa.

Saliformin is a salicylate of formin, soluble in water and alcohol.

Geoform and creoform result from action of guaiacol or creosote on formaldehyde. They are odourless, tasteless, not poisonous nor irritant, soluble in alcohol, ether, benzol, solution of hydroxide of potassium; insoluble in water and benzine. They are highly antiseptic.

Euformol is an antiseptic mixture of oil of eucalyptus, oil of wintergreen, thymol, menthol, boric acid, fluid extract of wild indigo, and formaldehyde.

Tannoform, or methylene di-tannin, results from mixing formaldehyde with aqueous solution of tannin, and precipitating with hydrochloric acid. It is soluble in alkalies, but insoluble in water, and used for affections of the skin, and intestinal catarrh.

Quinoform, querciform, quebrachinoform, and krameroform are similarly produced from the cinchona, oak, quebracho, and rhatany tannins.

Tannopine, or tannon, is a condensation product of 13 per cent. hexamethylene-tetramine,[1] and 87 per cent. tannin. It is a light-brown powder, tasteless, hygroscopic, soluble in weak alkalies; but not in water, weak acids, alcohol and ether. It has been tried in chronic enteritis and typhoid fever.

For poisoning by formaldehyde the best antidote is a weak solution of ammonia, whereby urotropin[1] is formed, which is not caustic nor poisonous.

[1] Urotropin is the same substance as hexamethylene-tetramine.

GALBANUM (B.).

Galbanum.

Description.—Galbanum is a gum-resin obtained from *Ferula galbaniflua*, Boiss. and Buhse (B. and T., *Med. Pl.*, vol. ii., plate 128), and other species. It exists in the form of tears, or in that of agglutinated tears. The tears are roundish or irregular in form, and vary in size from that of a pea, which is not generally exceeded, to that of a hazel-nut. They are yellowish-brown, orange-brown, yellowish-green, or bluish-green, translucent, usually rough and dirty on the surface, hard and brittle in cold weather, but softer in the warmer weather, and ductile and sticky when exposed to the heat of the hand.

The masses may be yellowish-brown, varying to translucent bluish-green, generally contain pieces of root, stem, and other impurities, and are hard, compact, and irregular in form. The odour is peculiar, aromatic, and not disagreeable. The taste is bitter, somewhat alliaceous and unpleasant.

Therapeutics.—Galbanum is chiefly used in veterinary practice for making charges and plasters. Its properties are similar to those of asafœtida, and it has been administered with the object of allaying spasmodic cough. The dose is the same as that of asafœtida.

Test.—If a small piece be heated to redness in a dry test-tube, and then cooled and dissolved in boiling water, and largely diluted, and made alkaline by adding ammonia, a blue fluorescence is seen.

Doses of Galbanum :

Man	5 to 15 grains.
Dog	5 to 20 ,,
Pig	½ to 1 drachm.
Horse	1 to 4 drachms.

GALLÆ (A. and B.).[1]

Galls.

Natural Order.—Cupuliferæ.

Description.—Galls are excrescences on the tree *Quercus infectoria*, Olivier (B. and T., *Med. Pl.*, vol. iv., plate 249), caused by the puncture and deposit of an egg or eggs of *Cynips Gallæ tinctoriæ*, Olivier (Steph. and Church, *Med, Bot.*, plate 152); Class, Insecta; Order, Hymenoptera. A gall is a hard, heavy, subglobular body, which is from ½ inch to ¾ inch or more in diameter. The surface is tuberculated, the tubercles and intervening spaces being smooth. The colour is dark bluish-green or dark olive-green externally, while internally it is yellowish or brownish-white. There is a small central cavity. The taste is extremely astringent, and this is followed by a slight sweetness.

Therapeutics.—Galls have powerful astringent properties. They are prescribed for much the same purposes as tannic acid, to the presence of which

[1] The British Pharmacopœia name is Galla, Galls; the United States Pharmacopœia, Galla, Nut-gall.

they owe their activity. In passive hæmorrhages and chronic mucous discharges they are given internally. In cases of poisoning by vegetable alkaloids they are often employed, as also in poisoning by tartar emetic. Externally the ointment is useful in piles, and in prolapse of the rectum and uterus.

Dose.—*Dog* - - - - - - - 5 to 10 grains.
Pig - - - - - - - - 10 to 20 ,,
Sheep - - - - - - - - 15 to 40 ,,
Horse - - - - - - - - 1½ to 4 drachms.
Ox - - - - - - - - 2 to 6 ,,

GELSEMIUM (A. and B.).[1]

Description.—The rhizome and roots of Yellow Jasmine, *Gelsemium sempervirens* (Linné), Persoon (Nat. Ord., Loganiaceæ). Commercially it takes the form of cylindrical pieces, or sections, varying in thickness from about 5 to 30 millimetres thick, the roots being much thinner. The outer surface is yellowish-brown, with purplish-brown longitudinal lines. The substance is tough, though it breaks with a splintery fracture; the bark is thin, and has silky bast fibres, which adhere closely to the pale yellow porous wood, which is provided with fine medullary rays, and in the rhizome is a thin pith. The smell is aromatic and taste bitter.

Preparations.—Extractum Gelsemii Fluidum, Tinctura Gelsemii.

GENTIANÆ RADIX (A. and B.).[2]

Gentian Root.

Natural Order.—Gentianaceæ.

Description.—The dried rhizome and roots of *Gentiana lutea*, Linn. (B. and T., *Med. Pl.*, vol. iii., plate 182). Gentian has the form of more or less cylindrical pieces or longitudinal slices, from a few inches to a foot or more in length, and from half an inch to about an inch thick. Those pieces which have been upper parts of the root are wrinkled in an annular manner. All parts are marked with irregular longitudinal furrows. Externally the colour is deep yellowish-brown, internally it is yellowish or reddish-yellow. When dry, gentian root is brittle. The bark is thick, reddish, and separated from the central woody, somewhat

[1] The British Pharmacopœia name is Gelsemii Radix, Gelsemium root. The dried rhizome and roots of *Gelsemium nitidum*, Michaux (B. and T., *Med. Pl.*, vol. iii., plate 181).

[2] The United States Pharmacopœia designation is Gentiana, Gentian.

spongy portion by a dark-coloured cambium zone. The odour is peculiar, and the taste, at first sweetish, becomes afterwards very bitter. An infusion, when cold, is not coloured blue by solution of iodine.

Therapeutics.—Gentian is the most extensively employed of all those remedies classed as bitters, and including chiretta, calumba, quassia, and others. It is especially useful as a general tonic and as a stomachic, and may be prescribed as powder, infusion, or tincture. The extract is useful for making pills for dogs.

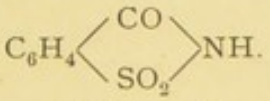
Dose.—Powdered gentian root :

Dog - - - -	5 to 20 grains.
Pig - - - -	¼ to 1 drachm.
Sheep - - - -	1 to 3 drachms.
Horse - - - -	¼ to 1 ounce.
Ox - - - -	1 to 2 ounces.

GLUSIDUM (B.).

Gluside.

Description.—Gluside (known also as saccharin), or benzoyl sulphonimide, is a sweet imide derivable from toluene, and has formula :



Characteristics and Tests.—It is a white crystalline powder, a diluted solution of which is very sweet. If heated, it melts and sublimes, being partly decomposed. Soluble in 400 parts of cold water, 24 of boiling water, 25 of alcohol (90 per cent.), and to a small extent in ether and chloroform ; also highly soluble in diluted solution of ammonia, and of bicarbonate of sodium (giving off CO_2). If a solution of bicarbonate of sodium be warmed and gluside added so as to neutralize it, and evaporated, 'soluble gluside' is formed, which is very soluble in water. Neither this variety nor gluside itself is blackened by sulphuric acid, even if gently warmed, whereas sugar would be so transformed.

If either variety be evaporated together with excess of Liquor Potassæ, and the residue be kept in a state of semi-fusion for a few minutes, then allowed to cool, dissolved in water, and a little hydrochloric acid be added and a few drops of ferric chloride solution, a brownish or purplish colour is produced.

GLYCERINUM (A. and B.).

Glycerin.

Natural Order.—Oleaceæ.

Description.—Glycerin, or glycerol, is a trihydric alcohol, with formula $C_3H_5(OH)_3$, with which is a small amount of water.

Mode of Preparation.—Glycerin separates from the olein, palmitin, or stearin contained in fats and fixed oils when they are saponified by alkalies, or distilled with superheated steam.

Characters.—It is a clear, colourless liquid, oily to the touch, odourless, but with a pleasant sweet taste.

Tests.—It is freely soluble in water, and absorbs water from the air, and in alcohol (90 per cent.); but insoluble in ether, chloroform, and fixed oils. It has no action on litmus. When decomposed by heat, it evolves intensely irritating vapours, and, if heated in an open capsule, leaves no ash. The specific gravity is about 1·255. The aqueous solution is not affected by nitrate of silver, sulphydrate of ammonium, oxalate of ammonium, or by chloride of barium, and is neutral to litmus solution or paper. Absence of foreign organic matter can be proved by the fact that, if it be shaken with an equal volume of sulphuric acid, no coloration, or only a very slight straw coloration, should occur. Absence of butyric acid should be proved by the fact that, when gently heated with a mixture of equal volumes of alcohol (90 per cent.) and diluted sulphuric acid, a fruity odour should not be produced. It should yield no red precipitate if excess of solution of potassio-cupric tartrate be added and boiled, even if previously acidified and boiled, thus proving the absence of grape and cane sugars.

Therapeutics.—Glycerin is nutrient and demulcent when taken internally, and is administered to calves and dogs suffering from acidity and flatulence. Externally, it has slightly stimulant, antiseptic, and hygroscopic properties, and is a valuable emollient in cases of cracked heels, mud fever, and in all cases where the skin is not too dry and brittle. It is a useful vehicle for borax and tannic acid, for sore mouths and aphtha, and with an equal quantity of Goulard's extract it is good, when suitably diluted with water, as a soothing and antiseptic application.

Dose.—

Man	1 to 2 fluid drachms.
Dog	1 to 3 ,, ,,
Pig	2 to 5 ,, ,,
Horse	1 to 4 fluid ounces.

GLYCERINUM ACIDI BORICI (B.).

Glycerin of Boric Acid.

Mode of Preparation.—Heat 9 ounces of glycerin in a weighed porcelain dish to 150° C., and add 6 ounces of finely-powdered boric acid in successive portions, and constantly stir the mixture. When all the powder has been dissolved, still keep it at the same temperature, stir often, and break up the film on the surface, until the mixture weighs only 10 ounces. Mix thoroughly with this 10 more ounces of glycerin, thus making 20 ounces of the product.

GLYCERINUM PHENOL (A. and B.).[1]

Glycerin of Phenol.

Mode of Preparation.—Rub together in a mortar 1 part of phenol and 5 fluid parts of glycerin until the phenol is dissolved.

GLYCERINUM ACIDI TANNICI (A. and B.).[2]

Glycerin of Tannic Acid.

Mode of Preparation.—Stir together in a porcelain dish 1 part of tannic acid and 5 fluid parts of glycerin, and heat at a temperature not exceeding that of a water-bath until complete solution is effected.

GLYCERINUM BORACIS (B.).[3]

Glycerin of Borax.

Mode of Preparation.—Rub together in a mortar or heat gently 1 ounce of borax and 6 fluid ounces of glycerin until the borax is dissolved.

[1] The United States Pharmacopœia preparation is a mixture of 1 part by weight of Carbolic Acid to 4 of Glycerin, and the United States and British Pharmacopœias designate it Glyceritum Acidi Carbolici and Glycerinum Acidi Carbolici respectively.

[2] The United States Pharmacopœia preparation is similarly a mixture of 1 part by weight of Tannic Acid to 4 parts by weight of Glycerin, and it is designated Glyceritum Acidi Tannici.

[3] A United States Pharmacopœia preparation, Glyceritum Boroglycerini, may be made of 310 parts by weight of Boric Acid, with 960 grammes of Glycerin added gradually, and kept at 150° C. until 1,000 grammes result.

GLYCERINUM PEPSINI (B.).

Glycerin of Pepsin.

Mode of Preparation.—Mix 110 minims of hydrochloric acid, 12 fluid ounces of glycerin, and 6 fluid ounces of distilled water, and add 800 grains of pepsin. After the lapse of seven days, filter, add sufficient distilled water to make 1 pint.

Composition.—One fluid drachm contains the equivalent of 5 grains of pepsin.

Dose.—*Man and Dog* - - - 1 to 2 fluid drachms.

GLYCYRRHIZÆ RADIX (A.[1] and B.).

Liquorice Root.

Description.—The peeled root and peeled subterranean stem of *Glycyrrhiza glabra*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 74), and other species (Nat. Ord., Leguminosæ). It occurs commercially in long cylindrical pieces, which before being peeled are dark brown and wrinkled lengthwise, but not scaly, and after being peeled are yellow, with a nearly smooth fibrous surface. It breaks with a coarsely fibrous surface. If it be cut, a porous, radiated wood is shown with groups of bast fibres arranged radially, and a thick cortex. There is a faint smell and a familiar sweet taste.

Doses of Powdered Root:

Dog - - - -	¼ to 1 drachm.
Pig - - - -	½ to 1½ drachms.
Horse - - - -	½ to 1½ ounces.

GOSSYPIUM (A.[2] and B.).

Cotton Wool.

Natural Order.—Malvaceæ.

Description.—Cotton wool consists of the hairs of the seed of *Gossypium barbadense*, Linn. (B. and T., *Med. Pl.*, vol. i., plate 37), and of other species of Gossypium, from which fatty matter and other impurities have been removed.

Characters.—Cotton wool is inodorous and tasteless, and is composed of

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[1] The United States Pharmacopœia name is Glycyrrhiza, the root of *G. glabra*, variety glandulifera (Waldstein et Kittaibel), Regel et Herder.

[2] The appellative used in the United States Pharmacopœia is Gossypium Purificatum, Purified Cotton, the hairs of the seed of *G. herbaceum*, Linné, and other species.

white soft filaments. Each consists of an elongated tubular cell. When examined with the microscope, it appears as a flattened twisted band with slightly thickened rounded edges.

Tests.—It should be readily wetted by water, and should not impart to it either an alkaline or an acid reaction. When ignited in the air, cotton wool burns, leaving less than 1 per cent. of ash. It is soluble in concentrated solution of ammonio-sulphate of copper.

Preparation.—Pyroxylin.

Therapeutics.—Cotton wool may be medicated with carbolic acid, salicylic acid, thymol, perchloride of iron, iodine, or iodoform, thus forming a very convenient method of applying these remedies locally.

GRANATI CORTEX (A.[1] and B.).

Pomegranate Bark.

Description.—The dried bark of the stem and root of *Punica Granatum*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 113. Nat. Ord., Lythrarieæ). Irregularly curved or channelled pieces about 3 inches long and about ¾ inch wide. The outer surface of the root-bark is rough, yellowish-gray, and has irregular conchoidal depressions, whilst the bark of the stem is smoother, and often has minute lichens. The inner surface is yellowish-brown. It breaks off short, being rather brittle, and the surface exposed is pale. If cut transversely, numerous fine radial and tangential lines are seen. Odourless, but with astringent taste.

Composition.—Contains punico-tannic acid, pelletierine, and other alkaloids, also a substance like mannite, mucilage, etc.

Actions and Uses.—It has an anthelmintic and irritant action, and is also somewhat astringent, unless taken in large doses. Tapeworms are expelled, but they are not killed, if the decoction or a dose of sulphate of pelletierine (about 6½ grains) be administered after a purgative and be followed by a purgative.

Dose.—

Dog	½ to 5 drachms.
Pig	½ to 1 ounce.
Horse	1 to 4 ounces.

Decoction (1 to 10):

Dog	½ to 1½ fluid ounces.
Pig	1 to 3 ,, ,,
Horse	4 to 10 ,, ,,

GUAIACI LIGNUM (A. and B.).

Guaiacum Wood.

Natural Order.—Zygophyllaceæ.

Description.—The heart-wood of *Guaiacum officinale*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. i., plate 41), or of *Guaiacum sanctum*, Linn. (Sargent, *Silva*, vol. i., plate 28). Dark greenish-

[1] Named Granatum, Pomegranate, in the United States Pharmacopœia.

brown, dense, and heavier than water. When chewed the wood has an acrid taste, and when heated it has an aromatic smell. A tincture of it in alcohol gives a blue colour with solution of perchloride of iron.

GUAIACI RESINA (A. and B.).

Guaiacum Resin.

Description.—The resin obtained from the stem of the two trees mentioned above is generally in large masses, but may be in tears. It is brittle, and breaks with a glassy fracture. If in thin pieces, it is transparent, and the colour varies from yellowish-green to reddish-brown. The powder is grayish, but on exposure turns green, and if it be warmed, a balsamic odour is yielded, and the taste is slightly acrid. A solution in alcohol (90 per cent.) becomes blue, if a little solution of perchloride of iron be added.

Actions and Uses.—*Internally*, it acts as a local stimulant, causing salivation, an acrid hot feeling in the throat, warmth in the region of the stomach, increase of the movements and secretions of the stomach and bowels. In large amount it acts as a gastro-intestinal irritant, causing vomiting and purging. Doses of 30 grains of powdered guaiacum, placed on the tongue and slowly swallowed every six hours, are good for laryngitis. It also stimulates the circulation, skin, kidneys, liver, and general metabolism. It is very useful in chronic gout and rheumatism, as resin or ammoniated tincture, or as the mixture of guaiacum.

Dose of Guaiacum Resin:

Man - - - -	5 to 15 grains.
Dog - - - -	5 to 20 ,,
Pig - - - -	$\frac{1}{10}$ to 1 drachm.
Horse - - - -	1 to 6 drachms.

HÆMATOXYLI LIGNUM (A. and B.).[1]

Logwood.

Natural Order.—Leguminosæ.

Description.—Logwood is the sliced heart-wood of *Hæmatoxylon campechianum*, Linn. (B. and T., *Med. Pl.*, vol. ii., plate 86). The logs, which are imported, are hard, heavy, blackish-red externally, and reddish-brown internally. The chips have a

[1] In the United States Pharmacopœia it is described as Hæmatoxylon.

reddish-brown colour, a slight peculiar and pleasant odour, and a sweetish astringent taste. When chewed, logwood imparts to the saliva a brilliant dark reddish-pink colour.

Therapeutics.—Hæmatoxylon has astringent properties in virtue of the tannic acid it contains. It also contains hæmatoxylin, $C_{16}H_{14}O_6$, in colourless crystals, red on exposure to light. It is useful for diarrhœa, and causes the urine to be red.

Dose.—Decoction :

Man and Dog	¼ to 1½ ounces.
Pig	½ to 1½ ,,
Horse	3 to 8 ,,

Extract :

Dog	5 to 30 grains.
Pig	¼ to 1 drachm.
Horse	1 to 4 drachms.

HAMAMELIDIS CORTEX (B.)

Hamamelis Bark.

Description.—The dried bark of Witch Hazel, *Hamamelis virginiana*, Linn. (*Bot. Mag.*, plate 6,684. Nat. Ord., Hamamelaceæ), is generally presented in commerce in the form of curved pieces about $\frac{1}{16}$ inch thick and about 5 inches long. It is sometimes covered with a silvery or dark-gray scaly cork on which are transverse lenticels. Often the pieces are freed from the cork, and then the outer surface is smooth and reddish-brown. The inner surface is pale reddish-pink, and finely striated lengthwise. It breaks with a laminated and coarsely fibrous fracture. The taste is astringent, but the bark is devoid of smell. If it be cut transversely, a ring of sclerenchymatous cells and many tangential groups of bast fibres are seen.

Actions and Uses.—Hamamelis acts as an astringent and hæmostatic both directly and indirectly. The ointment is useful in hæmorrhoids, and also acts beneficially in cases of bleeding from nose, lungs, rectum, and uterus.

HAMAMELIDIS FOLIA (A. and B.).

Hamamelis Leaves.

Description.—The leaves, collected in autumn, fresh and dried, of *Hamamelis virginiana*, Linn., are broadly oval in outline,

about $4\frac{1}{2}$ inches long. The upper surface is of a dark-green colour, the lower being paler. The apex is obtuse, and the margin sinuate. The leaves are narrow near the base, oblique, slightly cordate, and shortly petiolate. They are veined like a feather, the veins being marked on the under surface, and having stellate hairs. The leaves are inodorous, but have an astringent taste.

HEROIN.

Horton Brown and Duncan Tomkins find that the hydrochloride gives the best results, the dose being $\frac{1}{12}$ to $\frac{1}{6}$ grain, repeated if necessary.

It was first used instead of codeine for coughs, then for all pulmonary and cardiac diseases, angina pectoris, diabetes, neuralgia, asthma, narcotic inebriety, and arterio-sclerosis; also instead of morphine in chronic opium-poisoning, and in tampons for the vagina. It is a hypnotic, having no bad after-effects, antispasmodic, and analgesic.

M. G. Kandel says that $\frac{1}{2}$ grain prevents the suffering caused by cutting off morphine, and is useful where morphine has to be rapidly withdrawn.

Professor C. R. Marshall, of St. Andrews, says that the action of morphine is modified by acid and alkyl groups, the narcotic effects being lessened and the convulsant increased.

Heroin in rabbits affects the respiratory centre, while in somewhat larger doses it certainly depresses it. The increased depth of inspiration may perhaps counterbalance the increased slowing, although it does not as measured by the air expired per unit of time.

A sedative resembling morphine and devoid of its depressing action on the respiratory centre, and its narcotic effects on the higher parts of the brain, is required.

Of heroin, dionin, and codeine—the substitutes for morphine—the first two are better than the third; dionin is more sedative than heroin, but has less effect on the respiration.

Heroin, in certain well-defined doses, slows and increases the depth of the respiration. The distance between the smallest efficient dose and that causing depression of the respiratory centre is not great. The dose must be carefully regulated.

HETOL.

Actions and Uses.—It is synthetically prepared cinnamate of sodium, and is used for tuberculosis. Kuhn begins with 1 milligramme and reaches 25 milligramme doses.

Guttman says it causes a general leucocytosis, and by leucocytes cuts off the tuberculous deposit. In the rabbit the number rose from 8,000 to 31,440 in four hours, whilst in a human case it rose to 20,000. If the spleen be removed, hetol in very large doses only causes a slight increase. In tuberculous people there is first a leucocytosis of the lungs, then a walling-in of the deposit by leucocytes, then a formation of connective tissue in the wall, then scarring of the whole area. The process is like that occurrnig in spontaneous cure. The first injection lessens cough and expectoration and night-sweats.

The arm is bandaged so as to make a vein prominent, the point of the needle is passed through its wall, and 1 milligramme ($\frac{1}{65}$ grain) is injected. Every other day a solution is injected, the dose being gradually increased up to 15 milligrammes (about $\frac{1}{4}$ grain).

The treatment causes a tendency to hæmoptysis, weariness, and somnolence. The bacilli showed no degenerative changes, and the temperature and night-sweats are not influenced.

Krompecher says the drug caused a temporary leucocytosis within about three and a half hours, with hyperæmia of bone-marrow. Preventive treatment gave no immunity, and suitable animals inoculated with virulent bacilli succumbed in spite of the treatment as rapidly as those used for comparison. This does not seem very promising, but at least the trial of hetol may possibly lead in the right direction for some future discovery of a cure for tuberculosis. Other modes of treatment may be mentioned—*e.g.*, that Professor Richet of Paris finds that raw meat or its plasma is one of the strongest remedies for phthisis. One may give 1 to $1\frac{1}{2}$ pounds each day of meat, or else the pressed juice of 2 to 3 pounds. Again, Henry Harper injects pure urea hypodermically, 40 grains dissolved in 4 fluid drachms of sterilized water. The injections are given daily for forty-five consecutive days, and the dose is gradually increased to 65 grains. In regard to the light treatment of lupus, as good results can be obtained by the action of the focus-tube from which the X rays are emitted as

by Finsen's method. The focus-tube heals lupus, certain ulcers, and skin diseases.

HIRUDO (B.).

Leech.

Description. — There are two kinds—viz.: (1) *Sanguisuga medicinalis*, Savigny, the Speckled Leech (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table xxviii., fig. 34); and (2) *Sanguisuga officinalis*, Savigny, the Green Leech (*ibid.*, vol. ii., table xxx., fig. 1). The body is soft, smooth, 2 inches or more long, tapering at each end, marked with about a hundred fine rings. The back is of an olive-green colour, and has six reddish long stripes. At the front end is a small sucker which surrounds the three-rayed jaws, and at the hinder end is a large sucker also. In *S. medicinalis* the lower surface is greenish-yellow with black spots, whilst that of *S. officinalis* is olive-green and devoid of spots.

Actions and Uses.—Leeches are used to abstract blood, and each leech may be considered to take away about ½ ounce of blood. They are useful in congestive or inflammatory disorders, whether internal or external, and in cardiac distension. They may be also used for reducing such small abscesses as it is not thought advisable to incise—*e.g.*, whitlows in fingers (especially of human beings who are afraid of the knife) and also hæmorrhoids.

HOMATROPINÆ HYDROBROMIDUM (B.).

Hydrobromide of Homatropine.

Description.—The hydrobromide of an alkaloid prepared from tropine and having the formula, $C_{16}H_{21}NO_3$,HBr. It is a white crystalline powder, or aggregate of minute trimetric crystals, soluble in 6 parts of cold water and 133 parts of absolute alcohol, and the solutions should be neutral in reaction to litmus. If a little of a highly-diluted aqueous solution be applied to the eye, it, like that of sulphate of atropine, causes marked dilatation of the pupil. If heated on platinum foil, it fuses and burns, almost without any residue.

The addition of solution of iodine gives a brown, and that of mercuric chloride a white, precipitate.

If treated with fuming nitric acid and hydroxide of potassium,

no reddish-violet colour is produced (as is yielded by atropine), and the residue becomes reddish-yellow.

Actions and Uses.—It is used mainly in ophthalmic work, because, acting on the eye as quickly as atropine, though not so strongly, its effects subside in one-fourth the time.

Dose.—*Man* - - - - $\frac{1}{80}$ to $\frac{1}{20}$ grain.

HYDRARGYRI AMMONIO-CHLORIDUM.

Ammonio-Chloride of Mercury.

Synonym.—Hydrargyrum Ammoniatum is the name in both British and United States Pharmacopœias.

Mode of Preparation.—Dissolve 3 ounces of perchloride of mercury in 3 pints of distilled water by the aid of heat. Pour the aqueous solution of corrosive sublimate thus formed into 4 fluid ounces of solution of hydrate of ammonium diluted with 1 pint of distilled water, constantly stirring. Collect the precipitate on a filter, and wash it well with cold distilled water, until the liquid which passes through ceases to give a precipitate when dropped into a solution of nitrate of silver acidulated with nitric acid. Dry the product at a temperature not exceeding 100° C.

Character.—Ammonio-chloride of mercury is an opaque white powder.

Tests.—Alcohol and ether do not act upon it at all, and water but slightly. If warmed together with hydroxide of potassium, it gives off ammonia gas, acquiring a pale-yellow colour, and the fluid, filtered and acidulated with nitric acid, gives a white precipitate with nitrate of silver. If boiled with a solution of stannous chloride, ammonio-chloride of mercury becomes gray, and yields globules of metallic mercury. It is entirely volatilized at a temperature below that of redness, without fusing or leaving an appreciable amount of ash. It should yield 78·5 per cent. of the element mercury.

Preparation.—Unguentum Hydrargyri Ammoniati (1 to 9 parts of white paraffin ointment).

Therapeutics.—This preparation is used for external purposes, chiefly in the form of the Pharmacopœial ointment. It is very useful as a parasiticide, being very destructive to pediculi and fleas. In chronic inflammatory conditions of the skin it is likewise serviceable.

HYDRARGYRI OLEAS (B.).

Oleate of Mercury.

Mode of Preparation.—Precipitated oleate of mercury is produced by the interaction of oleate of sodium and perchloride of mercury thus: One ounce of mercuric chloride is dissolved in 10 fluid ounces of distilled water. Rub together 1 fluid drachm of oleic acid with 2 ounces of powdered hard soap, and then dissolve the product in 11 fluid ounces of distilled water. Mix these two solutions, and boil the two together for ten minutes. After a time the oleate of mercury which is precipitated will be deposited, and the supernatant liquid is then to be poured away. Wash the oleate with hot distilled water, until the liquid, which has been thus used and poured off, yields very feeble chloride reaction, and finally dry the washed substance on a water-bath.

Characteristics.—Oleate of mercury is of a light grayish-yellow colour, with an ointment-like consistence and a soapy odour, and it is liable to become darker if kept.

HYDRARGYRUM (A. and B.).

Mercury.

Symbol and Atomic Weight.—Hg = 198·8.

Characters.—Mercury is a brilliantly lustrous silvery metal prepared from native mercuric sulphide. At ordinary temperatures it is fluid. It is easily divisible into spherical globules. At a temperature below that of visible redness, mercury volatilizes, leaving no appreciable amount of residue.

Therapeutics of Mercury and its Salts.—The salts of mercury act upon the mouth, gums, and salivary glands, causing salivation. This is caused by their excretion by these organs. On the stomach and intestinal tract, mercurials in large doses act as irritants, calomel or gray powder being often employed as a purgative. This effect is due to the local action of the drugs, which are eliminated mainly in the fæces, although the perspiration also contains a certain amount. It is believed that the intestinal glands are especially stimulated, and the peristaltic action of the intestines is exalted. Mercurials in this manner act as indirect cholagogues, owing to their hurrying on the watery fæces before it has time to become reabsorbed by the duodenal walls, and carried back into the portal circulation. The liver, since it has to make good the loss sustained by the bile being passed away along with the fæces, is thus indirectly stimulated to action. Mercury has no direct effect on the blood, which it enters as an oxyalbuminate. After absorption into the blood, mercury is

soon deposited in the organs of the body, where it may remain a long time. The alterative properties which it exerts in some forms of inflammatory action may be owing to its interfering with the growth or life of certain germinal cells; partly also 'it may have a destructive influence on some ferments or organisms connected with physiological and pathological metabolism' (Bruce).

Mercurial salts are sometimes prescribed as alteratives in controlling chronic inflammations, especially those of serous membranes.

Externally, mercurial ointments and weak solutions of the bichloride are astringent, stimulant, and antiphlogistic. Stronger solutions of the bichloride and the acid solution of the nitrate are caustic. All mercurial preparations have an antiseptic and disinfectant action. The constitutional effects of mercury can be obtained from its local application by inhalation or by inunction, or endermically, or hypodermically. Mercury, when applied externally, produces general as well as topical effects.

HYDRARGYRI IODIDUM RUBRUM (A. and B.).

Red Iodide of Mercury.

Synonyms.—Hydrargyri Biniodidum, Mercuric Iodide.

Mode of Preparation.—Precipitated mercuric iodide, HgI_2, is made by acting on solution of perchloride of mercury with solution of iodide of potassium thus: Dissolve 4 ounces of perchloride of mercury in 3 pints of boiling distilled water and 5 ounces of iodide of potassium in 1 pint of boiling distilled water, and mix the two solutions. When the temperature of the mixture has fallen to that of the atmosphere, decant the supernatant liquid from the precipitate. Collect the latter on a filter, wash it twice with cold distilled water, and dry it at a temperature not exceeding 100° C.

Characters.—Red iodide of mercury is a vermilion-coloured crystalline powder.

Tests.—It becomes yellow, when gently heated over a lamp, spread as a thin layer on a sheet of tinfoil. It is almost insoluble in water, sparingly soluble in alcohol, freely and entirely in ether (thus showing absence of mercurous iodide), or in an aqueous solution of iodide of potassium. When digested with solution of hydroxide of sodium, it assumes a reddish-brown colour, and the fluid, if cleared by filtration and mixed with solution of starch,

gives a blue precipitate on being acidulated with nitric acid. It is entirely volatilized at a temperature under that of redness, leaving only a trace of ash. If heated with excess of copper, it should give about 43·75 per cent. of mercury.

Therapeutics. — The red iodide of mercury, when applied externally, acts as a powerful caustic. It is seldom used for internal purposes.

The ointment of the red iodide is the best application for the reduction of bony enlargements, such as splints, bone spavins, ring bones, and several other forms of osseous deposit. Likewise in the reduction of bursal enlargements it is most suitable. For enlarged and rheumatic joints it is largely used. It is also employed occasionally as a counter-irritant in cases of sore throat, roaring, and chronic cough.

Dose.—

Man	$\frac{1}{32}$ to $\frac{1}{16}$ grain.
Dog	$\frac{1}{32}$ to $\frac{1}{4}$,,
Pig	$\frac{1}{4}$ to 1 ,,
Horse	1 to 4 grains.

HYDRARGYRI OXIDUM FLAVUM (A. and B.).

Yellow Oxide of Mercury.

Formula.—HgO.

Mode of Preparation.—Dissolve 4 ounces of perchloride of mercury in 4 pints of distilled water with the aid of heat. Add the solution thus formed to 2 pints of solution of hydroxide of sodium, and stir the mixture well. Allow the yellow precipitate which is formed to subside, remove the supernatant liquor by decantation, thoroughly wash the precipitated oxide on a calico filter with distilled water, and finally dry it by the heat of a water-bath.

Tests.—Yellow oxide of mercury is a yellow powder readily soluble in hydrochloric acid. The solution thus formed gives with solution of ammonia a white precipitate. If very slightly heated, it turns red and is entirely volatilized, being resolved into oxygen gas and the vapour of mercury, leaving only a trace of fixed residue, and the proportion of mercury obtained is about 92·25 per cent.

Preparation.—Oleatum Hydrargyri.

Therapeutics. — The yellow oxide of mercury is not much employed, but an ointment made with it has been used externally

in reducing inflammation of the skin, and in cases of irritable swollen conditions of the eyelids. The strength of the ointment for this purpose should be that of about 16 grains to the ounce of lard.

HYDRARGYRI OXIDUM RUBRUM (A. and B.).

Red Oxide of Mercury.

Mode of Preparation.—Red Mercuric Oxide, HgO, is made by acting on mercuric chloride with hydroxide of sodium, or thus:—Dissolve 4 ounces of mercury in $4\frac{1}{2}$ fluid ounces of nitric acid diluted with 2 fluid ounces of water. Evaporate the solution to dryness, and with the dry salt thus obtained triturate 4 ounces of mercury, until the two are uniformly blended together. Heat the mixture in a porcelain dish, stirring well, until acid vapours cease to be evolved.

Tests.—Red oxide of mercury is an orange-red powder readily soluble in hydrochloric acid, yielding a solution which, with solution of hydroxide of potassium in excess, gives a yellow precipitate, and with solution of hydroxide of ammonium a white precipitate. Red oxide of mercury, if only gently heated, turns dark violet, and orange-red again on cooling; but is entirely decomposed at a temperature under that of redness into oxygen gas and mercury vapour. Even when submitted to heat in a test-tube, no orange vapours should be given off, thus showing that nitrate is absent.

Therapeutics.—Red oxide of mercury is applied externally as a caustic for the reduction of protuberant granulations on surface wounds, and for promoting the healing of unhealthy callous ulcerated surfaces. It is used as powder or ointment, being in this latter form employed for the reduction of glandular enlargements.

HYDRARGYRI PERCHLORIDUM (B.).[1]

Perchloride of Mercury.

Synonyms.—Corrosive Sublimate; Hydrargyri Bichloridum; Mercuric Chloride.

Formula.—$HgCl_2$.

Mode of Preparation.—Reduce 20 ounces of persulphate of mercury and 16 ounces of dried chloride of sodium, each to fine

[1] In the United States Pharmacopœia it is known as Hydrargyri Chloridum Corrosivum, Corrosive Mercuric Chloride.

powder. Mix together these two powders, with 1 ounce of black oxide of manganese in fine powder, by thorough trituration in a mortar. Place the mixture into an apparatus specially suitable for sublimation, and apply sufficient heat to cause vapours of perchloride of mercury to rise into the less heated part of the apparatus, which has been arranged for their condensation.

Characters.—Mercuric chloride exists in heavy, colourless masses of prismatic crystals. The taste of this salt (which is an excessively poisonous one) is highly acrid and metallic.

Tests.—Perchloride of mercury is soluble in 16 parts of cold and 2 of boiling water, by trituration in 2 of cold glycerin, in 3 of alcohol (90 per cent.), and in 4 of ether. An aqueous solution gives a yellow precipitate with solution of hydroxide of potassium, a white precipitate with hydroxide of ammonium, and a curdy white precipitate with nitrate of silver. When heated, it sublimes entirely without decomposition or residue. If heated together with an excess of lime, it yields 73·3 per cent. of mercury.

Preparations:

Liquor Hydrargyri Perchloridi ($\frac{1}{2}$ grain in 1 fluid ounce);
Lotio Hydrargyri Flava (20 grains to 10 fluid ounces of Solution of Lime).

Therapeutics.—As an internal remedy, perchloride of mercury has been prescribed in glanders and farcy in horses, and also in cases of elephantiasis or chronic weed. Its chief value, however, is as an external application in numerous conditions.

The perchloride is the most active of all the preparations of mercury. It is a very powerful antiseptic. One part in 10,000 has been proved to destroy bacilli and micrococci, while 1 part in 1,000 destroys their spores. It has also astringent, stimulant, and caustic properties. As an application for wounds, 1 part in 10,000 is sufficient for general purposes; but for foul sores, indolent ulcers, or protuberant discharging granulations, 1 in 500 (or about 1 grain to the ounce) is not too strong. Such a solution is also destructive of pediculi and the scab acarus, not only killing the parasite itself, but also preventing the hatching of the eggs. In ringworm it destroys the vegetable fungus, and arrests the spreading of the growth. As a general disinfectant, a solution of 1 part in 500 acts very efficiently for destroying the unhealthy walls of winding fistulæ. With this object, as also for destroying the walls of the fistulæ of quittor, 4 or 5 grains of the solid perchloride may be wrapped up in a thin strip of paper,

which may then be passed deeply into the wound. This method causes sloughing of the unhealthy surface.

Dose.—

Man and Dog	$\frac{1}{32}$ to $\frac{1}{16}$	grain.
Pig	$\frac{1}{16}$ to $\frac{1}{2}$	,,
Sheep	$\frac{1}{8}$ to $\frac{1}{2}$	,,
Horse	$1\frac{1}{2}$ to $4\frac{1}{2}$	grains.
Ox	2 to 6	,,

HYDRARGYRI SUBCHLORIDUM (B.).[1]

Subchloride of Mercury.

Synonyms.—Calomel; Hydrargyri Chloridum; Mercurous Chloride.

Mode of Preparation.—Calomel, of which the formula is Hg_2Cl_2, is produced as a sublimate when a mixture of mercurous sulphate and chloride of sodium is heated, thus: Moisten 10 ounces of persulphate of mercury with boiling distilled water, and rub it with 7 ounces of mercury until no globules of mercury are visible. Add 5 ounces of dried chloride of sodium, and thoroughly mix by continued trituration. Sublime by means of a suitable apparatus into a chamber of such size that the calomel which is formed, instead of adhering to the sides as a crystalline crust, shall fall as a fine powder on its floor. Wash this powder with boiling distilled water, until the washings are no longer darkened by a drop of sulphydrate of ammonium. Dry at a temperature not exceeding 100° C.

Characters.—Calomel is a dull-white, heavy, and nearly tasteless powder.

Tests.—The salt is sometimes rendered yellowish by trituration in a mortar. It is insoluble in water, alcohol, or ether. Digested with solution of hydroxide of potassium, calomel becomes black; and the clear solution, acidulated with nitric acid, gives a copious white precipitate with nitrate of silver. If placed in contact with hydrocyanic acid, calomel becomes darkened, being converted into mercuric chloride and dark globules of mercury. When sufficiently heated, the salt is entirely volatilized, leaving only a slight residue. Warm ether, which has been shaken with

[1] This salt appears in the United States Pharmacopœia under the heading Hydrargyri Chloridum Mite, Mild Mercurous Chloride.

it, should leave on evaporation no residue whatever, thus showing that mercuric chloride is absent.

Therapeutics.—Calomel is prescribed in equine practice as a purgative, more especially in cases of congestion of the liver. In inflammation of the serous membranes, more especially of the pleural, peritoneal, and pericardial sacs, whether of the acute or chronic varieties, it is far less commonly given than in the past. As a vermicide it is not uncommonly given with santonine or other remedies, and for this purpose it acts well. As an aperient, calomel is the most suitable of all remedies in treating the constipation of tetanus in horses.

With aloes it forms a useful combination for opening the bowels in cases of so-called 'grease.' In dogs it is advantageously combined with jalap, and in cattle and sheep with sulphate of magnesium or sodium. Externally, calomel is used as a powder for thrush of the foot in horses. It may be advantageously mixed for this purpose with an equal quantity of iodoform or powdered starch. In solution or as an ointment it is useful in killing pediculi or acari, as well as in allaying the irritation of prurigo. In eczematous eruptions on the limbs it also acts beneficially. A suitable ointment may be made for these purposes of 1 part of calomel to 8 of lard.

Dose.—As a purgative (with other agents):

Man	½ to 5 grains.
Dog	2 to 6 ,,
Horse	1 drachm.
Ox	1 to 1½ drachms.

As an alterative:

Dog	½ to 3 grains.
Sheep and Pigs	2 to 12 ,,
Horse	10 to 40 ,,
Ox	10 grains to 1 drachm.

These latter doses may be repeated twice daily.

HYDRARGYRUM AMMONIATUM (A. and B.).

Ammoniated Mercury.

See Hydrargyri Ammonio-chloridum.

HYDRARGYRUM CUM CRETA (A.[1] and B.).

Mercury with Chalk.

Mode of Preparation.—Rub 1 ounce of mercury with 2 ounces of prepared chalk in a porcelain mortar, until metallic globules of mercury cease to be visible to the naked eye, and the mixture has acquired a uniform gray colour.

Characters.—Mercury with chalk is a light-gray powder, free from grittiness.

Tests.—The preparation is insoluble in water. Hydrochloric acid dissolves the chalk, leaving the mercury in a finely-divided state. The solution formed with hydrochloric acid does not produce any white or gray precipitate on the addition of stannous chloride, thus proving the absence of mercuric salts.

Therapeutics.—Gray powder is alterative and laxative. In the treatment of 'grease' in horses it is especially valuable in ½-drachm doses, given twice daily with other remedies in the form of a ball. It is also given in indigestion and diarrhœa in calves and foals, in doses of 5 to 15 grains repeated three times daily. It may be given suspended in water or as a powder. As an alterative, gray powder has a beneficial action on dogs.

Dose.—

Man	1 to 5	grains.
Dog	3 to 10	,,
Calf and Foal	5 to 15	,,
Pig	5 to 20	,,
Horse	1 to 1½	drachms.
Ox	1½ to 1¾	,,

HYDRASTIS RHIZOMA (A.[2] and B.).

Hydrastis Rhizome.

Description.—The dried rhizome and roots of *Hydrastis canadensis*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. i., plate 1). The rhizome is yellowish-brown, has a twisted form, may be simple or branched, about 1 inch long, and about ¼ inch thick. The upper surface bears short ascending branches, generally terminating in cup-shaped tears. On the lower surface and sides are many thin brittle roots. The rhizome breaks with a resinous snap, and the surface left is brownish or greenish-yellow, and displays a ring of bright yellow narrow wood-bundles, well separated from one another. Slight smell and bitter taste.

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[1] The mode of preparation is different in the United States Pharmacopœia.

[2] In the United States Pharmacopœia it is known as 'Hydrastis.'

Actions and Uses.—Golden Seal, as Hydrastis is also known, is a bitter, and a spinal stimulant, causing convulsions, very much like Nux Vomica. It is used as a tonic and nervine stimulant; also locally in cases of ulceration and bleeding from nose, rectum, and uterus. The dose of tincture of hydrastis for man is ½ to 1 fluid drachm.

HYOSCINÆ HYDROBROMIDUM (B.).[1]

Hydrobromide of Hyoscine.

Synonym.—Hydrobromide of Scopolamine. The word Hydrobromate is a misnomer, and should not be used as equivalent to Hydrobromide.

Description.—The hydrobromide of an alkaloid which can be obtained from leaves of *Hyoscyamus niger*, different species of Scopola, and other solanaceous plants. The formula is thus:

$$C_{17}H_{21}NO_4,HBr,3H_2O.$$

Characters.—The drug exists as colourless and transparent rhombic crystals, permanent in the air at the ordinary temperature. It has an acrid and slightly bitter taste, and no odour. It is very slightly soluble in ether or chloroform, in 1 part of cold water, and in 13 parts of alcohol (90 per cent.). If heated to 100° C., it loses a little more than 12 per cent. of its weight, fusing to a viscid mass which liquefies at 193·5° C.

Tests.—An aqueous solution slightly reddens blue litmus, and gives a precipitate with test solution of mercuric chloride, solution of iodine, or solution of potassium hydroxide, but not with solution of ammonia or solution of bichromate of potassium. With perchloride of gold it yields a crystalline salt which melts at 198° C. It also gives the usual hydrobromide reactions. If heated to redness in the air no residue is left.

Actions and Uses.—Like those of Belladonna and Stramonium; but larger doses of the preparations may be given. The secondary calmative effects of the atropaceous plants on the convolutions of the brain is more marked, and hence hyoscyamus is employed for maniacal excitement. This is due to hyoscine, which is a strong cerebral sedative, calming restlessness, and giving several hours' deep sleep. Hyoscine hydrobromide is used hypodermically in doses of $\frac{1}{200}$ to $\frac{1}{100}$ grain in man, especially for delirium. Hyoscyamine seems to have an action different from that of hyoscine. Hyoscyamus acts also as a laxative, also

[1] In the United States Pharmacopœia it occurs as Hyoscinæ Hydrobromas.

on the urinary organs, and therefore is useful in cases of irritability of the bladder.

Dose.—*Man* - - - - $\frac{1}{200}$ to $\frac{1}{100}$ grain.

HYOSCYAMI FOLIA (A.[1] and B.).

Henbane Leaves.

Natural Order.—Atropaceæ.

Description.—The fresh leaves and flowers, with the branches to which they are attached, of *Hyoscyamus niger*, Linn. (B. and T., *Med. Pl.*, vol. iii., plate 194), or henbane; and also the leaves separated from the branches, and flowering tops, carefully dried. They should be collected from flowering biennial plants of the second year's growth, growing wild or cultivated in Britain, when about two-thirds of the flowers are expanded.

The *leaves* vary in length, sometimes being as much as 10 inches long. They may be with or without a stalk, and have a marked mid-rib. They are alternate, exstipulate, triangular-ovate, or ovate-oblong, acute, undulated, irregularly toothed, sinuated or pinnatifid, pale green, and glandular-hairy, particularly on the veins and on the under surface.

The *branches* are subcylindrical, and also glandular-hairy. The corolla is yellow, and has a network of purple veins. The mesophyll of the leaf has small prismatic crystals of oxalate of calcium. The fresh herb has a strong unpleasant odour, and a bitter and slightly acrid taste, which nearly disappears during the process of drying. The fresh juice, dropped into the eye, dilates the pupil.

The *seeds* are very small and brown, and are sometimes employed medicinally.

Composition.—All parts of the plant contain *Hyoscyamine*, a volatile alkaloid, which is isomeric with *Atropine*, but not identical with it. An acid, probably *malic*, and a volatile principle are also present.

Therapeutics.—The properties of hyoscyamus and its uses are very similar to those of belladonna; but its preparations are not so strong as those of the latter drug. Hyoscyamus has a more soothing effect on the brain than belladonna. It has also laxative and carminative effects on the bowels, and a more decided remote action on the urinary organs than the latter.

[1] In the United States Pharmacopœia as Hyoscyamus.

Rabbits and pigeons, which are very tolerant of atropine, are readily acted upon by a few doses of hyoscyamine.

Hyoscyamus is given with drastic purgatives to dogs, as it prevents the griping effect. As an antispasmodic the tincture is often given to dogs with distemper.

The preparations used are the succus, extract, tincture, hyoscyamine and the sulphate of hyoscyamine.

Dose.—Succus Hyoscyami:

Dog	15 to 40 minims.
Man	30 to 60 ,,
Pig	1 to 2½ drachms.
Sheep	2 to 4 ,,
Horse	½ to 1½ ounces.
Ox	½ to 2 ,,

Extractum Hyoscyami Viride:

Man and Dog	2 to 8 grains.
Pig	4 to 15 ,,
Sheep	5 to 20 ,,
Horse	½ to 2½ drachms.
Ox	1 to 3 ,,

Tinctura Hyoscyami:

Dog	15 minims to 1 fluid drachm.
Man	½ to 1 fluid drachm.
Pig	1 to 3 ,, drachms.
Horse	1 to 3 ,, ounces.
Ox	1 to 4 ,, ounces.

Hyoscyamine:

Dog	$\frac{1}{60}$ to $\frac{1}{20}$ grain.
Pig	$\frac{1}{15}$ to $\frac{1}{5}$,,
Horse	1 to 2 grains.

Sulphate of Hyoscyamine:

Man	$\frac{1}{200}$ to $\frac{1}{100}$ grain.

HYOSCYAMINÆ SULPHAS (A. and B.).

Sulphate of Hyoscyamine.

Description.—The above drug is the sulphate of hyoscyamine, which is an alkaloid derivable from hyoscyamus leaves, and probably other solanaceous plants. The formula is thus:—

$$(C_{17}H_{23}NO_3)_2,H_2SO_4,2H_2O.$$

Characteristics.—It is a crystalline powder, which is deliquescent, is devoid of odour, has a bitter, acrid taste, and melts at 206° C. It is very slightly soluble in ether or chloroform, in 0·5 part of water, and 2·5 parts of alcohol (90 per cent.). The tests for sulphates are given. If to an aqueous solution hydrochloric acid be added, together with solution of perchloride of platinum, no precipitate is yielded. Addition of solution of perchloride of gold causes a yellow precipitate which is soluble in boiling water to which hydrochloric acid has been added, and is again deposited on cooling in golden-yellow scales (thus distinguishing it from atropine). If it be heated to redness with supply of air, no residue is left.

Dose.—*Man* - - - - $\frac{1}{200}$ to $\frac{1}{100}$ grain.

INFUSA (A.).

Infusions.

Mode of Preparation.—Unless otherwise directed, as in the case of powerful drugs, 50 grammes of the substance should be deposited in a suitable vessel having a cover, and on it should be poured 1,000 c.c. of boiling water, the vessel being then securely covered and set aside for half an hour. Then strain through flannel, and pass sufficient additional water through the strainer to make the product measure 1,000 c.c.

INFUSUM DIGITALIS (B.)[1]

Infusion of Digitalis.

Mode of Preparation.—Place 60 grains of Digitalis leaves in a vessel, and infuse with 1 pint of boiling distilled water for fifteen minutes and strain, or 6·8 grammes with 1,000 c.c.

Dose.—*Man* - - - - 2 to 4 fluid drachms.
Dog - - - - 2 to 5 ,, ,,
Pig - - - - $\frac{1}{2}$ to $1\frac{1}{2}$,, ounces.
Horse - - - - 2 to 4 ,, ,,

[1] The United States Pharmacopœia preparation of the same name is different.

INFUSUM ERGOTÆ (B.).

Infusion of Ergot.

Mode of Preparation.—Infuse 1 part of crushed ergot in 20 fluid parts of boiling distilled water in a covered vessel for fifteen minutes, and strain.

Dose.—Infusion of Ergot :

Dog	- - - -	½ to 1	fluid ounce.
Man	- - - -	1 to 2	,, ounces.
Pig	- - - -	1 to 4	,, ,,
Sheep	- - - -	2 to 6	,, ,,
Horse	- - - -	4 to 10	,, ,,
Ox	- - - -	4 to 12	,, ,,

INFUSUM LINI.

Infusion of Linseed.

Mode of Preparation.—Infuse 1 part of linseed in 20 fluid parts of boiling distilled water in a covered vessel for two hours, and strain.

Dose.—Ad libitum.

INFUSUM QUASSIÆ (B.).

Infusion of Quassia.

Mode of Preparation.—Infuse 10 grammes of finely-rasped quassia-wood in a covered vessel with 1,000 c.c. of cold distilled water for fifteen minutes, and strain.

Dose.—

Man	- - - -	½ to 1	fluid ounce.
Dog	- - - -	½ to 1½	,, ounces.
Pig	- - - -	1 to 2½	,, ,,
Horse	- - - -	5 to 10	,, ,,

INFUSUM SCOPARII (B.).

Infusion of Broom.

Mode of Preparation.—Infuse 100 grammes of dried and bruised broom-tops with 1,000 c.c. of boiling distilled water in a

covered vessel for fifteen minutes and strain. It replaces the decoction of broom of the 1885 British Pharmacopœia.

Dose.—*Man* - - - - 1 to 2 fluid ounces.
Dog - - - - 1 to 2 ,, ,,
Pig - - - - 1½ to 4 ,, ,,
Horse - - - 5 to 10 ,, ,,

INFUSUM SENEGÆ (B.).

Infusion of Senega.

Mode of Preparation.—Infuse 50 grammes of senega root in No. 10 powder in a covered vessel with 1,000 c.c. of boiling distilled water for half an hour, and strain.

Dose.—*Man and Dog* - - ½ to 1 fluid ounce.
Pig - - - - ½ to 2 ,, ounces.
Horse - - - - 4 to 10 ,, ,,

INFUSUM SENNA (B.).[1]

Infusion of Senna.

Mode of Preparation.—Infuse 100 grammes of senna and 6·25 grammes of sliced ginger with 1,000 c.c. of boiling distilled water for fifteen minutes, and strain.

Dose.—*Man* (*a*) - - - - ½ to 1 fluid ounce.
(*b*) as a single draught 2 ,, ounces.
Dog - - - - - ½ to 2 ,, drachms.
Pig - - - - - ½ to 4 ,, ounces.

INFUSUM TABACI.

Infusion of Tobacco.

Mode of Preparation.—Pour 1 pint of boiling distilled water on to 200 grains of dried and powdered tobacco in a vessel having

[1] Infusum Sennæ Compositum is the name given in the United States Pharmacopœia for Black Draught, not identical with Mist. Sennæ Co., the British Pharmacopœia Black Draught.

a cover, securely fasten the latter, and set aside for half an hour, and strain.

Dose.—*Dog* - - - - 1 to 2 fluid ounces.
Pig - - - - 2 to 5 „ „
Horse - - - - 1 to 2 pints.

INJECTIO APOMORPHINÆ HYPODERMICA (B.).

Hypodermic Injection of Apomorphine.

Mode of Preparation.—Boil 10 c.c. distilled water for a few minutes, cool, and add 0·1 c.c. diluted hydrochloric acid. Dissolve 0·1 gramme apomorphine hydrochloride in this mixture, and add enough recently-boiled cold distilled water to make 10 c.c. in all. Thus 100 c.c. contain 1 gramme, and 110 minims 1 grain, of apomorphine hydrochloride.

Therapeutics.—Apomorphine is an efficient emetic in dogs, and is the most useful agent we possess in cases of poisoning in these animals, where it is desired to produce immediate vomiting.

Hydrochloride of apomorphine is a useful hypnotic in human beings, and probably in animals, if given in doses too small to excite vomiting.

For this purpose 2 milligrammes ($\frac{1}{32}$ grain) may be hypodermically injected, but as the emetic dose varies in different individuals, the best rule is $\frac{1}{3}$ of that dose required to produce nausea. Sleep occurs in from five to twenty-five minutes, and lasts from one to two hours, and may be extended by some other mild soporific. It is useful even for wildly delirious patients.

Dose.—By subcutaneous injection :

Dog - - - - - 5 minims.
Man - - - - - 5 to 10 minims.

INJECTIO COCAINÆ HYPODERMICA (B.).

Hypodermic Injection of Cocaine.

Mode of Preparation.—Boil 6 fluid drachms of distilled water, and add $\frac{1}{2}$ grain of salicylic acid. Dissolve 33 grains of hydrochloride of cocaine in the above solution, when it has cooled. Add, if necessary, enough recently-boiled and cooled distilled water

to yield 6 fluid drachms in all. In 110 minims are about 10 grains of the hydrochloride, and in 100 c.c. are about 10 grammes.

Dose.—By subcutaneous injection:

Man - - - -	2 to 5 minims.

INJECTIO ERGOTÆ HYPODERMICA (B.).

Hypodermic Injection of Ergot.

Mode of Preparation.—Mix 0·3 gramme phenol with 20 c.c. distilled water, boil for a few minutes, cool, add 10 grammes extract of ergot, and water (distilled, boiled, and cooled) to 30 c.c. In 110 minims about 33 grains, and in 100 c.c. 33 grammes.

Dose.—By subcutaneous injection:

Man - - - -	3 to 10 minims.
Horse - - - -	10 to 20 ,,
Ox - - - - -	15 to 40 ,,

INJECTIO MORPHINÆ HYPODERMICA (B.).

Hypodermic Injection of Morphine.

Mode of Preparation.—Dissolve 5 grammes of tartrate of morphine in enough recently-boiled and cooled distilled water to make 100 c.c.

Strength.—The amount of morphine is less than half that of the British Pharmacopœia 1885 similar injection. In 110 minims are 5 grains, and in 100 c.c. 5 grammes. It is a clear solution, free from solid particles, and slightly acid.

Dose.—By subcutaneous injection:

Dog - - - -	1 to 3 minims.
Man - - - -	2 to 5 ,,
Pig - - - - } *Sheep* - - - - }	3 to 6 ,,
Horse - - - -	20 to 40 ,,
Ox - - - - -	30 to 60 ,,

IODAS CALCII.

Iodate of Calcium.

Uses.—It may be employed for the same purposes as iodoform, and as a gastro-intestinal antiseptic.

At 11·5° C. it is soluble in 380 parts of water, and this solution stops decomposition, and preserves food-substances.

In operations where surfaces are left to granulate—*e.g.*, after curetting—it is used as a dusting-powder. It causes a little smarting at first, has no smell, checks fœtor and hyper-granulation, and undue formation of pus. It can be used in aqueous solution for gargle, for washing out the bladder, vagina, or uterus, or as a urethral injection. Internally, a 15-grain dose in aqueous solution may be given.

IODIPIN.

Chemical Constitution.—Iodipin is a combination of iodine, triglycerides, and sesame oil. In 10 per cent. solution it is an oily liquid, specific gravity 1·025, insoluble in water and alcohol, but soluble in chloroform, ether, and benzol. One fluid drachm of this 10 per cent. solution contains 6 grains of iodine, and corresponds to 8 grains of iodide of potassium.

Therapeutics.—The daily dose is 1 to 6 drachms, and it is good for asthma, bronchitis, emphysema, pleurisy, inflammation of glands, and tertiary syphilis. It may be injected subcutaneously in the lumbar and gluteal regions. In 25 per cent. solution it is a red-violet oil, honey-like in cold weather.

Winternitz says it is stored as iodized fat in the omentum, subcutaneous tissue, liver, muscles, and bone-marrow. It is found in the urine even twenty-nine days after the last dose, whereas in the case of potassium iodide the urine is free from iodine in four days.

IODOFORMUM.

Iodoform.

Description and Formula.—Iodoform, or tri-iodomethane, CHI_3, bears the same relation to iodine that chloroform does to chlorine, $CHCl_3$, and sometimes may have a similar, though much less marked, somnolent effect. It is a product of the action of iodine on a mixture of ethylic alcohol and solution of carbonate of potassium. The reaction is thus represented:—

$$C_2H_6O + 4I_2 + 3K_2CO_3 = CHI_3 + KCHO_2 + 5KI + 2H_2O + 3CO_2.$$

It exists in the form of shining, lemon-yellow, crystalline scales, which are somewhat greasy to the touch. It possesses a characteristic, persistent, and saffron-like, penetrating odour and an unpleasant taste.

Tests.—Iodoform is very slightly soluble in cold water, soluble

in 80 parts of cold, or 10 parts of boiling, alcohol (90 per cent.), in 5 parts of cold ether, soluble in chloroform, readily and entirely soluble in warm ether, soluble also in carbon bisulphide, or fixed and volatile oils, and sparingly in benzol. The solutions are neutral in reaction. When heated, it first melts, forming a brown liquid, then it gives off brown and violet vapours, leaving a black residue, which entirely disappears on continued ignition. If iodoform is warmed with an alcoholic solution of hydroxide of potassium, and the resulting fluid is acidified by nitric acid, iodine is liberated, the mixture acquiring a brown colour, or when cold a blue colour, on the addition of mucilage of starch. If water be shaken with the powder it should not become coloured, nor bitter to the taste, nor should it yield any indication of iodides.

Preparation.—Unguentum Iodoformi (1 part to 9 of yellow paraffin ointment).

Therapeutics.—Iodoform has powerful antiseptic, as well as slight anæsthetic, properties. Unlike iodine, it is not irritant when taken internally, or locally applied. Externally, it has been much used, although other substances, such as amyloform and iodate of calcium have been used as substitutes. The ointment is especially valuable as an antiseptic for ulcerated or foul sores. A good antiseptic ointment for dressing wounds may be made of iodoform, 20 grains; oil of eucalyptus, 30 minims; carbolic acid, 30 minims; vaseline or lard, 1½ ounces. The powdered iodoform may be dusted on raw indolent ulcers, and for thrush in the horse's foot it may be mixed with equal parts of calomel. A mixture of equal parts of iodoform and calomel is also useful as an insufflation for chronic nasal catarrh in horses, being antiseptic and mildly caustic. About 1 drachm may be injected every day by means of a nasal insufflator. Internally, iodoform has been given to beasts suffering from actinomycosis, but the results of the internal administration cannot be regarded as encouraging, and even may cause restlessness and delirium in some subjects, or at times rather drowsiness and collapse in others when absorbed from wounds. A fatal issue may arise from this cause, and care must be taken with animals, lest they lick it off from a wound and so poison themselves. A drachm will kill a dog of 10 pounds weight.

Dose.—

Man	½ to 3 grains.
Dog	1 to 5 ,,
Pig	5 to 15 ,,
Horse	½ to 1 drachm.

IODUM (A. and B.).

Iodine.

Symbol and Atomic Weight.—I = 125·9.

Description.—Iodine is an element obtained from the ashes of sea-weeds, and from mineral iodides and iodates. It exists in the form of rhombic prisms or octahedra of the trimetric system, and emits a peculiar odour. They are dark, possess a metallic lustre and a peculiar odour, and when heated yield a beautiful violet-coloured vapour.

Tests.—Iodine is soluble in 500 parts of water, but freely dissolved by alcohol, by ether, chloroform, and by a solution of iodide of potassium. The aqueous solution gives with starch a deep-blue colour. Iodine sublimes without leaving any residue, and the portion that first comes over ought not to include any slender colourless prisms emitting a pungent odour, which would be produced by cyanide of iodine. A solution of iodine in chloroform should be perfectly clear, and thus show its freedom from moisture.

Physiological Action.—Iodine belongs to the halogen group, and, in common with chlorine and bromine, other members of that group, it is a strong antiseptic and oxidizing agent. If a strong solution be painted on the skin it causes a burning sensation, which is after a time followed by desquamation. If still stronger solutions be employed vesication may result. If taken internally, it may cause catarrh of the intestinal mucous membrane. It may slightly increase the pulse-rate and the temperature. It seems to cause absorption of enlarged glands and thickenings produced by chronic inflammation. It combines with lead or mercury, if either be in the system, forming soluble iodides. It is eliminated by the urine, nasal mucous membrane, saliva, intestinal mucus, and milk. Even small doses may cause *iodism*—*i.e.*, irritation of the nose or intestinal tract. As a rule, there is profuse secretion from the nostrils and eyes, and frontal headache; but these nasal symptoms may be coupled with, or replaced by, gastric irritation, loss of appetite, nausea, and perhaps by looseness of the bowels.

In iodine-poisoning there is collapse, followed by a look of fever, with quick pulse and flushed face, but without rise of temperature. After several days this condition may disappear, and whilst convalescing a patient may suddenly die. Small

doses may act as aphrodisiacs, but large doses are said to have produced atrophy of the mammæ, ovaries, and testes. Very large doses evoke delirium, and twitching or paralysis of the muscles.

Therapeutics.—Iodine, taken *internally*, irritates the mucous membrane, and it is therefore generally better to use potassium iodide for internal purposes. Iodine is quickly absorbed into the blood as sodium iodide. It then speedily passes into the tissues, soon, however, leaving them. In its passage it accelerates metabolism. By its internal or external employment nearly all enlargements of the lymphatic and mesenteric glands, but especially those of a scrofulous character, may be reduced in size. In the treatment of glanders[1] iodine is said to have proved of great value, probably destroying the germs of the disease. Lead or mercury which have accumulated in the system, will combine with iodide of potassium if administered, and in this way may be eliminated from the system. In subacute and chronic inflammations, more especially when there is effusion or exudation into synovial or serous cavities (pleural, pericardial, or peritoneal), the salts of iodine have a beneficial effect by promoting absorption of the fluid. Iodine may be also simultaneously applied externally. It is speedily excreted in the urine, the mucous secretions, especially those of the respiratory passages, the saliva, bile, milk, and perspiration. It has a stimulating expectorant effect on the mucous membrane of the respiratory channel, being excreted by this surface. A similar effect is produced by inhalation of iodine in vapour.

Iodine is given internally in cases of diabetes insipidus in horses. In this disease the iodide has proved of no value, whereas marked curative results are said to follow pure iodine in doses of 20 to 30 grains, administered once or twice daily, until 6 or 8 doses are given. It is also given internally in scrofula, skin-diseases, and glanders. The British Pharmacopœia Liquor Iodi, or the United States Pharmacopœia Liquor Iodi Compositus, arrests vomiting when swallowed in doses of 3 to 5 minims diluted with water.

Externally applied to the skin, iodine is a parasiticide, and is destructive to the fungus of tinea (ringworm). For this purpose it may be used alone, or in the form of ointment, or mixed with tar in the strength of 2 drachms of iodine to 1 fluid ounce of light

[1] The late Mr. D. Gresswell held that iodine was a curative agent in glanders, and in certain experiments he tried he found it a more efficient antiseptic than several other powerful drugs.

oil of wood tar. It is irritant, vesicant, and antiseptic, and is quickly absorbed into the blood, as it likewise is when inhaled as a vapour.

If the solution be painted on the skin, it alleviates muscular pains, and causes absorption of inflammatory thickenings near joints, and also of enlarged strumous glands, scrofulous and other swellings, and bursæ. The tincture is scarcely strong enough for these purposes, but it can be made stronger.

If painted on the skin around an enlarged thyroid gland in goitre, it will sometimes cause disappearance of the swelling, and if not, then an injection of 10 to 30 minims of tincture of iodine into the tumour by a hypodermic syringe, care being taken to avoid injection into a vein, may produce this result.

Solution of iodine, externally applied, also causes absorption of fluid from serous cavities, as in animals affected with pleurisy. After fluid has been withdrawn from a serous sac, such as the pleura, or the tunica vaginalis in hydrocele, or from ovarian cysts, a little diluted tincture of iodine injected into the sac may prevent further effusion. In cases of slight consolidation of the lung, whether after pneumonia or pleurisy, or at the onset of phthisis, tincture or liniment of iodine, or a mixture of the two, may be beneficially applied to the chest-wall every second day, so as to keep the part slightly tender. Patients afflicted with ozæna may have the nostrils washed out with a solution of common salt containing a few drops of tincture of iodine.

A very useful means of disinfection is to burn a little iodine, and let it permeate the air of a room, and sometimes obstinate cases of chronic bronchitis and phthisis can be benefited by inhaling some vapour of iodine, but great care must be used in this method, or otherwise much discomfort may be caused, and some cases are not suited for this treatment by inhalation on account of their liability to nervous fits of coughing.

In cases of chronic bronchitis in horses, iodine, given internally or by inhalation, is often advantageous, easing the cough and producing a healthier condition of the mucous membrane.

Dose.—

Dog	½ to 2 grains.
Pig	1 to 5 ,,
Sheep	2 to 10 ,,
Horse	5 to 30 ,,
Ox	15 to 50 ,,

IPECACUANHÆ RADIX (A.[1] and B.).

Ipecacuanha Root.

Natural Order.—Cinchonaceæ.

Description.—The dried root of *Psychotria Ipecacuanha*, Stokes (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 145—the long-styled form. Berg. und Schmidt, *Off. Gewächse*, vol. ii., table xv. *c.*—the short-styled form), exists in the shape of more or less twisted pieces, usually about 4 inches long, and about the size of a small lead pencil—*i.e.*, ¼ inch thick. It consists of two parts—namely, a central inert whitish woody axis, and a thick cortical or active portion, which is brownish, grayish-brown, or reddish-brown, irregularly annulated, these rings not being narrow merging ridges, as is the case in Carthagena ipecacuanha, and having a short fracture. The taste is somewhat acrid and bitter, the odour slight, peculiar, and especially marked when the root is powdered. The broken surface shows a thick gray cortex, which may be resinous or starchy, and a small dense central portion. If examined with the microscope, in the cortex are seen small compound starch grains and raphides. The wood has no vessels.

Therapeutics.—Ipecacuanha is a gastric stimulant, in large doses acting as an emetic on the dog. On the intestines it is also stimulant, and in large doses irritant. On the skin it has a diaphoretic action. It also has sedative, expectorant, and direct cholagogue properties. As an emetic, when a quick action is not necessary, ipecacuanha is prescribed for cats and dogs. For this purpose it is chiefly useful in the early stages of catarrh and in cutting short inflammatory attacks, especially of the eyes, brain, and air-passages. It is given to horses in mucous catarrh, and as a sedative expectorant with other remedies in dry cough. In dysentery it may be prescribed as Dover's powder, or alone. In this disease it has a very beneficial effect on the human subject, being regarded as a specific.

[1] In the United States Pharmacopœia the name is Ipecacuanha, Ipecac, the root of *Cephaelis Ipecacuanha* (Brotero), A. Richard.

Ipecacuanha Powder.

Dose.—As an emetic :

Cat	5 to 10 grains.
Dog	10 to 30 ,,
Man	15 to 30 ,,
Pig	20 to 30 ,,

As an expectorant :

Man	¼ to 2 grains.
Dog	1 to 5 ,,
Pig	3 to 20 ,,
Horse	½ to 1½ drachms.

In dysentery :

Horse	2 to 4 drachms.

Dover's Powder (Pulv. Ipecac. Co.).

Cat	2 to 5 grains.
Man and Dog	5 to 15 ,,
Pig	10 to 40 ,,
Sheep	20 to 60 ,,
Horse	1½ to 2 drachms.
Ox	1½ to 3 ,,

JABORANDI FOLIA (B.).[1]

Jaborandi Leaves.

Synonym.—Pilocarpi Foliola.

Natural Order.—Rutaceæ.

Description.—The leaflets of *Pilocarpus Jaborandi*, Holmes (*Bot. Mag.*, plate 7,483, and *Pharm. Journ.*, ser. 3, vol. v., p. 582), which should be dried before being used, are very shortly stalked, about 3¼ inches or more in length, oval-oblong or oblong-lanceolate, slightly unequal at the base, obtuse, and emarginate at the apex, somewhat revolute and entire at the margins, coriaceous. The lateral veins are well marked on the upper surface. The mature leaflets are glabrous, or have at most a few scattered hairs on the under surface ; are, except when young, dull green. The under surface is paler, often somewhat hairy,

[1] In the United States Pharmacopœia there is the corresponding Pilocarpus, the leaflets of *Pilocarpus Selloanus*, Engler (Rio Janeiro Jaborandi), and of *P. Jaborandi*, Holmes (Pernambuco Jaborandi).

with a very prominent midrib, and marked irregularly all over with pellucid dots (oil-glands in the mesophyll) when held against the light. The odour, when bruised, is slightly aromatic. The taste, when the leaves are chewed, is slightly bitter and aromatic at first, but subsequently pungent, and the flow of saliva is augmented.

Therapeutics.—Jaborandi leaves and the alkaloid, pilocarpine, which is obtained from them, are sudorific, sialogogue, and antipyretic. The alkaloid enters the blood quickly, causing profuse salivation, perspiration, disturbance of vision, and circulatory depression. The motor centres are paralyzed, and the arterioles dilated. Poisonous doses arrest the heart in diastole. Pilocarpine resembles muscarin in action, and is antagonized by atropine. It should be remarked that the perspiration, so markedly caused by this drug in man, is not so pronounced a result in horses and dogs. Jaborandi has been given for promoting the absorption of pleuritic and other effusions, and also in eczema and prurigo. For azoturia in horses the hypodermic injection of pilocarpine is believed to be beneficial, and for albuminuria in horses it is also recommended.

Dose.—Jaborandi leaves powdered :

Dog - - - -	10 to 60 grains.
Pig - - - -	30 to 60 ,,
Horse - - -	2 to 5 drachms.

JALAPA (A. and B.).

Jalap.

Natural Order.—Convolvulaceæ.

Description.—The dried tubercules of *Ipomæa Purga*, Hayne (Bentl. and Trim., *Med. Pl.*, vol. iii., plate 186). They should be irregularly oblong, somewhat ovoid, napiform, or rarely fusiform, hard, compact, and vary in size from ½ inch to 3 or 4 inches in diameter, from that of a nut to that of an orange. The larger are frequently incised, or cut into halves or quarters. Externally, they are dark-brown, and more or less irregularly furrowed and wrinkled, and marked with paler transverse lines or scars. Internally, the colour is dirty-yellow or brownish, and they are marked with dark-brown irregular concentric circles. If a section be examined with the microscope, many compound starch grains,

clustered crystals of oxalate of lime, and cells with resin in them can be seen. The odour is faint, peculiar, and smoky, and is increased by rubbing or powdering. The taste is sweet, acrid, and nauseous. Not less than 9 and not more than 11 per cent. by weight of resin should be capable of being obtained from it, and of this not more than one-tenth should be soluble in ether.

Therapeutics.—Jalap closely resembles scammony in its effects. It has a powerful hydragogue cathartic action on human beings, pigs, cats, and dogs ; but in the case of horses and cattle this result is relatively small. It only purges when in the presence of the duodenal secretions. Jalap is a powerful stimulant of the intestinal secretions, and is especially adapted for use in dogs and pigs as a purgative. It may be prescribed together with calomel. After the administration of anthelmintic drugs, jalap is useful, both as a laxative and also as a vermicide.

Dose.—

Man	5 to 20 grains.
Cat	10 to 30 ,,
Dog	20 to 85 ,,
Pig	1 to 3½ drachms.
Ox	1 to 3 ounces.

JALAPÆ RESINA (A.[1] and B.).

Resin of Jalap.

Mode of Preparation.—Place 8 ounces of jalap in No. 40 powder with twice its weight of alcohol (90 per cent.) in a covered vessel, and heat gently for twenty-four hours. Then transfer the product to a percolator, and pass more alcohol through, until no more is dissolved. Add to this resulting tincture 4 fluid ounces of distilled water. Remove the alcohol by distilling, place the hot product in an open dish, and set it aside to cool. Pour off the liquid, and wash the resin with hot distilled water twice or thrice, and dry.

Characteristics and Tests. — Jalap resin occurs in dark-brown portions, translucent at the edges where thin, brittle, and with a resinous fracture. It can easily be made into a pale-brown powder, sweet in smell, acrid to the throat, readily soluble in alcohol (90 per cent.), but insoluble in oil of turpentine. The powder yields very little to warm water, and not more than 10 per cent. to ether, whereby the absence of scammony resin

[1] In the United States Pharmacopœia the title is Resina Jalapæ.

and tampico jalap resin is indicated. An alcoholic solution is not rendered bluish-green by addition of solution of perchloride of iron (as would be guaiacum resin).

Dose.—*Man* - - - - 2 to 5 grains.

KAMALA (A.).

Description.—Kamala is a powder, which consists of the minute glands and hairs obtained from the surface of the fruits of *Mallotus philippinensis* (Lamarck) Mueller Arg. (Nat. Ord., Euphorbiaceæ). It is a fine granular mobile powder, of a brick-red or madder colour, and is nearly tasteless and odourless. Water has scarcely any effect upon it, even when boiling, but it forms deep red solutions with alkaline fluids, alcohol, ether, or chloroform. When examined by the microscope, the powder is seen to consist of irregular, spherical, flattened, or depressed garnet-red glands with wavy surfaces, mixed with nearly colourless thick-walled stellate hairs. If ignited in the air, it should yield 4 or 5, and not more than 9, per cent. of ash.

Therapeutics.—Kamala is an anthelmintic. It is very destructive to tape-worms as well as to round worms in dogs.

Dose.—*Dog* - - - - - - ½ to 2 drachms.
Pig - - - - - - ½ to 3 ,,
Horse - - - - - - 2 to 8 ,,

KAOLINUM (B.).

Kaolin.

Description. — Kaolin is really a silicate of aluminium, found native, powdered, and freed by elutriation from gritty particles.

Characteristics.—It is a soft white powder, and is insoluble in water or in diluted acids. If it be fused with an alkali, digested in water, and hydrochloric acid be added, a gelatinous precipitate of silica is formed, and the tests for aluminium can be obtained.

Uses.—To prepare pilula phosphori, and generally as a basis for pills or powders containing drugs easily decomposable by other bases, such as nitrate of silver, permanganate of potassium, and phosphorus. Also as a dusting-powder.

KINO (A. and B.).

Description.—Kino is the juice obtained from incisions made in the trunk of *Pterocarpus Marsupium*, Roxburgh (B. and T., *Med. Pl.*, vol. ii., plate 81. Nat. Ord., Leguminosæ), inspissated without the aid of artificial heat. It exists in small, angular, glistening, opaque, reddish-black, brittle fragments, which in thin laminæ and at the edges are transparent and ruby-red. They are inodorous and very astringent, and when chewed stick to the teeth and tinge the saliva blood-red. Kino is almost entirely soluble in rectified spirit, and yields little or nothing to ether.

Therapeutics.—Kino has properties very similar to those of tannic acid, and may be employed for the same purposes. It is used especially as a constituent of mixtures for diarrhœa, but is less powerful than catechu.

Dose of Kino powdered:

Dog	2 to 10 grains.
Man	5 to 20 ,,
Pig	6 to 20 ,,
Horse	½ to 2½ drachms.

KRAMERIÆ RADIX (A.[1] and B.).

Krameria Root.

Description.—The dried root of: (1) Para Rhatany, which is probably *Krameria argentea*, Mart. (*Fl. Brasil.*, vol. xiii., part iii., plate 28); or of (2) Peruvian Rhatany, *Krameria triandra*, Ruiz and Pavon (*Fl. Peruv.*, vol. i., plate 93). (1) The first of the above, Para Rhatany, occurs in cylindrical pieces, and is of purplish-brown hue, and has a smooth thick bark, marked by deep transverse cracks, and closely adherent to the wood, which is pale reddish-brown. If broken, it snaps off short. (2) Peruvian Rhatany is dark reddish-brown, and has a yellow woody axis, from which the bark readily separates. This bark is thinner than that of Para Rhatany, and on its inner surface is bright reddish-brown, and rough and scaly. If broken, it splinters.

Both kinds of rhatany bark have a strong styptic taste, and tinge the saliva red.

Actions and Uses. — Like those of tannic acid, but of no value in poisoning by antimony.

Dose.—

Dog	5 to 30 grains.
Pig	10 to 60 ,,
Horse	1 to 6 drachms.

LACHNANTHES.

Description.—Dr. Murrell reminds us that *Lachnanthes tinctoria* belongs to the Natural Order Hæmoderaceæ. It is called 'red root' and 'spirit wood,' is a native of the United States, growing profusely in sandy swamps and on the borders of grounds near the Atlantic coast from Rhode Island to Florida. It flowers in July, and the root is used as a dye. A saturated solution of the whole plant is used.

Therapeutics.—In large doses it dilates the pupils, impairs vision, causes 'dizziness.' Murrell says better results can be

[1] The United States Pharmacopœia also gives *Krameria Ixina*, Linné, and the Natural Order of all species is Polygaleæ.

obtained in a case of phthisis from a week's inhalation of an efficient antiseptic, such as formaldehyde, than from giving gallons of tincture of lachnanthes.

According to J. A. Gardner, H. R. D. Spitta, and A. Latham, lachnanthes consists largely of a resinous substance or substances, together with a constituent which is precipitated by subacetate of lead, and is soluble in water.

A dose of 5 c.c. of an aqueous solution of the material obtained by alcoholic extraction of the plant kills guinea-pigs, and doses of from 1 to 3 c.c. of the same solution seem to hasten the progress of tuberculosis. Hence the use of this drug cannot be advised, but we give the dose in case anyone should wish to test its value.

Dose of the Solution:

Man - - 2 minims well diluted with water every four hours.

LAMELLÆ ATROPINÆ (B.).

Discs of Atropine.

These are prepared from gelatine and some glycerin, weigh about $\frac{1}{50}$ grain, and contain $\frac{1}{5000}$ grain of sulphate of atropine.

LAMELLÆ COCAINÆ (B.).

Discs of Cocaine.

These are discs of gelatine with some glycerin, weigh about $\frac{1}{50}$ grain, and contain $\frac{1}{50}$ grain of hydrochloride of cocaine.

LAMELLÆ HOMATROPINÆ (B.).

Discs of Homatropine.

Description.—The above are discs of gelatine, together with some glycerin, each of which weighs about $\frac{1}{50}$ grain, and contains $\frac{1}{100}$ grain of hydrobromide of homatropine.

LAMELLÆ PHYSOSTIGMINÆ (B.).

Discs of Physostigmine.

These are discs of gelatine with some glycerin, weigh about $\frac{1}{50}$ grain, and contain $\frac{1}{1000}$ grain of sulphate of physostigmine.

LEPTANDRA (A.).

Leptandra.

Description.—Leptandra, or Culver's Root, really consists of the rhizome and roots of *Veronica virginica*, Linné (Nat. Ord., Scrophulariaceæ). The *rhizome* grows horizontally, is about 12½ centimetres long, about 5 millimetres thick, flattened, bent, and branched, blackish-brown, has cup-shaped scars on its upper surface, hard, breaks like wood, has a thin black bark and a hard yellow wood, with a large purplish-brown pith with about six rays. The *roots* are thin, wrinkled, very fragile, odourless, but with bitter taste.

Preparations.—Extractum Leptandræ :

Dose.—*Man* - - - 2 to 4 grains.

Extractum Leptandræ Fluidum :

Dose.—*Man* - - - ½ to 1 fluid drachm.

Composition.—Contains Leptandrin, a resinous substance.

Uses.—It stimulates the secretion of bile, and is used as a cathartic.

LINIMENTUM ACONITI (B.).

Liniment of Aconite.

Mode of Preparation. — Mix 500 grammes of aconite in No. 40 powder with 20 fluid ounces of alcohol (90 per cent.), and macerate in a closed vessel for three days, with occasional agitation. Transfer to a percolator, and when the liquid ceases to pass continue the percolation with more alcohol, allowing the liquid to drop into a receiver which contains 25 grammes of camphor, until the product measures 750 c.c.

LINIMENTUM ACETICUM.

Acetic Liniment.

Mode of Preparation.—Mix together the contents of 4 eggs, 4 fluid ounces of acetic acid, 4 fluid ounces of solution of acetate of lead, ½ ounce of oil of rosemary, 8 ounces of oil of turpentine, and water to make 2 quarts.

LINIMENTUM ACETICUM CUM POTASSII IODIDI.

Acetic Liniment with Iodide of Potassium.

Mode of Preparation.—Add to 8 fluid ounces of acetic liniment 2 ounces of iodide of potassium.

LINIMENTUM AMMONIÆ (B.).[1]

Liniment of Ammonia.

Mode of Preparation. — Mix with solution of ammonia 25 c.c., almond oil 25 c.c., olive oil 50 c.c.; agitate until the thick emulsion at first produced becomes of such consistence that it can be poured from a bottle.

LINIMENTUM AMMONIÆ COMPOSITUM.

Compound Ammonia Liniment.

Mode of Preparation. — Mix together 2 pints of alcohol (45 per cent.), ½ pint strong solution of ammonia, 4 ounces of soft soap, and 1 ounce of camphor.

LINIMENTUM BELLADONNÆ (A. and B.).

Liniment of Belladonna.

Mode of Preparation.—Dissolve 25 grammes camphor in 150 c.c. of alcohol (90 per cent.), add 250 c.c. liquid extract of belladonna, 50 c.c. distilled water, and enough alcohol to make 500 c.c. in all, leave for twenty-four hours, and filter.

United States Pharmacopœia: Dissolve 50 grammes camphor in 200 c.c. fluid extract of belladonna, add more of the latter to make 1,000 c.c., and mix well.

LINIMENTUM CALCIS (A. and B.).

Liniment of Lime.

Mode of Preparation.—Mix thoroughly and shake well equal parts of solution of lime and of olive oil, or (United States Pharmacopœia) of linseed oil.

[1] The Linimentum Ammoniæ of the United States Pharmacopœia is made by mixing thoroughly 350 c.c. Ammonia Water, 50 c.c. Alcohol, and 600 c.c. Cotton-seed Oil, and should be freshly prepared as required, and kept in a well-corked bottle.

LINIMENTUM CAMPHORÆ (A. and B.).

Liniment of Camphor.

Mode of Preparation.—Dissolve 1 part of camphor in 4 fluid parts of olive oil, or (United States Pharmacopœia) cotton-seed oil. Gently heat the mixture by vapour-bath.

Preparations:

Linimentum Chloroformi, made of equal parts of above and chloroform.

Linimentum Hydrargyri (*q.v.*).

Linimentum Terebinthinæ Aceticum, made of equal parts of it and oil of turpentine, and ¼ part of glacial acetic acid.

LINIMENTUM CAMPHORÆ AMMONIATUM (B.).

Ammoniated Liniment of Camphor.

Mode of Preparation.—Dissolve 50 grammes camphor and 2·5 c.c. oil of lavender in 240 c.c. of alcohol (90 per cent.), add gradually 100 c.c. strong solution of ammonia, shaking them together, until a clear solution is formed, and adding enough alcohol to make 400 c.c.

LINIMENTUM CANTHARIDUM.

Liniment of Cantharides.

1. Digest 1 part of powdered cantharides with 8 fluid parts of olive oil over a hot bath.

2. (Liquor Epispasticus of the British Pharmacopœia.) Mix 500 grammes of cantharides in No. 20 powder with 250 c.c. of acetic ether. Pack in a percolator. At the expiration of twenty-four hours pour a sufficient quantity of acetic ether over the contents of the percolator, and allow the solution to pass slowly through until 1,000 c.c. are obtained. Keep the liquid in a stoppered bottle.

LINIMENTUM CHLOROFORMI (A. and B.).

Liniment of Chloroform.

Mode of Preparation:

1. British Pharmacopœia: Mix equal parts of chloroform and liniment of camphor.
2. United States Pharmacopœia: Mix three parts by weight of chloroform with 7 of soap liniment.

LINIMENTUM CROTONIS (B.).

Liniment of Croton Oil.

Mode of Preparation.—Mix together 2 fluid parts of croton oil, 7 fluid parts of oil of Cajuput, and 7 fluid parts of alcohol (90 per cent.).

LINIMENTUM HYDRARGYRI (B.).

Liniment of Mercury.

Mode of Preparation.—Mix 10 c.c. solution of ammonia with 35 c.c. liniment of camphor; rub 30 grammes ointment of mercury with enough liniment of camphor to make 45 c.c. of the mixture, and mix the two mixtures together.

LINIMENTUM HYDRARGYRI PERCHLORIDI.

Liniment of Perchloride of Mercury.

Mode of Preparation. — Add 40 grains of perchloride of mercury to 1 fluid ounce of methylated spirit. Colour with alkanet.

Use. — This strong absorbent blistering application should be painted on the part with a brush. It is especially useful in reducing bony enlargements.

LINIMENTUM IODI.

Liniment of Iodine.

Mode of Preparation.—Dissolve $2\frac{1}{2}$ parts of iodine, 1 part of iodide of potassium, and $\frac{1}{2}$ part of camphor in 20 fluid parts of alcohol (90 per cent.) or methylated spirit.

Use.—This absorbent blistering liniment should be painted by means of a brush on the part to be blistered.

LINIMENTUM OPII (B.).

Liniment of Opium.

Mode of Preparation.—Mix together 1 fluid part of tincture of opium and 1 fluid part of liniment of soap, leave for a few days, and filter.

LINIMENTUM SAPONIS (B.).[1]

Liniment of Soap.

Mode of Preparation.—Dissolve 2 ounces of soft soap in 4 fluid ounces of distilled water. Dissolve 1 ounce of camphor and 3 fluid drachms of oil of rosemary in 16 fluid ounces of alcohol (90 per cent.). Mix the two solutions, set aside for a week, and filter.

LINIMENTUM SINAPIS COMPOSITUM.

Compound Liniment of Mustard.

1. Mix 4 ounces of mustard seeds powdered with 5 fluid ounces of oil of turpentine, leave for ten days, and add 4 fluid ounces of linseed oil.

2. British Pharmacopœia[2]: Dissolve 3 grammes Camphor in 43 c.c. alcohol (90 per cent.), add 2 c.c. volatile oil of mustard and 7 c.c. castor oil, and mix well together.

3. United States Pharmacopœia: Dissolve 60 grammes camphor in 500 c.c. alcohol, and 200 c.c. fluid extract of mezereum, add 30 c.c. volatile oil of mustard and 150 c.c. castor oil, and enough alcohol to make 1,000 c.c., and mix well.

LINIMENTUM TEREBINTHINÆ (B.).[3]

Liniment of Turpentine.

Mode of Preparation.—Mix 37·5 grammes soft soap with 50 c.c. distilled water. Dissolve 25 grammes camphor in 325 c.c. oil of turpentine. Finally, rub the two fluids together until they are thoroughly mixed, and add enough distilled water to make 1,000 c.c.

LINIMENTUM TEREBINTHINÆ ACETICUM (B.).

Liniment of Turpentine and Acetic Acid.

Mode of Preparation.—Mix 4 fluid parts of oil of turpentine, 1 part of glacial acetic acid, and 4 fluid parts of liniment of camphor.

[1] The Linimentum Saponis Mollis (United States Pharmacopœia) is made by mixing 20 c.c. Oil of Lavender Flowers with 300 c.c. Alcohol (91 per cent.), dissolving 650 grammes Soft Soap in this mixture, leaving for twenty-four hours, filtering through paper, and passing water through filter to make 1,000 c.c., and mixing well.

[2] Called Linimentum Sinapis.

[3] The United States Pharmacopœia directs 650 grammes of Resin Cerate to be melted in a capsule, on a water-bath, 350 grammes of Oil of Turpentine to be added, and the two well mixed.

LINUM (A. and B.).

Linseed.

Natural Order.—Linaceæ.

Description.—The dried ripe seeds of *Linum usitatissimum*, Linn. (B. and T., *Med. Pl.*, vol. i., plate 39), vary in length from $\frac{1}{6}$ to $\frac{1}{4}$ inch, are rather flat, ovoid, somewhat obliquely pointed, brown, smooth, shining on their outer surface, which is glabrous and pitted minutely, internally yellowish-white, with narrow, oily endosperm, and two large oily cotyledons, odourless. They possess a mucilaginous oily taste.

Tests.—A decoction of linseed should not give a blue colour with solution of iodine.

Therapeutics.—Externally, linseed meal is used in the form of a poultice (*cataplasma lini*), which is employed to convey heat and moisture. It is also used in the preparation of poultices of chlorinated lime, charcoal, and mustard. Bruised linseed mixed with an equal quantity of bran is a very convenient application for many purposes.

Infusion of linseed and linseed-gruel are given as demulcent drinks in cases of irritation of the pharynx and fauces, alimentary canal, bladder, and kidneys. They also form suitable media for the administration of many medicines, and likewise prove beneficial in cases of poisoning by irritant substances. Linseed has a slight diuretic action.

The therapeutics of linseed oil will be treated of under Oleum Lini.

Doses of Linseed Oil:

Dog - - - -	1 to 2 fluid ounces.
Pig - - - -	2 to 6 „ „
Horse - - - -	$\frac{1}{2}$ to $1\frac{1}{2}$ pints.

LINUM CONTUSUM (B.).

Crushed Linseed.

Description.—Linseed, coarsely powdered, when mixed with warm water, should have a bland and not pungent odour. When exhausted with bisulphide of carbon, it should yield no less than 30 per cent. of oil, and should not give reactions for starch. Burnt in air, it should only leave 5 per cent. of ash.

Actions and Uses.—*Externally.*—As a poultice. The oil is used for burns, either alone, or mixed with an equal amount of lime-water (United States Pharmacopœia, carron oil). Similarly, the Linimentum Calcis (British

Pharmacopœia) is composed of equal quantities of olive oil and lime-water. The oil of linseed might also be used in small quantity as a laxative enema.

Internally.—Linseed Tea (Infusum Lini) contains much mucilage, and this, especially if mixed with a little lemon-juice, relieves throat cough. It probably has a demulcent effect on the bronchi and urinary passages, and is slightly diuretic, being excreted by the kidneys as a resinoid body, whereby the cellular activity is augmented.

LIQUOR ACIDI CHROMICI (B.).

Solution of Chromic Acid.

Composition.—Solution of chromic acid is composed of 25 per cent. of chromic anhydride, CrO_3, or 29·5 per cent. of real chromic acid, H_2CrO_4.

Mode of Preparation.—Dissolve 1 part of chromic anhydride in 3 fluid parts of distilled water.

Characters.—Solution of chromic acid is orange-red, inodorous, caustic, and strongly acid, and has a specific gravity of 1·185. One fluid drachm contains the equivalent of nearly 18 grains of chromic anhydride, CrO_3.

Therapeutics.—Chromic acid has powerful oxidizing properties, and is a potent caustic. Its deodorant and disinfectant action is also of a marked character.

The solution is recommended as a local application for the so-called 'grapes' in horses, and may be employed in the full strength or diluted with equal parts of water. When diluted with 12 parts of that fluid, it is serviceable in ulcerated conditions of the mouth and tongue.

LIQUOR AMMONIÆ (B.).

Solution of Ammonia.

Mode of Preparation.—Mix together 1 fluid part of strong solution of ammonia and 2 fluid parts of distilled water, and preserve in a stoppered bottle.

Characters.—The specific gravity is 0·959. Each gramme should require for neutralization 5·9 c.c. of the volumetric solution of sulphuric acid. One fluid drachm contains 5·2 grains of the gas ammonia (10 per cent. by weight).

Preparation.—Linimentum Ammoniæ.

Therapeutics.—Applied externally, solution of ammonia has counter-irritant and rubefacient properties. It is employed in the preparation of Linimentum Ammoniæ.

Internally, solution of ammonia has stimulant, antispasmodic, antacid, and diuretic properties. It stimulates the central nervous system, more especially acting upon the spinal cord and the respiratory centre. On the heart it has a powerful stimulant

action, increasing the number of the beats of the pulse, and raising the blood-pressure.

In cases of chronic bronchitis, more especially when associated with debility, in congestion of the lungs of the active type, in pneumonia, especially when the heart's action is feeble, it is of great value. As a general stimulant it is indicated in debilitated conditions of the system. In influenza, strangles, and other weakening fevers, it is commonly prescribed. In cases of serpents' bites it is tried in most instances, in order to sustain the vital energies, until the poison can be thrown off by the excretory organs.

On the stomach it acts as a carminative and reflex general stimulant, and it produces antacid effects on the contents. It is therefore useful in cases of indigestion and tympanitis. In poisoning by hellebore, opium, bryony, or other powerful depressors, it is of great efficacy.

In spasmodic and flatulent colic it is often given, controlling the spasms in the former, and dispelling the gaseous accumulations in the latter.

Solution of ammonia should be given freely diluted with cold mucilage, gruel, or water.

Dose.—

Dog	5 to 25 minims.
Pig	½ to 1½ fluid drachms.
Sheep	½ to 2 ,, ,,
Horse	2 to 6 ,, ,,
Ox	4 to 8 ,, ,,

LIQUOR AMMONIÆ FORTIS (B.).

Strong Solution of Ammonia.

Composition.—Strong solution of ammonia consists of the gas ammonia, NH_3, dissolved in water to the extent of 32·5 per cent. by weight of the solution.

Mode of Preparation.—The gas ammonia may be obtained by acting on chloride of ammonium with slaked lime, and the solution by passing the gas into distilled water.

Characters.—Strong solution of ammonia is a colourless liquid with a characteristic and very pungent odour, and a strong alkaline reaction. The specific gravity is 0·891. One fluid drachm contains 15·83 grains of ammonia gas. When

diluted with four times its volume of distilled water, it does not give precipitates with solution of lime, oxalate of ammonium, sulp-hydrate of ammonium, or ammonio-sulphate of copper; and, when treated with an excess of nitric acid, it is not rendered turbid by nitrate of silver or by chloride of barium. When mixed with an equal volume of water, and with hydrochloric acid, no colour or odour should arise.

Therapeutics.—Strong solution of ammonia is a little more than three times the strength of the foregoing preparation. It is used for making the compound liniment of ammonia, and in the compound liniment of camphor. It is not to be used for internal purposes, the previous preparation being alone serviceable in this respect, and that only when freely diluted with water and in small doses.

LIQUOR AMMONII ACETATIS (A.[1] and B.).

Solution of Acetate of Ammonium.

Chemical Composition.—Acetate of ammonium, the formula of which is $NH_4C_2H_3O_2$, dissolved in water.

Mode of Preparation.—Fifty grammes carbonate of ammonium must be mixed with 500 grammes of distilled water, the solution neutralized with acetic acid, and enough distilled water added to make 1,000 c.c., and the solution should be stored in green glass bottles free from lead. The specific gravity is 1·022.

Test.—A little of the solution, heated in a test-tube to expel carbon dioxide gas, should be neutral or only slightly acid to litmus.

Therapeutics.—Acetate of ammonium is prescribed in fever, in virtue of its marked stimulant action on the skin. It is a reliable diaphoretic, and is also a diuretic. It does not, however, possess the general stimulant action of the solution of ammonia, or of the carbonate of ammonium. In the treatment of diseases attended by fever, such as influenza, scarlet fever, chill, and inflammatory conditions of the respiratory tract, it is one of the most commonly prescribed of veterinary medicines.

[1] The United States Pharmacopœia solution contains about 7 per cent. of the salt, and small amounts of acetic and carbonic acids. It is made by adding 5 grammes carbonate of ammonium, free from bicarbonate, gradually to 100 c.c. cold diluted acetic acid, and stirring until solution is effected. The solution (called Spirit of Mindererus) should be prepared shortly before use.

Dose.—*Dog* - - - - 1 to 3 fluid drachms.
Man - - - - 2 to 6 ,, ,,
Pig - - - - 2 to 6 ,, ,,
Sheep - - - - 2 to 8 ,, ,,
Horse - - - - 1 to 4 fluid ounces.
Ox - - - - 1 to 5 ,, ,,

LIQUOR AMMONII ACETATIS FORTIS.

Strong Solution of Acetate of Ammonium.

Mode of Preparation.—Crush 15½ ounces of carbonate of ammonium, and add it gradually to about 45 fluid ounces of acetic acid. Then add more of the acid, until a neutral liquid results, and, lastly, add sufficient distilled water to yield 3 pints. The solution should be stored in bottles free from lead.

Characters.—A little of the solution, heated in a test-tube to expel carbonic acid gas, should be neutral. The specific gravity is 1·073.

Preparation.—Liquor Ammonii Acetatis.

Therapeutics.—The strong solution of acetate of ammonium is nearly five times as strong as the foregoing preparation, and is administered for the same purposes in doses proportionately reduced; but, in order to avoid mistakes, the previous preparation should alone be used for internal purposes.

LIQUOR AMMONII CITRATIS (B.).

Solution of Citrate of Ammonium.

Mode of Preparation.—Dissolve 2½ ounces of citric acid in five times its weight (*i.e.*, 12½ ounces by weight) of distilled water. Neutralize with 1¾ ounces of carbonate of ammonium, and add enough distilled water to make 1 pint (1,000 c.c.) in all. It should be preserved in a green glass bottle.

Test.—Heat a small quantity of the liquor in a test-tube to expel carbonic acid gas, and the reaction should then be neutral.

Dose.—*Man* - - - - - 2 to 6 fluid drachms.

LIQUOR ANTIMONII CHLORIDI.

Solution of Chloride of Antimony.

Mode of Preparation.—Place 1 pound of purified black antimony in a porcelain vessel, pour upon it 4 pints of hydrochloric acid, and, constantly stirring, heat gently, gradually augmenting the heat as the evolution of gas

becomes slower, until the liquid boils. Continue to maintain this temperature for fifteen minutes. Remove the mixture from the source of heat, and filter the liquid through calico into another vessel, returning what passes through first, in order that a perfectly clear solution may be obtained. Boil this down to the bulk of 2 pints, and preserve in a stoppered bottle.

Characters.—Solution of chloride of antimony is a heavy liquid, usually of a yellowish-red colour, and has a specific gravity of about 1·47.

Tests.—A little of it dropped into water gives a white precipitate, and the filtered solution lets fall a copious deposit on the addition of nitrate of silver. If the white precipitate formed by water be treated with sulphuretted hydrogen, it becomes orange-coloured.

Preparation.—Antimonii Oxidum.

Therapeutics.—Solution of chloride of antimony was formerly much used as a caustic in the treatment of thrush, canker, and foot-rot, being either employed alone, or mixed with one or two or more parts of compound tincture of myrrh. It is not so commonly used now, though for fistulous cavities and sinuses it proves a painless and efficient caustic. It cannot be diluted with water without undergoing decomposition.

LIQUOR ARSENICALIS (B.).[1]

Arsenical Solution.

Synonym.—Fowler's Solution.

Mode of Preparation.—Place 10 grammes of arsenious anhydride in powder, and the same quantity of carbonate of potassium in a 1-litre flask with 500 c.c. of distilled water, and apply heat until a clear solution is obtained. Allow it to cool, and then add 31·25 c.c. compound tincture of lavender, and as much distilled water as will make 1,000 c.c.

Character.—Arsenical solution is a reddish liquid, alkaline in reaction, and with a smell of lavender.

The solution contains 1 per cent. of arsenious anhydride, each fluid ounce containing, therefore, $4\frac{1}{3}$ grains, 100 c.c. containing 1 gramme, and 110 minims 1 grain.

Tests.—After being acidulated with hydrochloric acid, it gives with sulphuretted hydrogen a yellow precipitate, which is brightest when the arsenical solution has been previously diluted.

Therapeutics.—Liquor arsenicalis is the form in which it is

[1] The United States Pharmacopœia has the Liquor Acidi Arsenosi, which, however, is a different preparation. It is made by mixing 50 c.c. diluted hydrochloric acid with 250 c.c. distilled water, adding 10 grammes of arsenious acid, and boiling until the latter is dissolved. Filter the solution, and pass sufficient distilled water through to make 1,000 c.c. in all, and mix thoroughly. In 100 c.c. of the solution is contained 1 gramme of arsenious acid.

generally customary to administer arsenious oxide, since the latter, when not given in solution, is too irritating for internal use. The solution is not uncommonly, also, used for external purposes, more especially for the destruction of pediculi and acari, but it is advisable to use preparations for these purposes which, while being less dangerous to the animal, are not less destructive to the parasites.

Dr. Brunton implies that arsenic may perhaps replace N or P in the living tissues, and especially in protagon, which is one of the most important constituents of nerves. It alters the chemical changes which occur in them during life. In minute doses it is useful; but large doses destroy both animals and plants, and in man and animals it causes irritation and inflammation of any part of the body in contact with it, whether it be directly applied, or get to it through the blood.

Thus, from wall-paper or artificial flowers it may enter through the eyes, nose, lungs by inhalation, or the skin. If well diluted, it may primarily cause but little irritation, but gain access to the blood, and be carried all over the system. When absorbed through the stomach, it must pass through the liver. Whilst circulating in the blood, it acts on the heart, muscles, and nerves, stomach, intestines, lungs, and mucous membranes of the eyes and skin, and all these, whilst eliminating it, are thereby irritated.

When arsenic is applied to a wound, it causes more violent and more quick inflammation of the stomach, than when it is swallowed, and it seems probable that, except when given in large and strong doses, the effect on the stomach is generally caused secondarily by the arsenic carried there through the circulation.

It affects chiefly the nervous system and muscles, the mucous membranes and skin. A few minutes after its absorption, it begins to be eliminated by the kidneys, and later by the mucous membranes and skin, thereby irritating them. If more is taken than can be easily eliminated daily, storage and poisoning occur after a time. Women can take less than men, and children very much less than either. Whilst some persons cannot take more than 3 minims of Liquor Arsenicalis without intestinal irritation, others will not be inconvenienced by 30 minims thrice daily. If 5 minims were given on an empty stomach thrice daily, irritation of stomach and intestines would soon be caused; but, if taken after a meal and well diluted, no local discomfort is produced.

Alcohol directs mercury to the nervous system, causing, perhaps, peripheral neuritis, and the same may be true of arsenic.

A sufferer from ague should be given quinine for his own safety, and for that of the community arsenic, which prevents the growth of sexual parasites in his system (H. E. Durham).

For pernicious anæmia 5 minims of Liquor Arsenicalis are given thrice daily, and the dose may be gradually increased by 1 minim every other day, until about 12 or 15 minims is reached. It is said that even ½ to 1 drachm a day may be required before good results are obtained; but these large doses can only be given with the utmost care. The corpuscles, which may be at first only 1,000,000 per cubic millimetre or less, steadily increase, the abnormal corpuscles disappear, and healthy red cells take their place (C. H. Melland).

Arsenic causes red bone-marrow to replace the yellow marrow, and to produce many more red cells. Some say arsenic also lessens the hæmolytic action of the liver, and Hunter holds that the disease is due to a chronic infection of the gastro-intestinal tract, which the arsenic destroys.

Unfortunately, however, though the disease may be apparently cured, one recurrence may follow on another, and after about four years a fatal one may close the scene.

Dose.—

Man	2 to 8	minims.
Dog	2 to 5	,,
Pig	15 to 45	,,
Sheep	30 to 60	,,
Horse	2 to 6	fluid drachms.
Ox	2 to 8	,, ,,

LIQUOR ARSENII ET HYDRARGYRI IODIDI (A. and B.).[1]

Solution of Iodide of Arsenic and Mercury.

Synonym.—Donovan's Solution.

Mode of Preparation.—Triturate 10 grammes of iodide of arsenic and 10 grammes of red iodide of mercury with 200 c.c. of distilled water, until nearly all is dissolved. Pass firstly the solution through a filter, and then pour on the filter as much water as will produce 1,000 c.c. of filtrate in all.

[1] The preparation is of the same strength in each Pharmacopœia.

Characters.—Solution of iodide of arsenic and mercury is a clear pale yellow liquid, and possesses an unpleasant metallic flavour. The specific gravity is 1·016.

Tests.—If sulphuretted hydrogen be added, a precipitate partially insoluble in strong nitric acid is produced; while the dissolved part, when diluted, yields a yellow precipitate on the gradual addition of solution of sulphydrate of ammonium.

One fluid ounce contains about 1 per cent. by weight of arsenious iodide, AsI_3, and of mercuric iodide, HgI_2. One grain of both AsI_3 and HgI_2 is contained in 110 minims, and one gramme of each of these iodides in 100 c.c.

Therapeutics. — Donovan's solution is given, when it is required to produce the combined action of mercury, iodine, and arsenic.

It is not much used, although for many forms of chronic skin disease it is a valuable preparation.

Dose.—

Dog - - - -	2 to 5 minims.
Man - - - -	5 to 20 ,,
Pig - - - -	15 to 40 ,,
Horse - - - -	2 to 6 fluid drachms.

LIQUOR ARSENII HYDROCHLORICUS (B.).[1]

Hydrochloric Solution of Arsenic.

Mode of Preparation.—Boil 10 grammes of arsenious anhydride in powder with 12·5 c.c. of hydrochloric acid and 500 c.c. of distilled water until solution is effected. Then add distilled water to make 1,000 c.c.

Characters.—Hydrochloric solution of arsenic is a colourless liquid, having an acid reaction. The specific gravity is 1·01. The solution contains 1 per cent. of arsenious anhydride, each fluid ounce containing $4\frac{1}{3}$ grains. In 110 minims is 1 grain, and in 100 c.c. 1 gramme.

Test.—Sulphuretted hydrogen produces at once, when mixed with it, a yellow precipitate.

Therapeutics.—The uses and the doses of this preparation are the same as those of the liquor arsenicalis.

Dose.—*Man* - - - - 2 to 8 minims.

[1] Called in the British Pharmacopœia Liquor Arsenici Hydrochloricus.

LIQUOR ATROPINÆ SULPHATIS (B.).

Solution of Sulphate of Atropine.

Mode of Preparation.—Dissolve 1 gramme of sulphate of atropine and 0·12 gramme salicylic acid in enough recently-boiled and cooled distilled water to make 100 c.c. One hundred c.c. contain 1 gramme; 110 minims 1 grain.

Therapeutics. — Solution of sulphate of atropine is a convenient form in which to administer atropine by the mouth or hypodermically.

One-fiftieth grain atropine sulphate, given hypodermically to a dog, produced in thirty seconds an increase in rapidity of pulse and in blood-pressure, and the respiration was hastened and made more vigorous. The animal, unless deeply anæsthetized, struggles. If, in an animal under the influence of atropine, the vagi be cut, no change of pulse or blood-pressure is observed, and even stimulation of the distal end of one of the cut vagi produces no change in the blood-pressure tracing (Rudolph).

E. Müller showed that the accelerating action of atropine on the heart diminished with age, and is not produced when the heart has had extra strain for some time.

Some give an injection of atropine with or without morphine before giving chloroform. One-fiftieth grain of atropine given hypodermically to a fox-terrier, with artificial respiration, saved it from chloroform-poisoning. A minute after the dose the heart, which had ceased, started to beat rapidly. Soon natural breathing began again in a rapid, shallow manner, and the animal recovered. Another dog was saved in the same way, and ten dogs under the influence of atropine were more difficult to kill with chloroform than others not so treated.

Ernest Bashford has tried the action of atropine sulphate on white rats, poisoned with tartrate of morphine.

If the injection of atropine were postponed for thirty minutes after that of morphine, the dose of morphine which could be antagonized by atropine was at the most $1\frac{1}{2}$ times the minimum fatal dose, instead of $2\frac{1}{4}$ times when they were injected simultaneously.

The smallness of the dose of atropine which can be safely given in morphine-poisoning is strange, for not more than 1·5 milli-

grammes (about $\frac{1}{42}$ grain) of atropine should be injected, and that for only once.

Binz, however, has advised repeated doses of 10 to 30 milligrammes (nearly $\frac{1}{2}$ grain), and the patient is to be kept warm.

In the *Atropa belladonna* are contained atropine and hyoscyamine. *Scopolia carniolica* (Japanese belladonna), which is sometimes substituted according to H. C. Wood, contains probably hyoscyamine and hyoscine in very small amount. Husemann says that hyoscyamine acts locally like atropine, constricting the bloodvessels, increasing the pulse-rate by paralysis of the vagus peripherally, and in small doses elevating the blood-pressure. It also dilates the pupil, lessens secretion, and increases respiration.

In frogs both drugs produced a rapidly increasing paralysis.

Fraser showed that when sublethal doses are given the paralysis caused by atropine is followed by exaggerated reflexes, frequently associated with motor weakness, probably due to depression of the inhibitory centre of the cord, which persists after paralysis of the motor cells has passed off. This paralysis of Setschenow's centre is equally well marked after the scopolia alkaloids as after atropine.

Husemann gives the dose of hyoscyamine as 1 to 2 milligrammes, and after investigation $\frac{1}{100}$ to $\frac{1}{25}$ grain was fixed as the dose. Even $\frac{1}{40}$ grain has caused serious poisoning.

In Merck's catalogue is given: Hyoscyamine, pure, $\frac{1}{8}$ to $\frac{1}{4}$ grain amorphous; hyoscyamine, c.p., $\frac{1}{130}$ to $\frac{1}{65}$ crystalline.

Great care should be taken in regard to these alkaloids.

Dose.—By the mouth:

Man	$\frac{1}{2}$ to 1 minim.
Dog	1 to 5 minims.
Sheep	4 to 12 ,,
Pig	4 to 15 ,,
Horse and Ox	$\frac{1}{2}$ to $1\frac{1}{2}$ fluid drachms.

Hypodermically.—One-fifth of the above doses suffices when the medicine is given hypodermically.

LIQUOR BISMUTHI ET AMMONII CITRATIS (B.).

Solution of Citrate of Bismuth and Ammonium.

Mode of Preparation. — Dissolve 70 grammes bismuth oxynitrate in 50 c.c. nitric acid + 50 c.c. distilled water, add distilled water with stirring until there is a faint opalescence, add 70 grammes potassium citrate and 20 grammes potassium carbonate dissolved in a little distilled water, heat to boiling, cool, filter off the precipitate, wash it with a little distilled water until free from nitrates, and add a little solution of ammonia gradually and with stirring, until the moist precipitate is just dissolved. Dilute with distilled water to form 1,000 c.c., and filter.

Characters.—Solution of citrate of bismuth and ammonium is colourless, and has a slightly metallic taste. One fluid drachm contains an amount of bismuth equivalent to about 3 grains of oxide of bismuth. The specific gravity is 1·07.

Tests.—It is neutral or slightly alkaline in reaction, and freely miscible with water. When heated with alkalies it evolves ammonia gas, and yields a white precipitate. If the salt is evaporated to dryness and the residue is ignited, a charred mass with a yellow edge results, and if this is treated with nitric acid a solution free from impurities should result.

Preparation.—Bismuthi et Ammonii Citras.

Therapeutics.—Solution of citrate of bismuth and ammonium is a useful remedy in cases of chronic indigestion in dogs.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 2 „ drachms.

LIQUOR CALCII HYDROXIDI (A. and B.).[1]

Solution of Hydroxide of Calcium.

Synonym.—Lime Water.

Mode of Preparation.—Wash 2 ounces of slaked lime with distilled water until a little of the liquid, when filtered and acidified with nitric acid, produces no turbidity with nitrate of silver. Place the washed lime into a stoppered bottle containing 1 gallon of the water, and shake well for two or three minutes. After twelve hours the excess of lime will have subsided, and the clear solution may be drawn off with a syphon and transferred to a green glass bottle provided with a well-pressed stopper.

Test.—Twenty-four c.c. require for neutralization 10 c.c. of the decinormal

[1] In both Pharmacopœias it is called Liquor Calcis, Solution of Lime, but the strength is slightly different.

volumetric solution of sulphuric acid, and therefore 1,000 c.c. contain about 1 gramme of lime, CaO, or 1 fluid ounce contains about ½ grain. Nitrate of silver gives no precipitate, when added to solution of lime acidified with nitric acid (absence of chlorides), and there should be no reaction for lead.

Dose.—*Man* - - - - - - 1 to 2 fluid ounces.
Dog - - - - - - 1 to 6 ,, drachms.
Pig - - - - - - 4 to 8 ,, ,,
Sheep - - - - - - 4 to 10 ,, ,,
Calf - - - - - - 1 to 2 ,, ounces.
Horse - - - - - - 1 to 6 ,, ,,
Ox - - - - - - - 2 to 8 ,, ,,

LIQUOR CALCIS CHLORINATÆ (B.).

Solution of Chlorinated Lime.

Mode of Preparation. — Mix well 5 litres of distilled water and 500 grammes of chlorinated lime by trituration in a mortar, and, having poured the mixture into a stoppered bottle, shake it well several times for the space of three hours. Pour out the contents of the bottle on to a calico filter, and preserve the solution which passes through in a stoppered bottle in a cool dark place.

Tests.—The specific gravity is about 1·055.

When the solution is made with the best chlorinated lime, and is quite fresh, it may yield about 3 per cent. of available chlorine. There should be at least 2 per cent.

Therapeutics.—See Calx Chlorinata, p. 109.

Dose.—*Dog* - - - - - - ½ to 1½ fluid drachms.
Sheep and Pig - - - - 2 to 6 ,, ,,
Horse - - - - - - 1 to 2 ,, ounces.
Ox - - - - - - 1½ to 3 ,, ,,

LIQUOR CALUMBÆ CONCENTRATUS (B.).

Concentrated Solution of Calumba.

Mode of Preparation. — Macerate 10 ounces of calumba root in No. 5 powder for twenty-four hours in 10 fluid ounces of distilled water, press firmly and remove the fluid, and again macerate what remains for another twenty-four hours, adding another 10 fluid ounces of distilled water and again firmly press. Now mix the two solutions, and heat the mixture for five minutes to 180° F. Allow it to cool, and add 4½ fluid ounces of alcohol (90 per cent.), filter, and add sufficient distilled water to make 1 pint.

Dose.—*Man and Dog* - - ½ to 1 fluid drachm.
Pig and Sheep - - 1 to 2 ,, drachms.
Horse and Ox - - 4 to 9 ,, ,,

LIQUOR CAOUTCHOUC (B.).

Solution of Indiarubber.

Mode of Preparation.—Cut up 1 ounce of indiarubber into fine shreds, and place these into a bottle containing a mixture of 10 fluid ounces of benzol and the same amount of bisulphide of carbon, and cork the bottle well. Agitate the mixture now and again, keeping the bottle in a cool place, until the rubber is dissolved.

LIQUOR CHIRATÆ CONCENTRATUS (B.).

Concentrated Solution of Chiretta.

Mode of Preparation.—Moisten 10 ounces of chiretta in No. 40 powder with 5 fluid ounces of alcohol (20 per cent.), pack it in a closed percolator, and let it remain for three days; add every twelve hours for ten successive times 2 fluid ounces of alcohol as before, and then add more alcohol at intervals so as to make 1 pint.

Dose.—*Man*	½ to 1	fluid	drachm.
Dog	½ to 1½	,,	drachms.
Pig	1 to 2	,,	,,
Horse	4 to 9	,,	,,

LIQUOR CUSPARIÆ CONCENTRATUS (B.).

Concentrated Solution of Cusparia.

Mode of Preparation.—Add to 10 ounces of cusparia bark in No. 40 powder 5 fluid ounces of alcohol (20 per cent.), pack the mixture in a closed percolator for three days, add every twelve hours 2 fluid ounces of alcohol as before for ten successive times, adding still more alcohol in portions, until 1 pint of the solution remains.

Dose.—*Man* - - - - - - ½ to 1 fluid drachm.

LIQUOR ETHYL NITRITIS (B.).

Solution of Nitrite of Ethyl.

Description.—The above is a mixture of 95 parts by volume of absolute alcohol with 5 parts by volume of glycerin, and when freshly made it contains 3 per cent. by weight, and not less than 2½ per cent. by weight of nitrite of ethyl. The latter is made by acting upon alcohol (90 per cent.) with nitrite of sodium and diluted sulphuric acid at a low temperature.

It should be stored in small bottles.

Characteristics.—It is a limpid liquid, devoid of appreciable colour, but with apple-like odour and taste, and very inflammable. Its specific gravity is 0·8245.

Tests.—If it be poured on an acidulated strong solution of ferrous sulphate in a test-tube, a deep olive-brown colour occurs at the surface of contact, and this ring deepens if the tube be gently shaken. The absence of acid should be proved by shaking it carefully with bicarbonate of sodium, when no effer-

vescence should occur. Again, if 10 c.c. be mixed with 5 c.c. of the volumetric solution of hydroxide of sodium and 5 c.c. of water, a yellow colour should not be produced, thus proving the absence of aldehyde. Again, 1 volume, agitated sharply at intervals for five minutes in a brine-charged nitrometer, with 1 volume of solution of iodide of potassium and 1 volume of diluted sulphuric acid, should give, at the ordinary temperature of 60° F., and pressure of 760 millimetres of mercury, when freshly prepared, at least 7·6 volumes of nitric oxide gas, and even after some time at least five-sixths of that amount.

Dose.—*Man* - - - - - - - 20 to 60 minims.

LIQUOR EPISPASTICUS (B.).

Blistering Liquid.

Mode of Preparation.—Mix 500 grammes of cantharides in No. 20 powder with 250 c.c. of acetic ether, pack the mixture in a percolator, leave for a day, then pour acetic ether over the mixture, and let the solution pass slowly through until 1 pint (1,000 c.c.) has collected.

LIQUOR FERRI CITRATIS (A.).

Solution of Citrate of Iron.

Mode of Preparation.—Mix 880 c.c. of liquor ammoniæ with 3,000 c.c. of cold water, and also 1,050 grammes of solution of ferric sulphate with 10,000 c.c. of cold water, and add this latter solution to the former slowly, constantly stirring. Pour the mixture on a wet muslin strainer, and let the liquid run through. Remove the moist remains from the strainer, mix it thoroughly with 6,000 c.c. of cold water, and let it again pass through the strainer. Repeat this process of washing several times, until only a little sulphate reaction with solution of chloride of barium is given by the filtrate. Now drain totally, and place the drained precipitate in a porcelain capsule. To this add 300 grammes of citric acid, and heat on a water-bath to 60° C., and stir continuously until the precipitate is dissolved. Filter and evaporate at the same temperature, until it weighs 1,000 grammes.

Characteristics and Tests.—A dark-brown liquid, devoid of odour, and with taste of iron. Specific gravity about 1·250 at 15° C.

If 100 grammes be evaporated on glass plates, about 42·5 grammes of red scales will be left.

It has an acid reaction to litmus, and is darkened but not precipitated by ammonia. With ferrocyanide of potassium it yields a bluish-green colour, made blue with hydrochloric acid.

Preparations.—Ferri Citras; Ferri et Ammonii Citras.

LIQUOR FERRI DIALYSATUS.

Solution of Dialysed Iron.

Chemical Composition.—The solution of dialysed iron is in reality a solution of highly basic ferric oxychloride, or chloroxide of iron, from which most of the acidulous matter has been removed by dialysis.

Mode of Preparation.—Mix 6 fluid ounces of strong solution of perchloride of iron with 2 pints of distilled water, and stir into the mixture sufficient diluted solution of ammonia to impart, after thorough agitation, a distinct ammoniacal odour. Filter through calico, wash the precipitated ferric hydrate with distilled water, and then squeeze it to remove superfluous moisture. Add the precipitate to 1 fluid ounce of solution of perchloride of iron, stir thoroughly, warm gently, and when complete, or nearly complete, solution is obtained, filter if necessary, and place the liquid in a covered dialyser. Then subject it to a stream of water until the solution on the dialyser is almost tasteless. The resulting solution should measure 28 fluid ounces.

Characters and Tests.—Solution of dialysed iron is a clear dark reddish-brown liquid, free from any marked ferruginous taste and acid reaction. The specific gravity is about 1·047. The solution gives no precipitate with ferrocyanide of potassium or with nitrate of silver, thereby indicating the absence of perchloride of iron.

Therapeutics and Dose.—Dialysed iron is good for administering iron in dogs, and the dose is from 15 to 30 minims.

LIQUOR FERRI PERCHLORIDI (B.).

Solution of Perchloride of Iron.

Mode of Preparation.—Mix 5 fluid ounces of strong solution of perchloride of iron with 15 fluid ounces of distilled water.

Characters.—Solution of perchloride of iron is of the same strength as the tincture of perchloride of iron. The specific gravity is 1·11.

Therapeutics.—The uses and doses of the liquor ferri perchloridi are the same as those of the tincture.

Dose.—

Man	5 to 15 minims.
Dog	5 to 25 ,,
Pig	30 to 60 ,,
Horse	2 to 6 drachms.

LIQUOR FERRI PERCHLORIDI FORTIS (B.).

Strong Solution of Perchloride of Iron.

Mode of Preparation.—Place 4 ounces of iron wire in a flask, and add a mixture of 12½ fluid ounces of hydrochloric

acid and 7 of water. Expose the whole to a moderate temperature until effervescence ceases, heat to boiling, filter in order to remove undissolved iron, rinse the flask and contents with a little water, and pour this over the filter, add to the filtrate 7 fluid ounces of hydrochloric acid, and pour the solution slowly and continuously into 1½ fluid ounces of nitric acid, the evolution of red fumes being promoted, if necessary, by slightly heating. Evaporate the product, until no more nitrous fumes escape, and a precipitate begins to form, and then add 1 fluid ounce of hydrochloric acid, and sufficient water to produce 17½ fluid ounces of the solution.

Characters and Tests.—Strong solution of perchloride of iron is orange-brown in colour, possesses a strong styptic taste, and is miscible with water and rectified spirit in all proportions. If diluted with water, like all chlorides, it gives a white precipitate with nitrate of silver; also a blue one with ferrocyanide of potassium, but none with ferricyanide of potassium. The specific gravity is about 1·42. A piece of copper, boiled for a few minutes in two fluid drachms of the solution diluted with water, and then rinsed in water, dried and heated in a dry test-tube, yields no white crystalline sublimate. Two ounces of iron are contained in 10 fluid ounces of the solution. In 100 c.c. are 22·5 grammes, and in 110 minims are 22·5 grains, of iron.

LIQUOR HAMAMELIDIS (B.).

Solution of Hamamelis.

Mode of Preparation.—Macerate 50 ounces of fresh leaves of hamamelis in a still for twenty-four hours with 100 fluid ounces of water and 10 fluid ounces of alcohol (90 per cent.), and distil one-half.

LIQUOR HYDRARGYRI NITRATIS ACIDUS (B.).[1]

Acid Solution of Nitrate of Mercury.

Mode of Preparation.—Mix 5 fluid ounces of nitric acid with 1½ fluid ounces of distilled water in a flask, and dissolve 4 ounces of mercury in the mixture without the aid of heat. Boil gently for fifteen minutes, cool, and preserve the solution, which should weigh about 12 ounces, in a stoppered bottle away from the light.

[1] The Liquor Hydrargyri Nitratis of the United States Pharmacopœia is prepared differently, and contains about 60 per cent. of mercuric nitrate, and about 11 per cent. of free nitric acid.

Characters and Tests.—Acid solution of nitrate of mercury is colourless and strongly acid, and gives a yellow precipitate with solution of hydroxide of potassium added in excess. A crystal of sulphate of iron, dropped into it, soon acquires a dark-brown colour, as does also the solution in proximity with it. The specific gravity is about 2. A little of the solution, when dropped into hydrochloric acid, diluted with twice its volume of water, gives no precipitate.

Therapeutics.—Acid solution of nitrate of mercury has powerful caustic properties, and may be applied to foul ulcers with the view of promoting healing. As a gargle, 5 minims to 1 ounce of water is useful in aphthous conditions of the mouth and in sore throat. In cases of canker of the horse's foot, where it is desired to destroy the unhealthy growth, the acid solution may be cautiously applied over the diseased part; but the dressing must not be repeated, for some time at any rate. The application may be followed up by the use of strong solutions of carbolic acid or other antiseptics.

Diluted solutions of the acid nitrate of mercury are useful as stimulants in chronic diseases of the skin, and are often employed in eczema, after the inflammatory stage is over. They also destroy the fungi of ringworm, and are also useful in killing pediculi.

LIQUOR HYDRARGYRI PERCHLORIDI (B.).

Solution of Mercuric Chloride.

Mode of Preparation.—Dissolve 10 grains of mercuric chloride in 1 pint distilled water, or 1 gramme in ,875 c.c.

The solution contains $\frac{1}{16}$ grain in 1 fluid drachm, or 0·114 gramme in 100 c.c.

Dose.—*Man* - - - - - $\frac{1}{2}$ to 1 fluid drachm.

LIQUOR HYDROGENII PEROXIDI (B.).

Solution of Peroxide of Hydrogen.

Mode of Preparation.—The aqueous solution of peroxide of hydrogen is made by mixing water, peroxide of barium, and a diluted mineral acid, and submitting the mixture to a temperature below 50° F.

Characteristics.—It is a liquid devoid both of colour and odour, having an acid taste, and making the saliva frothy.

Tests.—Solution of peroxide of hydrogen, if heated, is decomposed into water and oxygen. If a few drops be added to 9 c.c. of water containing

1 drop of solution of chromate of potassium, 10 drops of diluted sulphuric acid, and 3 c.c. of ether, a blue layer appears where the two liquids meet, and the ether, if shaken, will itself also become blue.

If 1 volume be placed in a brine-charged nitrometer, together with 11 times its bulk of a mixture composed of 1 volume of sulphuric acid, 2 volumes of a 5 per cent. solution of permanganate of potassium, and 7 volumes of water, there should be yielded at normal temperature and pressure about 20 volumes of oxygen (about 10 volumes from the solution of peroxide of hydrogen). There should be no barium present, and, if it be evaporated to dryness on a water-bath, not more than 0·5 per cent. of solid residue should be left.

Dose.—*Man* - - - - - - - - ½ to 2 fluid drachms.

LIQUOR IODI FORTIS (B.).[1]

Strong Solution of Iodine.

Mode of Preparation.—Dissolve ¾ ounce iodide of potassium and 1¼ ounces iodine in 1¼ fluid ounces distilled water in a bottle. Then add 9 fluid ounces alcohol (90 per cent.) and shake.

LIQUOR KRAMERIÆ CONCENTRATUS (B.).

Concentrated Solution of Krameria.

Mode of Preparation.—Add to 10 ounces of krameria root in No. 40 powder 5 fluid ounces of alcohol (20 per cent.); leave the mixture packed in a closed percolator for three days, and add every twelve hours for ten successive times 2 fluid ounces of alcohol, and add more alcohol, until 1 pint is produced.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 1½ ,, drachms.
Pig - - - - 1 to 2 ,, ,,
Horse - - - - ½ to 1½ ,, ounces.

LIQUOR MORPHINÆ ACETATIS (B.).

Solution of Acetate of Morphine.

Mode of Preparation.—Mix 25 c.c. alcohol (90 per cent.) with 25 c.c. distilled water, adding 2 c.c. diluted acetic acid,

[1] The Liquor Iodi Compositus of the United States Pharmacopœia is made by dissolving 5 grammes of iodine and 10 grammes of iodide of potassium in enough distilled water to make 100 grammes. The proportions are 1 to 2 to 20, whilst those of the British Pharmacopœia are 3 to 5 to 5 to 45, or 3 to 5 to 50 (adding the water and alcohol together). The advantages of the British Pharmacopœia preparation is that it both acts and keeps well. Many solutions made without alcohol are liable to become useless, owing to the growth of fungi.

dissolve 1 gramme acetate of morphine in the mixture, and add enough distilled water to make 100 c.c. The acetate of morphine used should be recently prepared, and of such quality that 20 grains will form a clear solution with 1 fluid drachm of water by the help of not more than 1 grain of acetic acid. In 100 c.c. is 1 gramme, and in 110 minims 1 grain.

Therapeutics.—See Morphinæ Acetas.

Dose.—*Dog* - - - - 2 to 10 minims.
Pig - - - - 5 to 25 ,,
Man - - - - 10 to 60 ,,
Horse - - - - 1 to 4 fluid drachms.
Ox - - - - 1½ to 5 ,, ,,

LIQUOR MORPHINÆ HYDROCHLORIDI (B.).

Solution of Hydrochloride of Morphine.

Mode of Preparation.—Mix 25 c.c. alcohol (90 per cent.) with 25 c.c. distilled water, add 2 c.c. diluted hydrochloric acid. Dissolve 1 gramme morphine hydrochloride in the mixture, and dilute with enough distilled water to make 100 c.c. In 100 c.c. is 1 gramme, and in 110 minims 1 grain.

Dose.—*Man* - - - - 10 to 60 minims.
Dog - - - - 2 to 10 ,,
Pig - - - - 5 to 25 ,,
Horse - - - - 2 to 4 fluid drachms.

LIQUOR MORPHINÆ TARTRATIS (B.).

Solution of Tartrate of Morphine.

Mode of Preparation.—Mix 1 fluid ounce (25 c.c.) of alcohol (90 per cent.) with 1 fluid ounce (25 c.c.) of distilled water, and dissolve 17½ grains (1 gramme) of tartrate of morphine in the mixture, and then add sufficient distilled water to make the solution 4 fluid ounces (100 c.c.).

Composition.—One hundred c.c. contain 1 gramme, and 110 minims contain 1 grain of tartrate of morphine.

Dose.—*Man* - - - - - 10 to 60 minims.

LIQUOR PANCREATIS (B.).

Solution of Pancreas.

Description.—The above contains the digestive factors of the pig's pancreas, and it is most active when prepared from an animal fed a little before being killed.

Mode of Preparation.—A pig should be fed and then soon afterwards killed, and the pancreas abstracted whilst fresh. From it take 250 grammes, or 5 ounces, strip off the fat and outside membranes, and finely divide by rubbing it well with washed sand or powdered pumice-stone. This mass is placed, together with 1,000 c.c. (20 fluid ounces) of alcohol (20 per cent.), in a closed vessel for a week, and then filtered.

Test.—If 2 c.c. of the solution be mixed with 0·2 gramme of bicarbonate of sodium and 20 c.c. of water, and with 80 c.c. of milk, and kept at 45° C. for one hour, coagulation should not then occur if nitric acid be added.

Actions and Uses.—Digests proteids, fats, and amyloids, and is used for that purpose with milk, gruel, and soups in cases of indigestion in mankind. It is not used internally by itself.

LIQUOR PICIS CARBONIS (B.).

Solution of Coal-Tar.

Mode of Preparation.—To 100 grammes (2 ounces) of quillaia bark in No. 20 powder, add 50 c.c. (1 fluid ounce) of alcohol (90 per cent.), and percolate with more alcohol as in the preparation of tinctures, so that 1 pint results. Add to the resulting percolate 200 grammes (4 ounces) of prepared coal-tar, and set aside the mixture at 48·9° C. (120° F.) for two days, stirring now and again. The mixture is first cooled, and should then be filtered.

LIQUOR PLUMBI SUBACETATIS DILUTUS (B.).

Diluted Solution of Subacetate of Lead.

Synonym.—Goulard's Lotion.

Mode of Preparation.—Mix 5 c.c. alcohol (90 per cent.) with 390 c.c. recently boiled and cooled distilled water, add 5 c.c. strong solution of subacetate of lead, and shake. Filter through paper, and keep the clear solution in a stoppered bottle.

Therapeutics.—Diluted solution of subacetate of lead has

astringent, antiphlogistic, and anodyne properties. It is applied locally for the same purposes as the next preparation, the only difference between the two consisting in the less proportion of active ingredient.

LIQUOR PLUMBI SUBACETATIS FORTIS (B.).[1]

Strong Solution of Subacetate of Lead.

Synonym.—Goulard's extract.

Chemical Composition.—The above is an aqueous solution of subacetate of lead, $Pb_2O(C_2H_3O_2)_2$.

Mode of Preparation.—Boil 5 ounces of acetate of lead and $3\frac{1}{2}$ ounces of oxide of lead in powder in 1 pint of distilled water for half an hour, constantly stirring and adding a little distilled water. Filter, and when the liquid is cold, add to it more distilled water, until the product measures 20 fluid ounces. Keep the clear solution which results in stoppered bottles.

Characters and Tests.—Solution of subacetate of lead is a dense, clear, colourless liquid, possessing an alkaline reaction and a sweet astringent taste. By exposure to the air it becomes turbid. With mucilage of gum acacia it forms an opaque white jelly. Sulphuric acid in excess gives with it a white precipitate, acetic acid being set free, and each gramme needs for complete precipitation 17 c.c. of the decinormal volumetric solution of sulphuric acid. The specific gravity is 1·275.

Preparation.—Liquor Plumbi Subacetatis Dilutus.

Therapeutics.—Goulard's extract applied locally has astringent, antiphlogistic, and anodyne properties. It is used for bruises, sprains, and blistered surfaces. For sprains and bruises,

[1] The two corresponding United States Pharmacopœia solutions are respectively Liquor Plumbi Subacetatis, and Liquor Subacetatis Dilutus. The specific gravity of the first is 1·195 at 15° C., and it contains in solution about 25 per cent. of Lead Subacetate [$Pb_2O(C_2H_3O_2)_2$]. The latter—*i.e.*, the diluted solution—is made by mixing 3 parts by volume of the former with enough distilled water so as to make a 3 per cent. solution—*i.e.*, 100 parts in all. The United States Pharmacopœia Liquor Plumbi Subacetatis is a little weaker than the corresponding Liquor Plumbi Subacetatis Fortis of the British Pharmacopœia, and in regard to the diluted solution, the United States Pharmacopœia one is approximately a 3 per cent. solution of the stronger solution, whilst that of the British Pharmacopœia is a 1·25 per cent. solution of the stronger one. Hence the strong solution of the British Pharmacopœia is stronger, and the diluted solution weaker, than the corresponding United States Pharmacopœia solutions.

1 fluid ounce of Goulard's extract, 1 fluid ounce of spirit with 6 of distilled water, is a useful form. Or a lotion may be made of 1 fluid ounce of Goulard's extract, 1 fluid ounce of tincture of opium, 6 fluid ounces of distilled water; or 1 fluid ounce of Goulard's extract may be mixed with 4 of olive or linseed oil.

LIQUOR POTASSII HYDROXIDI.[1]

Solution of Hydroxide of Potassium.

Synonyms.—Liquor Potassæ, Solution of Potash.

Mode of Preparation.—Dissolve 1 pound of carbonate of potassium in 1 gallon of distilled water. Heat the solution to the boiling-point in a clean iron vessel, and gradually mix with it 12 ounces of washed slaked lime. In order to obtain the 12 ounces of washed slaked lime about 13 ounces of slaked lime must be washed with distilled water until a little of the washings, acidified with nitric acid, gives no cloudiness with nitrate of silver. Continue the ebullition for ten minutes with constant stirring. Remove the vessel from the fire, and when, by the subsidence of the insoluble matter, the supernatant liquor has become perfectly clear, transfer it by means of a siphon to a green glass bottle furnished with an air-tight stopper, and add distilled water, if necessary, to make its specific gravity 1·058, and its neutralizing power in accordance with the test. Preserve in a green glass bottle provided with an air-tight stopper.

Tests.—The specific gravity is 1·058. Nine c.c. require for neutralization 10 c.c. of the volumetric solution of sulphuric acid. The solution therefore contains 5·85 per cent. by weight of hydroxide of potassium, KHO. In 110 minims are 6·2 grains, and in 1 fluid ounce 27 grains. No effervescence takes place when the solution is added to an excess of diluted hydrochloric acid. Mixed with an equal volume of distilled water, solution of potash gives no precipitate with solution of lime or oxalate of ammonium. When it is treated with an excess of diluted nitric acid and evaporated to dryness, the residue forms with water a nearly clear solution, which may be slightly precipitated with chloride of barium or nitrate of silver, but is unaffected, or but slightly affected, by ammonia. Acidulated by hydrochloric acid,

[1] This solution is designated in both British and United States Pharmacopœias Liquor Potassæ.

the solution is unaffected with sulphuretted hydrogen. In 100 c.c. are contained 6·19 grammes of hydroxide of potassium.

Dose.—*Man and Dog* - - 10 to 30 minims, copiously diluted with water.
Pig - - - - ½ to 1 fluid drachm.
Horse - - - - 2 to 4 ,, drachms.

LIQUOR POTASSII PERMANGANATIS (A. and B.).

Solution of Permanganate of Potassium.

Mode of Preparation.—Dissolve 1 part of permanganate of potassium in enough distilled water to make 100 fluid parts of solution. In 100 cc. is 1 gramme, and in 110 minims 1 grain.

Therapeutics.—Solution of permanganate of potassium is used as a gargle in aphthous and ulcerated conditions of the mouth and tongue and fauces. For foul-smelling wounds it proves useful on account of its deodorant properties. As an injection diluted with equal parts of water, it is used in gonorrhœa in bulls, and also in leucorrhœa and foul discharges from the uterus in mares and cows and other animals. Permanganate of potassium is a powerful antiseptic. It has been used in very strong solution subcutaneously injected round a snake-bite in a dog subjected to the bite of a puff-adder, and it has been proved to destroy the deadly power of cobra poison, when mixed with it outside the body. *Vide* the *Veterinary Journal* for June, 1886, p. 395. In the article, for 'eczema' read 'ozæna,' and for 'Dr. Bruton' read 'Dr. Brunton.'

Dose.—*Dog* - - - - 1 to 3 fluid drachms.
Man - - - - 2 to 4 ,, ,,
Pig - - - - 2 to 5 ,, ,,
Horse - - - - ½ to 2 ,, ounces.

LIQUOR QUASSIÆ CONCENTRATUS (B.)

Concentrated Solution of Quassia.

Mode of Preparation.—Mix 100 grammes (2 ounces) of quassia wood in No. 40 powder with 100 c.c. (2 fluid ounces) of alcohol (20 per cent.), place the mixture in a percolator, close it, and set aside for three days, add 100 c.c. (2 fluid ounces) of alcohol for ten successive times at intervals of twelve hours, and more alcohol, until 1,000 c.c. (1 pint) are produced.

Dose.—*Dog* - - - - ¼ to 1 fluid drachm.
Man - - - - ½ to 1 ,, ,,
Pig - - - - ½ to 1½ ,, drachms.
Horse - - - - ¼ to 1½ ,, ounces.

LIQUOR RHEI CONCENTRATUS (B.).

Concentrated Solution of Rhubarb.

Mode of Preparation.—Add to 10 ounces of rhubarb root in No. 5 powder 5 fluid ounces of alcohol (20 per cent.), leave the mixture packed in a closed percolator for three days, add 2 fluid ounces of alcohol every twelve hours for ten successive times, and add more alcohol until 1 pint results.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - 1 to 2 ,, drachms.
Pig - - - - 1 to 4 ,, ,,
Horse - - - - 1 to 4 ,, ounces.

LIQUOR SARSÆ COMPOSITUS CONCENTRATUS (B.)

Concentrated Compound Solution of Sarsaparilla.

Mode of Preparation.—Infuse 20 ounces of sarsaparilla, cut transversely and bruised, in three successive portions of 5 pints of distilled water, for one hour each at 160° F. Mix 2 ounces of sassafras root in shavings, 2 ounces of guaiacum wood in shavings, 2 ounces of dried liquorice root bruised, and 1 ounce of Mezereon bark cut small, and boil with distilled water until exhausted. Now mix the infusion and the decoction, and quickly concentrate them by means of heat, until when cold the mixed liquid measures 16 fluid ounces; add 4½ fluid ounces of alcohol (90 per cent.), leave for a fortnight, and then filter, and there should be 1 pint left.

Dose.—*Man* - - - - 2 to 8 fluid drachms.

LIQUOR SENEGÆ CONCENTRATUS (B.)

Concentrated Solution of Senega.

Mode of Preparation.—Add to 10 ounces of senega root in No. 20 powder 4 fluid ounces of a mixture composed of 2 parts of alcohol (20 per cent.) and 1 part of alcohol (45 per cent.), leave

packed in a closed percolator for three days, percolate with ten successive portions of 2·1 fluid ounces of the same mixture as above every twelve hours, and add still more of the same fluid, until 1 pint of solution is produced.

Dose.—*Dog* - - - - 15 to 30 minims.
Man - - - - ½ to 1 fluid drachm.
Pig - - - - ½ to 1 ,, ,,
Horse - - - - ¼ to 1½ ,, ounces.

LIQUOR SENNÆ CONCENTRATUS (B.).

Concentrated Solution of Senna.

Mode of Preparation.—Divide 20 ounces of senna in No. 5 powder into 3 equal portions, each weighing 6⅔ ounces. Take one portion and add a little distilled water, and leave it packed in a percolator for one whole day, and then add distilled water to it, until 5 fluid ounces pass through. Now take the second portion and add sufficient of the above 5 fluid ounces to moisten it slightly, leaving it packed in a percolator as before for twenty-four hours, then add the rest of the 5 fluid ounces by degrees, and also another 5 fluid ounces obtained by passing more distilled water through the first portion. Repeat the process with the third portion of the senna, and continue percolating through the three portions until 16 fluid ounces has passed through the third percolator. Now heat this liquid to 180° F. for five minutes, cool, add a mixture of 2 fluid ounces of alcohol (90 per cent.) and 2½ fluid ounces of tincture of ginger, leave for a week, and filter, giving about 1 pint of filtrate.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 3 ,, drachms.
Pig - - - - ¼ to 1 ,, ounce.

LIQUOR SERPENTARIÆ CONCENTRATUS (B.).

Concentrated Solution of Serpentary.

Mode of Preparation.—Add to 10 ounces of serpentary rhizome in No. 40 powder 5 fluid ounces of alcohol (20 per cent.), leave the mixture packed in a closed percolator for three days, add ten successive portions of 2 fluid ounces of alcohol every twelve hours, and add more alcohol so as to furnish 1 pint of solution.

Dose.—*Man* - - - - - - ½ to 2 fluid drachms.

LIQUOR SODÆ CHLORINATÆ (B.).[1]

Solution of Chlorinated Soda.

Mode of Preparation.—Dissolve 24 ounces of carbonate of sodium in 2 pints of distilled water; thoroughly triturate 16 ounces of chlorinated lime with 6 pints of distilled water, and filter. Mix well the two solutions, and filter. Keep the solution in a stoppered bottle in a cool and dark place.

Characters and Tests.—Solution of chlorinated soda is a colourless alkaline liquid, with an astringent taste and a feeble odour of chlorine. It decolourizes sulphate of indigo, and is decomposed by hydrochloric acid, evolving chlorine and little or no carbonic acid gas. The specific gravity is 1·054. The solution consists of several chlorine compounds of sodium, and contains about 2½ per cent. of available chlorine. It yields only a slight precipitate with oxalate of ammonium.

Preparation.—Cataplasma Sodæ Chlorinatæ.

Therapeutics.—Solution of chlorinated soda has an antiseptic, antacid, and stimulating action, when taken internally. It is antidotic to poisoning by sulphuretted hydrogen and hydrocyanic acid. Its antiseptic properties are very marked, and it is a good deodorizer and disinfectant.

The solution is administered internally in septic diseases in horses, and when diluted it is used as a dressing for foul wounds, sores, and ulcers, and as a gargle in aphthous and ulcerated conditions of the mouth, tongue, and throat.

Dose.—

Man	- - -	10 to 20	minims.
Dog	- - -	10 to 25	,,
Pig	- - -	½ to 1	fluid drachm.
Sheep	- - -	½ to 1½	,, drachms.
Horse	- - -	1 to 4	,, ,,
Ox	- - -	1 to 6	,, ,,

LIQUOR SODII ETHYLATIS (B.).

Solution of Ethylate of Sodium.

Mode of Preparation. — Dissolve carefully in 20 c.c. of absolute alcohol in a flask 1 gramme of clean bright sodium,

[1] The corresponding solution of the United States Pharmacopœia, Liquor Sodæ Chloratæ, is a little stronger, containing at least 2·6 per cent. of available chlorine.

the flask being submitted to a stream of cold water in order to keep it cool. It should be recently prepared. It contains 18 per cent. of the solid, C_2H_5ONa.

Characteristics.—It is a colourless liquid of syrupy consistence, and becomes brown if kept. Specific gravity 0·867. If slightly heated, it boils, giving off alcoholic fumes, and leaving a white residue, which, if strongly heated, chars. If the white residue be mixed with water and heated, it produces ethylic alcohol, and the solution, if evaporated, leaves a white residue, nearly entirely consisting of caustic soda.

Uses.—It is a powerful caustic, used to destroy small tumours —*e.g.*, nævi.

LIQUOR SODII HYDROXIDI.[1]

Solution of Hydroxide of Sodium.

Synonyms.—Liquor Sodæ; Solution of Soda.

Mode of Preparation.—Dissolve 28 ounces of carbonate of sodium in 1 gallon of distilled water. Having heated the solution to the boiling-point in a clean iron vessel, gradually mix with it 12 ounces of washed slaked lime, and continue the ebullition for ten minutes with constant stirring. Remove the vessel from the fire, and when, by the subsidence of the insoluble matter, the supernatant liquor has become perfectly clear, transfer it by means of a siphon to a green glass bottle furnished with an air-tight stopper, and add distilled water, if necessary, to make it correspond with the tests of specific gravity and neutralizing power.

It will be seen that the method of preparation is the same as that for Liquor Potasii Hydroxidi, except that 28 ounces of the carbonate of sodium are used instead of 1 pound of carbonate of potassium.

Tests.—The specific gravity is 1·047. One fluid ounce, which weighs 485 grains, requires for neutralization 470 grain-measures of the volumetric solution of oxalic acid. Solution of hydroxide of sodium, therefore, contains 4·1 per cent. by weight of hydroxide of sodium, NaHO. In 1 fluid ounce are 18·8 grains of the same. It does not effervesce when added to an excess of diluted hydrochloric acid. Mixed with an equal volume of distilled water, it gives no precipitate with solution of lime or oxalate of ammonium. When it is treated with an excess of diluted nitric acid and evaporated to dryness, the residue forms with water a clear solution, which gives merely slight precipitates with chloride of barium (absence of more than a trace of sulphate) or nitrate of silver (absence of more than a trace of chloride) and none with ammonia. If hydrochloric acid be added, and then sulphuretted hydrogen, no metallic sulphide should be formed.

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[1] The United States Pharmacopœia has the Liquor Sodæ, which is a stronger solution, containing 5 per cent. of the hydroxide, NaOH, whereas the above has only 4·1 per cent.

Dose.—*Dog* - - - - - - 10 to 20 minims.
Pig - - - - - - 15 to 45 ,,
Horse - - - - - - 1 to 2 fluid drachms.

LIQUOR STRYCHNINÆ HYDROCHLORIDI (B.).

Solution of Hydrochloride of Strychnine.

Mode of Preparation.—Mix 25 c.c. alcohol (90 per cent.) with about 75 c.c. distilled water, and dissolve in the mixture 1 gramme hydrochloride of strychnine, adding water if necessary to make 100 c.c. in all.

The strength is 1 gramme in 100 c.c., or 1 grain in 110 minims.

Dose.—*Cat* - - - - $\frac{1}{20}$ to $\frac{1}{10}$ minim.
Dog - - - - $\frac{1}{10}$ to $\frac{1}{5}$,,
Man - - - - 2 to 8 minims.
Pig - - - - 4 to 12 ,,
Sheep - - - - 7 to 30 ,,
Horse - - - - $\frac{1}{2}$ to 1 fluid drachm.
Ox - - - - 1 to 2 ,, drachms.

LIQUOR THYROIDEI (B.).

Thyroid Solution.

Description.—The above is a solution of the fresh thyroid gland of a healthy sheep.

Mode of Preparation.—The fat and connective tissue should first be stripped off from thyroid glands removed from sheep, as soon as they have been killed. Then cut the glands transversely, and such as contain cysts, or are unhealthy or hypertrophied, must not be used. Then count the healthy glands, slice and bruise the slices well in a mortar. Now add for each gland (which consists of two lobes) 34 minims (or 2 c.c.) of glycerin, and also the same quantity of a 0·5 per cent. solution of phenol in distilled water. Stir well, and place the mixture in a flask, closing the neck with a cotton-wool plug, leave for 1 day, filter through linen, and strongly squeeze. Add to the strained solution enough 0·5 per cent. solution of phenol to make 100 minims of solution for each gland.

Characteristics.—The solution is pink and turbid, and is devoid of any odour signifying putridity. It should be kept in well-stoppered and sterilized bottles, and is best when fresh.

Actions and Uses in Mankind.—Under its influence, or when thyroid is eaten as food, or if an extract be injected under the skin, the symptoms and signs of myxœdema or of cretinism vanish, the oxidation processes of metabolism increase, the weight of the body falls at first, owing to removal of water and fat, but rises afterwards, and the excretion of urine and urea is augmented. Patients have to take, when under its influence, a good deal of nitrogenous food. Very large doses cause pyrexia, gastro-enteric irritation, glycosuria, and other grave symptoms. It is also useful for psoriasis, ichthyosis, lupus, obesity, and acute goitre.

Dose.—*Man* - - - - 5 to 15 minims.

LIQUOR TRINITRINI (B.).

Solution of Trinitrin.

Synonym.—Solution of nitroglycerin.

Mode of Preparation.—Dissolve 17½ grains (1 gramme) of trinitroglycerin of commerce in a sufficient quantity of alcohol (90 per cent.) to furnish 4 fluid ounces (100 c.c.) of the solution.

Characteristics.—It is a clear liquid, devoid of colour, and neutral to test-papers. The specific gravity is 0·840.

Tests.—Add 10 c.c. to an equal volume of water and cool to 60° F., when the mixture keeps clear; but if 1 c.c. of water be now added, opacity is produced, owing to the presence of trinitroglycerin. If more water be added and the mixture left, an oily liquid is deposited, and one drop of this, if absorbed by paper and struck with a hammer, explodes.

Composition. — One hundred c.c. contain 1 gramme, and 110 minims contain 1 grain of trinitroglycerin.

Actions and Uses.—Similar to those of nitrite of amyl, more slowly produced, though stronger and more persistent. It is reduced by an alkali in the proportion of two-thirds, nitrous acid and a nitrite being produced in the body.

Useful in angina pectoris, chronic cardiac disease, sea-sickness, asthma, and other spasmodic disorders.

Dose.—*Man* - - - - ½ to 2 minims.

LIQUOR ZINCI CHLORIDI (A.[1] and B.).

Solution of Chloride of Zinc.

Mode of Preparation.—Mix 44 fluid ounces of hydrochloric acid and 1 pint of distilled water in a porcelain dish, add 1 pound of granulated zinc, and apply heat gently, until hydrogen gas is no longer evolved. Boil for half an hour, supplying the water lost by evaporation, and allow the product to cool.

Add to a few drops excess of ammonia and then sulphydrate of ammonium. If iron or lead be present, a black precipitate is produced. If so, filter the remainder of the product into a bottle, and add solution of chlorine by degrees, with frequent agitation, until the fluid acquires a permanent odour of chlorine. Add $\frac{1}{2}$ ounce of carbonate of zinc in small successive quantities, and with renewed agitation, until a brown sediment appears, and the whole of the iron or lead is thus precipitated. Filter the liquid into a porcelain vessel, and evaporate it, until the bulk is reduced to that of 2 pints. If no iron or lead be present, filter and evaporate to 2 pints at once.

Characters.—Solution of chloride of zinc is a colourless fluid of astringent and sweetish taste. The specific gravity is 1·53.

Therapeutics.—Solution of chloride of zinc is a powerful caustic and astringent, and is used in the treatment of protuberant granulations and foul ulcerated surfaces. In the treatment of fistula and foot-rot the solid chloride of zinc (see Zinci Chloridum) is generally used. The solution proves a useful caustic antiseptic dressing for wounds having protruding granulations or diseased substance.

Owing to its deodorizing and disinfectant properties, the solution is sometimes used for cleansing stables. With this object it may be diluted with water and sprinkled over the floors.

LITHII CITRAS (A. and B.).

Citrate of Lithium.

Mode of Preparation.—Citrate of lithium,

$$C_3H_4{\cdot}OH{\cdot}(COOLI)_3{,}4H_2O,$$

is prepared by saturating citric acid with carbonate of lithium.

[1] The United States Pharmacopœia solution has about 50 per cent. by weight of the salt, and its specific gravity is 1·535 at 15° C., and the British Pharmacopœia solution is nearly the same—viz., 1·53.

Characteristics and Tests.—It is a white crystalline deliquescent salt, totally soluble in twice its weight of cold water. If heated to redness, it turns black, evolving inflammable gases. The residue, neutralized with hydrochloric acid, gives with alcohol (90 per cent.) a solution which burns with a red flame.

Dose.—*Man* - - - - 5 to 10 grains.

LITHII SALICYLAS (A.).

Salicylate of Lithium.

Characteristics.—This salt, of which the formula is $LiC_7H_5O_3$, should be preserved in well-stoppered bottles. It is a whitish powder, inodorous, but with sweet taste, deliquesces in air, and is very soluble in water and alcohol. If a solution of sulphate of copper be added to an aqueous solution (1 in 20), a bright-green colour is produced.

If a small amount of solution of ferric chloride be added to an excess of a strong aqueous solution, a deep red colour results, and if much water be added and more ferric chloride, it is converted into a deep blue tint.

Salts of lithium resemble those of strontium in making flame crimson. They also give a white precipitate with Na_2CO_3 after long standing. The hydrate, carbonate, and phosphate, are only slightly soluble in water.

Actions and Uses in Mankind.—Lithium salts in alkaline fomentations are useful external applications for gout. Internally they have an antacid action, like that of potassium, on the alimentary canal; but note well that the carbonate has a disturbing effect, and is liable to cause indigestion, unless given in very weak solutions.

Lithium in combination quickly enters the blood, and increases its alkalinity, thus resembling potassium, as it also does in being a cardiac and neuro-muscular depressant, if given in large doses, or for a long time. It is excreted by the kidneys and mucous membranes, and is a strong diuretic, lessening the acidity of the urine, and dissolving an excessive amount of uric acid. Lithium salicylate and citrate are both useful in gout and uric acid gravel. The citrate is soluble in proportion of 1 in 2 of cold water, whilst 1 of the carbonate requires 70 of water.

LOBELIA (A. and B.).

Natural Order.—Lobeliaceæ.

Description.—The dried flowering herb of *Lobelia inflata*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iii., plate 162), gathered after some of the capsules are inflated. Indian tobacco is indigenous in the Unites States. Lobelia is usually in compressed oblong rectangular packages, weighing from ½ pound to 1 pound each, and wrapped in sealed and labelled papers. The separate pieces are of various lengths, purplish or yellowish-green, channelled, angular, and have narrow wings. They bear sessile or stalked, hairy, oval, irregularly toothed alternate leaves, or scars of them, together with some flowers and fruits. The capsules are two-celled, and, when mature, contain small reticulated brown seeds. The taste is at first mild; but, after being chewed, lobelia has a burning and acrid effect on the mouth.

Preparation. — Tinctura Lobeliæ Ætherea (96 grains to 1 fluid ounce).

Therapeutics.—Lobelia in small doses is diaphoretic and expectorant, in large doses cathartic. The ethereal tincture may be given in spasmodic asthma in horses in doses of 1 fluid ounce.

Dose.—*Man* - - - - 5 to 15 minims.

LOTIO ACIDI BORICI.

Lotion of Boric Acid.

Mode of Preparation.—Dissolve 1 part of boric acid with 20 fluid parts of hot water.

LOTIO PHENOL.

Phenol Lotion.

Mode of Preparation.—Mix 1 fluid drachm of phenol with 5 fluid ounces of water, and shake thoroughly.

LOTIO AMMONII CHLORIDI ET POTASSII NITRATIS.

Lotion of Chloride of Ammonium and Nitrate of Potassium.

Synonyms.—Lotio Refrigerans; Cooling Lotion.

Mode of Preparation.—Dissolve 2½ ounces of chloride of ammonium and 2½ ounces of nitrate of potassium in 1 pint of water.

Use.—Directly the salts are dissolved, dip cloths in the solution and lay them on the affected part.

LOTIO HYDRARGYRI FLAVA (B.).

Yellow Mercurial Lotion.

Mode of Preparation.—Mix 20 grains, or 0·46 gramme, of perchloride of mercury with 10 fluid ounces, or 100 c.c., of solution of lime.

LOTIO HYDRARGYRI NIGRA (B.).

Black Lotion of Mercury.

Mode of Preparation.—Rub together 0·685 gramme mercurous chloride with 5 c.c. glycerine and 12·5 c.c. mucilage of tragacanth. Place the mixture in a bottle and add 20 c.c. solution of lime, shake, and add enough solution of lime to make 100 c.c.

LUPULINUM (A. and B.).

Lupulin.

Characteristics and Tests.—Glands obtained from the strobiles of *Humulus Lupulus*, Linn. (Nat. Ord., Urticaceæ), minute in size and forming in bulk a granular brownish-yellow powder. Each gland consists of a single hemispherical layer of cells, the cuticle of which has been raised by the oil or oleoresin secreted. It has a strong odour and a bitter aromatic taste, and should contain no more than 40 per cent. of matter which is insoluble in ether, and leave about 10 per cent. of ash when burnt.

Actions and Uses in Mankind.—The aromatic oil has a primary stimulant and secondary sedative action, like that of alcohol, and this is well seen in ales and beers. Lupulinic acid, the hop-bitter, has a tonic effect, as is seen in bitter beer. Ale is also laxative and diuretic by reason of the essential oil and alcohol.

Hops are useful for rousing the appetite and promoting sleep during convalescence. The preparations relieve craving for alcohol, and act as anaphrodisiacs and hypnotics.

Dose.—

Man	2 to 5 grains.
Dog	5 to 25 ,,
Pig	10 to 60 ,,
Horse	2 to 8 drachms.

LYCOPODIUM (A.).

Lycopodium.

Characteristics.—The spores of *Lycopodium clavatum*, Linné, and of other species of Lycopodium (Lycopodiaceæ), constitute a fine powder of a pale yellow colour, mobile, odourless, tasteless, float on water without being moistened, but sink if boiled with it, and burn quickly. By aid of the microscope the spores are seen to be sphæro-tetrahedral, the surfaces to have reticulated ridges, and the edges to have short projections. Pollen, starch,

and sand, should be absent, and no more than 5 per cent. of ash left when burnt in air.

MAGNESII CARBONAS (A. and B.).[1]

Carbonate of Magnesium.

Formula.—$(MgCO_3)_3,Mg(HO)_2,4H_2O$.

Mode of Preparation.—Dissolve 125 grammes of sulphate of magnesium and 150 grammes of carbonate of sodium each in 250 c.c. of boiling distilled water, mix the two solutions, and evaporate the mixture to perfect dryness by means of a sand-bath. Digest the residue for half an hour with 500 c.c. of boiling distilled water. Collect the insoluble matter on a calico filter, wash it repeatedly with distilled water, until the washings cease to give a precipitate with chloride of barium. Finally, dry the product at a temperature not exceeding 100° C.

A light form of the same chemical compound may be prepared by dissolving the same quantities of the same two salts each in half a gallon of cold distilled water, mixing the two solutions when cold, and boiling the mixture in a porcelain dish for fifteen minutes. The precipitate is then transferred to a calico filter, washed with boiling distilled water, until the washings cease to give a precipitate with chloride of barium, and finally dried at a temperature not exceeding 100° C.

Characters and Tests.—Carbonate of magnesium is a white granular powder, readily soluble in diluted mineral acids with evolution of carbonic acid gas. Solutions are produced which, when first treated with chloride of ammonium, are not precipitated by the addition of an excess of solution of ammonia, but yield a copious crystalline precipitate when phosphate of sodium is added. With excess of hydrochloric acid, carbonate of magnesium forms a clear solution in which chloride of barium causes no precipitate. When excess of ammonia is added, no immediate precipitate is produced with oxalic acid, and none with sulphuretted hydrogen. Five grammes subjected to a red heat are reduced to 2·1 grammes, the salt losing water and carbon dioxide, and leaving magnesia. The light carbonate is a very light powder.

Therapeutics.—Carbonate of magnesium neutralizes normal or excessive acidity of the stomach, evolving carbonic acid gas. It is prescribed in cases of indigestion in young animals. It has also a laxative action.

Dose.—

Man, *Cat*	5 to 30 grains; but for one administration 30 to 60 grains.
Dog	5 to 40 grains
Pig	10 to 45 ,,
Foal and Calf	1 to 3½ drachms.

Half as much again can be given as a laxative for one or only a few times.

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[1] The British Pharmacopœia makes a distinction between Magnesii Carbonas Levis and Magnesii Carbonas Ponderosus, but the doses are the same. The modes of preparation of both are described above. The chemical constitution is the same; but the formula given for the United States Pharmacopœia salt is $(MgCO_3)_4,Mg(OH)_2+5H_2O$, although it is practically the same as the British Pharmacopœia Magnesii Carbonas Ponderosus.

MAGNESII OXIDUM.[1]

Oxide of Magnesium.

Formula.—MgO.

Mode of Preparation.—Place 4 ounces of heavy carbonate of magnesium into a Cornish or Hessian crucible closed loosely by a lid, and expose it to a low red heat, so as to drive off the carbonic acid gas of which it is partly composed. Continue the heating until a small quantity, taken from the centre of the crucible, cooled, moistened with water, and dropped into warm diluted sulphuric acid, causes no effervescence. The oxide produced in this way is known as 'heavy magnesia.' The same oxide is produced in a lighter modification by heating the light carbonate of magnesium. Three and a half volumes of the light form weigh as much as one of the heavy modification.

Characters and Tests.—Oxide of magnesium is a white powder, insoluble in water, but readily dissolved by acids without effervescence. A solution in hydrochloric acid, when neutralized by a mixture of solution of ammonia and chloride of ammonium, gives a copious crystalline precipitate when phosphate of sodium is added. Dissolved in nitric acid, and neutralized with a mixture of ammonia and chloride of ammonium, it does not give any precipitate with oxalate of ammonium or chloride of barium.

Therapeutics.—Oxide of magnesium or magnesia has antacid and laxative properties. It is prescribed with bitters in cases of indigestion, flatulence, and acidity in young animals.

It is antidotic to poisoning by oxalic acid and the mineral acids.

Dose.—

Man - - - -	5 to 30 grains; but for one dose only 30 to 60 grains.
Cat - - - -	10 to 20 grains.
Dog - - - -	10 to 60 ,,
Foals and Calves - -	1 to 8 drachms

MAGNESII SULPHAS (A. and B.).

Sulphate of Magnesium.

Synonym.—Epsom Salts.

Formula.—$MgSO_4,7H_2O$.

Mode of Preparation.—By the interaction of the native

[1] The United States Pharmacopœia gives Magnesia and Magnesia Ponderosa; the British Pharmacopœia names are Magnesia Levis and Magnesia Ponderosa respectively. Two objections to the use of the word 'magnesia' may be urged—viz., that it is chemically ill-defined, and, secondly, that the public are so liable to mix up in mental confusion a variety of substances under that appellation. For example, it is often applied to effervescing citrate of magnesium. It is really best to discard the names soda, potash, magnesia, lithia, etc., altogether.

magnesium carbonates and diluted sulphuric acid, or by purifying the native sulphate.

Characters and Tests.—Sulphate of magnesium exists in minute colourless and transparent acicular crystalline rhombic prisms, which possess a bitter taste. The salt is readily soluble in water. The aqueous solution gives, like those of all sulphates, a copious white precipitate with chloride of barium. It also affords a copious white precipitate with a mixture of ammonia, chloride of ammonium, and phosphate of sodium (owing to the magnesium). At ordinary temperatures the aqueous solution is not precipitated by oxalate of ammonium, nor should it give a brown precipitate with chlorinated lime or soda. The crystals of sulphate of magnesium are exactly like those of sulphate of zinc, from which, however, they are readily distinguished by their bitter taste. Sulphate of zinc has a strong metallic taste.

Preparation.—Magnesii Carbonas.

Therapeutics.—Sulphate of magnesium is a hydragogue cathartic, and has also some diuretic effect. It is a very useful purgative for cattle and sheep, and may be given to horses as a febrifuge. It is an antidote for lead and barium poisoning, forming insoluble sulphates of those metals, and for phenol-poisoning, as it produces the sulpho-carbolate in the blood. It is best to give it in aqueous solution, and to add one teaspoonful of ginger and another of molasses to each ounce, and some also add as much common salt; but one must recollect that the latter is itself a poison in the case of pigs.

Dose.—

Man - -	20 to 120 grains for several times, and for a single dose ¼ to ½ ounce.
Dog - -	1 to 4 drachms.
Pig, *Calf* - -	1 to 3 ounces.
Horse - -	1 to 3 ounces as a febrifuge once or twice daily, or 2 to 4 as a laxative.
Sheep - -	1 to 5½ ounces.
Ox - -	2 to 4 ounces as a laxative; but as a cathartic ½ to 1½ lb., or even in severe constipation in a large animal 2 pounds.

MANGANESII OXIDUM NIGRUM (A.).[1]

Black Oxide of Manganese.

Formula.—MnO_2.

Characters and Tests.—Black oxide of manganese is a heavy black powder, almost entirely soluble in hydrochloric acid, with evolution of the yellow gas chlorine. When heated, this oxide parts with oxygen thus:

$$3MnO_2 = Mn_3O_4 + O_2.$$

It is, however, much more extensively used for preparing oxygen by mixing it with the salt, chlorate of potassium, and heating the mixture. The evolution of oxygen takes place at a much lower temperature than is required when either compound is heated separately. It is supposed to take up the oxygen from the chlorate, and then give it up again. This is an instance of what is called 'catalytic action.'

It is also used in producing the salt permanganate of potassium, but its chief value is in the preparation of oxygen and chlorine.

MASSA ALOES.

Aloes Mass.

Synonym.—Cathartic Mass.

Mode of Preparation.—Take of

Barbadoes Aloes, 6 pounds;
Rectified Spirit, 9 fluid ounces;
Soft Soap, 9 ounces;
Oil of Peppermint, 2 ounces.

Melt together the first three ingredients over a water-bath, and add, when they are all melted, the oil of peppermint. Mix. In summer time 8 fluid ounces of rectified spirit and 8 ounces of soft soap will be the correct quantities.

Dose.—

Dog	- - - -	$\frac{1}{4}$ to $\frac{1}{2}$ drachm.
Pig	- - - -	1 to 3 drachms.
Horse	- - - -	1 to 8 ,,

MASSA AMMONII CARBONATIS.

Mass of Carbonate of Ammonium.

Synonym.—Stimulating Mass.

Mode of Preparation.—Take of

Carbonate of Ammonium
Ginger in powder } of each 16 ounces;
Gentian in powder
Treacle, a sufficiency.

[1] Called in the United States Pharmacopœia Mangani Dioxidum, Manganese Dioxide.

Powder well the carbonate of ammonium, and mix it by the help of a sieve thoroughly with the ginger and gentian. Then add a sufficient quantity of treacle by degrees, and pound well, so as to form a coherent mass. This mass should be freshly made, and then made into 1-ounce balls.

Dose.—One ounce in the form of a ball may be given to a horse daily.

MASSA BELLADONNÆ COMPOSITA.

Compound Belladonna Mass.

Synonym.—Cough Mass (*a*).

Mode of Preparation.—Take of

Extract of Belladonna, ½ to 1 part;
Barbadoes Aloes in powder, 1 part;
Nitrate of Potassium, in powder, 2 parts;
Common Mass, a sufficient quantity.

Mix so as to form a coherent mass.

Use.—Useful in cases of chronic cough in horses.

Dose.—*Horse* - - - - 2 to 5 drachms.

MASSA CAMPHORÆ COMPOSITA.

Compound Camphor Mass.

Synonym.—Cough Mass (*b*).

Mode of Preparation.—Take of

Camphor, 2 parts;
Asafœtida, 2 parts;
Ammoniacum, 2 parts;
Squills in powder, 1 part;
Soft soap, a sufficient quantity.

Use.—Useful in cases of moist cough in horses.

Dose.—*Horse* - - - - ½ to 1 ounce, in the form of a ball daily.

MASSA COMMUNIS.

Common Mass.

Mode of Preparation.—Take of

Linseed, finely powdered
Treacle
} equal parts.

Mix well together so as to form a mass.

Use.—Common mass is used as an excipient for various medicinal agents, when they are to be administered in the form of a ball.

MASSA COPAIBÆ (A.).

Copaiba Mass.

Mode of Preparation.—Rub 6 grammes of magnesia with a little water in a capsule, and when thoroughly moistened gradually add 94 grammes of copaiba, mixing well together. Place the capsule on a water-bath, and heat for half an hour with repeated stirring.

MASSA DIGITALIS COMPOSITA.

Compound Digitalis Mass.

Synonym.—Cough Mass (*c*).

Mode of Preparation.—Take of

Barbadoes Aloes, in powder, 2 parts;
Digitalis, 1 part;
Common Mass, 13 parts.

Mix thoroughly.

Use.—In cases of chronic cough in horses.

Dose.—*Horse* - 1 ounce in the form of a ball, once or twice a day.

MASSA FERRI CARBONATIS (A.).

Carbonate of Iron Mass.

Mode of Preparation. — Dissolve 100 grammes sodium carbonate in 200 c.c. boiling distilled water. Dissolve 100 grammes ferrous sulphate in 200 c.c. boiling distilled water, and add 20 c.c. syrup.

Filter both solutions and let them get cold. Place the sodium carbonate solution in a bottle of 500 c.c. capacity, and add by degrees the iron solution, aiding the escape of CO_2 by rotating the flask. Then fill with distilled water, cork, and leave, so that the ferrous carbonate may subside. Pour away the supernatant fluid. Make a mixture of 1 volume of syrup and 19 of distilled water, and wash the ferrous carbonate until the water poured away from it no longer has a saline taste. Drain on a muslin strainer, getting rid of as much water as possible.

Then mix the ferrous carbonate with 38 grammes clarified honey and 25 grammes coarsely-powdered sugar, and evaporate on a water-bath in a tared capsule, frequently stirring, until 100 grammes alone remain.

MASSA FERRI CARBONATIS COMPOSITA.

Compound Mass of Carbonate of Iron.

Synonym.—Alterative Mass.

Mode of Preparation.—Take of

Resin, 35 parts;
Nitrate of Potassium, 21 parts;
Sulphur, 7 parts;
Gentian, 14 parts;
Carbonate of Iron, 7 parts;
Oil of Cubebs, ¼ part;
Turpentine, Soft Soap, of each a sufficiency.

Dose. — One ounce for a blood horse, or for a cart-horse 9 drachms. As an alterative, once or twice weekly; as a diuretic, once daily. For grease, once every other day.

MASSA FERRI SULPHATIS.

Sulphate of Iron Mass.

Synonym.—Tonic Mass.

Mode of Preparation.—Take of

Sulphate of Iron, in powder, 2 parts;
Ginger, in powder, 1 part;
Gentian, 1 part;
Common Mass, 5 parts.

Thoroughly mix.

Use.—Useful in giving tone to the system, especially in cases where iron is indicated.

Dose.—Six drachms to 1 ounce in the form of a ball may be given to a horse, and repeated if thought well for a few times.

MASSA HYDRARGYRI (A.).

Mercury Mass.

Mode of Preparation.—Rub 33 grammes of mercury with 34 grammes of honey of rose and 3 grammes of glycerin, until it is

thoroughly mixed. Gradually add 5 grammes of glycyrrhiza in No. 60 powder, and 25 grammes of althæa in No. 60 powder, and rub together until mercury globules cannot be seen by the aid of a lens magnifying 10 diameters.

MATRICARIA (A.).

Matricaria.

Description.—The flower heads of German Chamomile, *Matricaria Chamomilla*, Linné (Compositæ). Grows in Europe. They are about 17·5 millimetres broad, composed of a flat imbricated involucre, a conical hollow receptacle, which is about 5 millimetres high, and about fifteen white ligulate reflexed ray-florets, and many yellow tubular perfect disc-florets without pappus; very aromatic and bitter.

Action.—A moderate dose is a mild bitter tonic, but in larger amount it is emetic and anthelmintic. The infusion is used to prevent colic in teething children in small doses, and also as a diaphoretic in a moderate dose for adults.

The infusion is made of 1 to 2 ounces to the pint.

MEL (A.).

Honey.

Description.—Honey is a saccharine secretion in the honey-comb, where it is laid by *Apis mellifica*, Linné (Class, Insecta; Order, Hymenoptera). It is a syrupy liquid of light-yellow or brownish colour, translucent when fresh, but gradually becoming opaque and crystalline, with aromatic odour and pleasant sweet taste. It has a faintly acid reaction. If 1 part of honey be boiled with 5 parts of water, the resulting solution, when cold, should not be made blue or green by the addition of a little iodine, as it would be, if starch were present.

MEL BORACIS (B.).

Borax Honey.

Mode of Preparation.—Mix together 50 grammes of finely-powdered borax, 25 grammes glycerin, and 400 grammes clarified honey.

MEL DEPURATUM (B.).[1]

Clarified Honey.

Mode of Preparation.—Honey is melted in a water-bath, and is then strained while hot through flannel which has been moistened with warm water.

Characteristics.—A viscid translucent fluid of a yellowish or brownish hue, which gradually becomes partially crystalline and opaque. Characteristic odour and sweet taste. If burnt it should not leave more than 0·25 per cent. of ash, which if dissolved in water with a trace of nitric acid should only give

[1] A corresponding United States Pharmacopœia preparation, mixed with 5 per cent. of its weight of glycerin, is entitled Mel Despumatum, Clarified Honey.

a slight precipitate with solution of barium chloride (due to sulphate). It should give no reaction for starch with iodine.

Actions and Uses in Mankind.—The secretions of the mouth and throat are increased, and cough and dysphagia thereby relieved, and honey has, in addition, some laxative effect. Oxymel, consisting of 8 parts of mel depuratum, 1 part of acetic acid, and 1 part of water, is a useful preparation for sore throat in doses of about 1½ fluid drachms. Honey can also be mixed with lemon-juice for the same purpose.

MEL ROSÆ (A.).

Honey of Rose.

Mode of Preparation.—Place 120 c.c. fluid extract of rose into a vessel, and add sufficient clarified honey to make the two weigh 1,000 grammes, and mix well.

METHYL SALICYLAS (A.).

Salicylate of Methyl.

Description.—Synthetic oil of wintergreen, or methyl salicylate, has the formula, $CH_3C_7H_5O_3$, and the bottles containing it should be well stoppered and kept in the dark. It is colourless or yellowish, and has the aromatic odour and sweet aromatic taste of oil of gaultheria, with the essential part of which it is identical, and it is actually identical with volatile oil of betula. Specific gravity 1·185 at 15° C., and boiling-point 220° C. It is soluble in all proportions in alcohol, glacial acetic acid, and carbon disulphide. The alcoholic solution is slightly acid to litmus. If a drop be shaken with a little water, and a drop of ferric chloride *T.S.* be added, a deep violet colour is yielded.

MISTURA CRETÆ (A. and B.).

Chalk Mixture.

Mode of Preparation.—1. United States Pharmacopœia: Rub together 200 grammes of compound chalk powder in a mortar with 400 c.c. cinnamon-water, and about 200 c.c. of water gradually added, and thoroughly mix. Place in a graduated vessel, with a mark on it indicating 1,000 c.c., and rinse the mortar with sufficient water to make the product rise up to that mark. This mixture should be freshly made shortly before use, and if it should be desirable to keep it, a sufficient amount of alcohol should be added for that purpose.

2. British Pharmacopœia: Mix well 5 grammes of prepared chalk with 0·7 gramme of powdered tragacanth and 10 grammes

of refined sugar, and gradually add enough cinnamon water to make 160 c.c.

Dose.—*Man* - - - ½ to 1 fluid ounce of the British Pharmacopœia mistura.

MISTURA GUAIACI (B.).

Guaiacum Mixture.

Mode of Preparation.—Rub together 10 grammes guaiacum resin with 10 grammes refined sugar and 1·6 grammes tragacanth, finely powdered, and add by degrees 400 c.c. cinnamon water.

Dose.—*Man* - - - ½ to 1 fluid ounce.

MISTURA OLEI RICINI (B.).

Castor Oil Mixture.

Mode of Preparation.—1. British Pharmacopœia: (1) Mix together 25 c.c. undiluted orange-flower water and 62·5 c.c. cinnamon water. (2) Place 37·5 c.c. mucilage of gum acacia in a mortar, and to it add alternately and by degrees 75 c.c. castor oil and the above mixture of water, with constant stirring.

Dose.—*Draught for Man* - - 1 to 2 fluid ounces.

2. Veterinary Pharmacopœia: Mix together 3 fluid parts castor oil, 2 fluid parts syrup of buckthorn, 1 fluid part syrup of poppies.

Dose.—*Dog* - - - - 4 to 8 fluid drachms.

MISTURA SENNÆ COMPOSITA (B.).

Compound Mixture of Senna.

Synonym.—Black Draught.

Mode of Preparation.—Dissolve 250 grammes magnesium sulphate in 500 c.c. infusion of senna, then add a mixture made of 50 c.c. liquid extract of liquorice, 100 c.c. compound tincture of cardamoms, and 50 c.c. aromatic spirit of ammonia, and then sufficient infusion of senna to make 1,000 c.c. in all.

Dose.—As a draught:

Man - - - - 1 to 2 fluid ounces.

MORPHINÆ ACETAS (A. and B.).

Acetate of Morphine.

Formula.—$C_{17}H_{19}NO_3,C_2H_4O_2,3H_2O$.

Mode of Preparation.—Dissolve 2 ounces of hydrochloride of morphine in 1 pint of distilled water, and add solution of ammonia until the morphine is precipitated and the liquid rendered slightly alkaline. Collect the precipitate on a filter, wash it with distilled water, and then, having transferred it to a porcelain dish, add 4 ounces of distilled water and a sufficient quantity of acetic acid to neutralize and dissolve it. Evaporate the solution by means of the heat of a water-bath, maintaining acetic acid in slight excess until it concretes on cooling. Lastly, dry the salt with slight heat, so as to avoid much loss of acetic acid, and reduce it to powder. Keep the product in a well-stoppered bottle. Acetate of morphine may also be prepared by the action of acetic acid on pure morphine.

Characters and Tests. — Acetate of morphine is a white powder, almost entirely soluble in $2\frac{1}{2}$ parts of water at the ordinary temperature, and in about 100 parts alcohol (90 per cent.). From a solution of acetate of morphine hydroxide of potassium throws down a precipitate which is dissolved by excess of the alkali. Ignited with free access of air, it leaves no residue. Like hydrochloride of morphine, when moistened with strong nitric acid, it becomes orange-red, and, like this salt also, with solution of perchloride of iron it becomes greenish-blue. When sulphuric acid is added to the salt, acetous vapours are evolved. If exposed to the air, it loses acetic acid, and in that case the salt should be redissolved in hot water with acetic acid, and recrystallized therefrom.

Therapeutics.—See Morphinæ Hydrochloridum and Opium.

Dose.—By the mouth:

Man and Dog	$\frac{1}{8}$ to $\frac{1}{2}$ grain.
Pig	$\frac{1}{2}$ to $1\frac{1}{2}$ grains.
Sheep	$\frac{1}{2}$ to 2 ,,
Horse	3 to 8 ,,
Ox	5 to 10 ,,

Hypodermically:

Horse and Cattle	3 grains.
Sheep and Pigs	$\frac{1}{2}$ grain.
Dogs	$\frac{1}{10}$,,

MORPHINÆ HYDROCHLORIDUM (A.[1] and B.).

Hydrochloride of Morphine.

Formula.—$C_{17}H_{19}NO_3,HCl,3H_2O$.

Mode of Preparation.—The process is a long, complicated, and delicate one, but may be shortly described as follows: Concentrated infusion of opium must be mixed with chloride of calcium and decolourized by animal charcoal. Then by the addition of ammonia the morphine is to be precipitated. The morphine is then placed in a small quantity of boiling distilled water contained in a porcelain capsule kept hot, and then diluted hydrochloric acid must be added with caution and constant stirring, so that the morphine may be entirely dissolved and a neutral solution obtained. Set aside to cool and crystallize. Drain the crystals and dry them on filtering paper. By further evaporating the mother liquor, and again cooling, additional crystals are obtained.

Characters and Tests. — Hydrochloride of morphine exists in the form of a white powder, or in that of thin prisms possessing a silky lustre. The salt is not changed by exposure to the air. It is soluble in 24 parts of water at the ordinary temperature, 1 part of boiling water, and 50 of alcohol. It should be neutral to litmus.

An aqueous solution yields a white curdy precipitate with solution of nitrate of silver, and a white one with solution of hydroxide of potassium or of ammonia, readily soluble in excess of the alkali in the former, and with difficulty in the latter, case. Like the acetate of morphine, when moistened with nitric acid, hydrochloride of morphine becomes orange-red, and with solution of perchloride of iron greenish-blue. If hydrochloride of morphine is warmed with strong sulphuric acid and a little arseniate of sodium, a bluish-green tinge results. If ignited with free access of air, it burns without leaving any residue.

Action.—The action of the salts of morphine differs but little from that of opium (see Opium). The latter, however, is more slowly absorbed, and, inasmuch as it contains alkaloids which have a convulsive action, its sedative effect is not so marked as in the case of morphine. Opium also has a greater effect on the skin than this alkaloid.

[1] The United States Pharmacopœia heading is Morphinæ Hydrochloras, the same as the British Pharmacopœia had in the edition of 1885.

Uses.—The salts of morphine are especially employed in those cases where it is desired to produce a rapid effect, and, being very suitable for hypodermic injection, they are generally administered by this method. The effect of the alkaloid, moreover, is of a more definite character, and in consequence it is for this reason also sometimes preferred to opium itself.

In cases of enteritis, spasmodic colic, acute dyspepsia, post-partum hæmorrhage and straining, and spasmodic cough, the hypodermic injection of morphine is of great value. In the treatment of tetanus also in horses, the hypodermic injection of this alkaloid is sometimes efficacious in relieving the severity of the spasmodic seizures. In cases of diarrhœa and obstruction of the bowels the crude opium is preferable, because it reaches the bowel directly, and it is also more suitable in cases of diabetes and peritonitis. As an external application to the eye, opium itself is less irritating than morphine.

Dose.—By the mouth :

Man and Dog - -	$\frac{1}{8}$ to $\frac{1}{2}$ grain.
Pig - - - -	$\frac{1}{2}$ to $1\frac{1}{2}$ grains.
Sheep - - - -	$\frac{1}{2}$ to 2 ,,
Horse - - - -	3 to 8 ,,
Ox - - - -	4 to 10 ,,

Hypodermically :

Dog - - - -	$\frac{1}{10}$ grain.
Sheep and Pig - -	$\frac{1}{2}$,,
Horse - - - -	2 to 3 grains.

MORPHINÆ TARTRAS (B.).

Tartrate of Morphine.

Formula and Mode of Preparation.—Tartrate of morphine has formula, $(C_{17}H_{19}NO_3)_2C_4H_6O_6,3H_2O$, and is made by combination of morphine and tartaric acid in molecular proportions.

Characteristics. — It is a white powder, which consists of fine tufts of minute acicular crystals, and effloresces at 68° F., is soluble in 11 parts of cold water, and almost insoluble in alcohol (90 per cent.).

Tests. — Those of morphine and of tartrates are given. If 2 grammes be dissolved in 20 c.c. of warm morphinated water, and solution of ammonia be added in very slight excess, on cooling a crystalline precipitate is given, which, after being washed and

dried as described under 'Morphinæ Hydrochloridum,' should weigh 1·47 grammes.

If it be heated to redness with free access of air, no residue should be left, thus indicating the absence of mineral impurities.

Dose.—*Man* - - - - $\frac{1}{8}$ to $\frac{1}{2}$ grain.

MUCILAGO ACACIÆ (A. and B.).

Mucilage of Gum Acacia.

Mode of Preparation.—Rinse quickly 100 grammes of gum acacia with a little distilled water, then dissolve it in 150 c.c. of distilled water in a closed vessel, shake well, and strain through muslin. In the United States Pharmacopœia the proportions used are 340 grammes of acacia and enough water to make 1,000 grammes of mucilage.

Therapeutics.—Mucilage of gum acacia is demulcent and emollient, and is administered when the alimentary tract is irritated by the ingestion of poison or by inflammatory action.

Dose.—The dose is *ad libitum*.

MUCILAGO AMYLI.

Mucilage of Starch.

Mode of Preparation.—Triturate 24 parts by weight of starch with 875 fluid parts of distilled water, adding the latter gradually. Then boil for a few minutes, constantly stirring.

Use.—Mucilage of starch is used in the preparation of enemata of aloes, of opium, and of turpentine.

MYRRHA (A. and B.).

Myrrh.

Natural Order.—Amyridaceæ.

Description.—Myrrh is a gum-resinous exudation obtained from the stem of *Balsamodendron Myrrha* (Nees, *Med. Pl.*, plate 357) and probably other species; but in the United States Pharmacopœia from *Commiphora Myrrha* (Nees), Engler. (Nat. Ord., Burseraceæ). It occurs in the form of irregular tears, or in that of masses of agglutinated tears, which vary much in size. The colour is reddish-yellow or reddish-brown externally. Myrrh is dry, and generally more or less covered with a fine powder. The surface resulting from a fracture is irregular. Myrrh is a brittle substance, somewhat translucent, oily, and frequently marked with opaque whitish spaces or striæ. The odour is agreeably aromatic, and the taste is aromatic and bitter. If a

little nitric acid be applied, it turns violet (thus being different from bdellium, and false myrrh).

Preparation.—Tinctura Myrrhæ.

Therapeutics. — Externally, myrrh acts as a stimulant, astringent, and deodorizer, and is applied in the form of tincture to wounds and ulcers. Internally, in virtue of its stomachic and slightly tonic properties, it is sometimes given in cases of dyspepsia, and as an adjuvant to purgatives, especially aloes. As a stimulating and disinfecting expectorant, it is sometimes prescribed for chronic bronchitis in horses.

Dose of Powdered Myrrh :

Dog - - - -	7 to 25 grains.
Pig - - - -	10 to 50 „
Sheep - - - -	15 to 60 „
Horse - - - -	1 to 4 drachms.
Ox - - - -	2 to 6 „

NAPHTHOL (A. and B.).

Beta-Naphthol.

Description. — Beta - naphthol, or beta - mono - hydroxy - naphthalene, $C_{10}H_7OH$, is generally prepared from naphthalene-sulphonic acid.

Characteristics.—Beta-naphthol exists as white crystalline laminæ, or as a powder. The odour resembles that of phenol, and its taste is sharp and pungent. It is soluble in 1,000 parts of cold water and 75 of boiling water, in less than 2 parts of cold alcohol (90 per cent.), and very highly soluble in boiling alcohol, ether, chloroform, or solution of hydroxide of sodium. It melts at 251·6° F. (122° C.).

Tests.—If 1 drop of solution of ammonia be added to a hot and saturated watery solution of beta-naphthol, a blue fluorescence is yielded. If to a cold saturated watery solution an aqueous solution of chlorine be added, a white turbidity results, and if solution of ammonia be then added in excess, a green or brown colour is produced. Again, if 0·1 gramme of beta-naphthol be dissolved in 10 c.c. of boiling water, and 10 drops of a 3 per cent. solution of perchloride of iron in water be added, a white precipitate is yielded, which turns brown but not violet, thus proving the absence of Alpha-naphthol. Beta-naphthol is neutral to litmus-paper moistened with alcohol (90 per cent.), and there should be no mineral residue, after it has been heated to redness.

Actions and Uses.—Naphthol is an antiseptic. It is also used internally in piles as an intestinal disinfectant, in cases of typhoid fever, cholera, diarrhœa, and dysentery. Very little of the drug is absorbed, and the traces which are excreted in the urine are unchanged. It is used as ointment or solution (about 10 per cent.) in cases of hyperidrosis, scabies, and psoriasis.

Dose.—*Man* - - - - - - - - 3 to 10 grains.

NUX VOMICA.

Nux Vomica.

Natural Order.—Loganiaceæ.

Description.—The dried ripe seeds of *Strychnos Nux Vomica.* Linn. (B. and T., *Med. Pl.*, vol. iii., plate 178), are round, from about ¾ inch to 1 inch in diameter, and on an average nearly ¼ inch thick. They are flattish, or concavo-convex, or sometimes bent irregularly. One surface is marked by a central scar or hilum, from which a line which projects more or less markedly passes to the margin, where it terminates in a slight prominence. Externally, nux vomica seeds are ash-gray or of a yellowish-gray-green colour, and, being covered with short hairs, they present a glistening appearance like that of satin. Internally, they are horny, and somewhat translucent. They possess no odour, are very poisonous indeed, and the taste is extremely bitter.

Preparations :

Extractum Nucis Vomicæ (which contains 10 per cent. of alkaloids and 5 per cent. of strychnine).

Strychnina.

Tinctura Nucis Vomicæ (which contains 1 grain of strychnine in 1 fluid ounce).

Action. — Nux vomica and its alkaloid strychnine have stomachic properties, and act as augmenters of the intestinal peristalsis. Externally applied, strychnine has a slightly irritant and powerfully antiseptic action, though, on account of its intensely poisonous character, it cannot be applied to wounded surfaces. After absorption into the blood, this alkaloid rapidly enters the tissues and organs of the body, especially those of the nervous system. It remains in the body some time before being eliminated, and as it is absorbed very quickly after ingestion, it is 'cumulative' in action, and therefore apt to be exceedingly dangerous, even causing death, if used incautiously. Hence the very greatest care is necessary, and only small doses are to be used, and even these should be few, especially in cats or dogs, and, indeed, in all living beings.

In medicinal doses nux vomica and its alkaloid are valuable tonics. Large doses cause rigidity and spasm of all the voluntary muscles, and may evoke violent convulsions and death by exhaustion and asphyxia as a consequence of spasmodic arrest of

the respiratory muscles. These effects are due to the powerful irritation of the motor centres of the cord, the reflex excitability of which is immensely augmented. The convolutions of the brain are not acted upon; but all the chief centres of the medulla oblongata, the respiratory, vaso-motor, and cardiac, are excited to increased activity. The temperature also is raised during the spasmodic contractions.

Uses.—Nux vomica and its alkaloid strychnine are given with the object of stimulating the motor tract of the cord in paralysis proceeding from disease of this structure. In paralysis following febrile diseases, and in that form which is due to lead-poisoning, this drug is useful. In such cases as these nux vomica or strychnine may be given by the mouth, or the alkaloid may be injected locally into the paralyzed muscles. Nux vomica has been successfully administered to oxen affected with chronic paralysis and to cows suffering from puerperal apoplexy; and after parturition in these animals, when there is partial paralysis of the hind-quarters, nux vomica has been beneficial.

These drugs are of no value in sensory paralysis, but in amaurosis in horses strychnine has been injected hypodermically near the temple with advantage. Nux vomica, given by the mouth, has also proved of benefit in some cases of this affection.

In stringhalt in horses, and in chorea in horses and dogs, nux vomica is sometimes useful. In cases of torpid bowels it increases the peristaltic action, and is best prescribed with other aperients, especially aloes, its administration in small doses being continued for several days. In cases of chronic bronchitis it often proves beneficial in horses and cattle, and small doses may be advantageously combined with expectorants.

Strychnine is antagonistic to poisoning by chloral, morphine, and physostigmine.

Dose of Nux Vomica Seeds in Powder:

Dog	$\frac{1}{8}$ to $\frac{1}{4}$ grain.
Man	1 to 4 grains.
Pig	1 to 8 ,,
Horse	10 to 30 ,,
Ox	10 to 40 ,,

OLEATUM HYDRARGYRI (A.).

Oleate of Mercury.

Mode of Preparation.—Stir continually in a mortar 8 parts of oleic acid, while adding gradually 2 parts of yellow oxide of mercury, sifting it on the surface, and triturate occasionally until it is all dissolved. Then set the mixture aside in a warm place, keeping the temperature no higher than 40° C., and stir.

Characters.—This preparation, known as oleate of mercury, is a light-brown, oleaginous, semi-solid substance, which is really composed of oleate of mercury and oleic acid, and has a slight smell of the latter. When it is gently warmed, no black precipitate separates. If a piece of copper foil is heated with oleate of mercury, the copper acquires a thin coating of metallic mercury, which is shown when the foil is rubbed with a cloth.

Therapeutics.—Oleate of mercury is used as an application to bursal enlargements in horses.

OLEORESINA ASPIDII (A.).

Oleoresin of Aspidium.

Mode of Preparation.—Place 500 grammes of aspidium into a cylindrical glass percolator, provided with a stop-cock, and arranged with cover and receptacle for volatile liquids. Press firmly, and percolate slowly with ether, added successively, until the aspidium is exhausted. Now remove the greater portion of the ether by distilling on a water-bath, transfer the product to a capsule, and let the rest of the ether evaporate. It should be preserved in a well-stoppered bottle, and as it generally deposits a crystalline substance, this should be well mixed with the liquid portion before use.

OLEUM AMYGDALÆ (A.[1] and B.).

Almond Oil.

Characters.—The oil expressed from the bitter or the sweet almond is thin, pale yellow, nearly inodorous, and possesses a bland, oleaginous, and nutty taste. It is soluble in ether and chloroform in any proportion. The specific gravity is 0·9175. It does not solidify until reduced to −20° C.

Therapeutics.—Almond oil is used in the preparation of phosphorated oil. It has demulcent and nutritive properties, and is often substituted for olive and other oils.

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[1] The above is the same as the Oleum Amygdalæ Expressum of the United States Pharmacopœia, whilst the Oleum Amygdalæ Amaræ of the same is a volatile oil got by macerating bitter almond with water and then distilling, and preserving in small well-stoppered bottles in the dark.

OLEUM ANISI (A. and B.).

Oil of Anise.

Characters.—The oil distilled in Europe from anise-fruit, *Pimpinella Anisum* (Nat. Ord., Umbelliferæ), or in China from star-anise fruit, *Illicium verum*, Hook. fil. (*Bot. Mag.*, plate 7,005), Nat. Ord., Magnoliaceæ, is colourless, or of a very pale yellow appearance. It has the characteristic odour of the fruit, and a sweet aromatic taste. The ordinary oil of anise-fruit congeals at from 10° to 15° C., and should not become liquid again below 15° C.; while the oil of star-anise fruit only becomes solid at a few degrees above 0° C. The specific gravity at 20° C. is 0·9825. The oil rotates the plane of a ray of polarized light slightly to the left.

Therapeutics.—Oil of anise has a similar action to that of the other aromatic oils, being a cordial stimulant, and diminishing reflex excitability. It has a specially stimulant effect on the bronchial mucous membrane, like ammoniacum, both drugs being partly excreted by this channel, and is for this reason often added to cough mixtures and lozenges. It is antiseptic also. It is chiefly used for flavouring mixtures and masses; and, as a preventive against griping, is often added to purgative masses. For destroying pediculi it is sometimes mixed with olive oil and applied to the skins of small house-dogs.

Dose.—

Man	- - - -	½ to 3 minims.
Dog	- - - -	1 to 4 ,,
Pig	- - - -	2 to 10 ,,
Horse	- - - -	10 to 60 ,,

OLEUM BETULÆ VOLATILE (A.).

Volatile Oil of Betula.

Description.—The above volatile oil, also called oil of sweet birch, is obtained by distilling the bark of *Betula lenta*, Linné (Betulaceæ). It is identical with methyl salicylate, and nearly so with oil of gaultheria. The bottles containing it should be well-stoppered, and kept in the dark.

For properties and tests, see Methyl Salicylas.

OLEUM CADINUM (A. and B.).

Oil of Cade.

Mode of Preparation.—Oil of Cade, or Juniper Tar Oil, is an empyreumatic oily liquid, prepared by the destructive distillation of the woody parts of *Juniperus Oxycedrus*, Linné (Moggridge, *Flora of Mentone*, table lxv.), and some other species of juniper (Coniferæ).

Characteristics.—It is a reddish-brown or nearly black, viscid, oily liquid, with tarry odour and aromatic bitter taste. Its specific gravity is about 0·99. It is soluble in ether and chloroform, partly soluble in cold and nearly totally in hot alcohol (90 per cent.). It is very slightly soluble in water, and the filtered solution is nearly colourless and acid in reaction.

OLEUM CAJUPUTI (A. and B.).

Oil of Cajuput.

Natural Order.—Myrtaceæ.

Characters.—Oil of cajuput, which is distilled from the leaves of the plant *Melaleuca Leucadendron*, Linn. (*Melaleuca Cajuputi*), Roxb. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 108), is a transparent, limpid, very volatile, pale bluish-green liquid. It possesses a strong, penetrating, and agreeable odour like that of camphor, and a warm, bitterish, aromatic, camphoraceous taste, which is succeeded by a sensation of coldness in the mouth. Specific gravity, 0·926. It becomes semi-solid if, when cold, stirred with half its volume of phosphoric acid, thus showing that a due amount of cineol is present.

Preparation.—Linimentum Crotonis.

Therapeutics.—Oil of cajuput is now seldom used in veterinary practice. It has a similar action to that of oil of cloves. Externally, it is sometimes employed on account of its counter-irritant properties in cases of chronic rheumatism. Internally, it acts as a diffusible stimulant, antispasmodic, and diaphoretic, and has been given to horses afflicted with colic.

Dose.—

Man	- - - -	½ to 3 minims.
Dog	- - - -	½ to 4 ,,
Pig	- - - -	2 to 10 ,,
Horse	- - - -	15 to 60 ,,

OLEUM CARUI (A.[1] and B.).

Oil of Caraway.

Description.—The oil distilled from caraway fruit is colourless or slightly yellow, with spicy odour and taste, and specific gravity 0·915.

Dose.—		
Man	½ to 3	minims.
Dog	½ to 4	,,
Pig	2 to 10	,,
Horse	15 to 60	,,

OLEUM CARYOPHYLLI (A. and B.).

Oil of Cloves.

Natural Order.—The *Eugenia caryophyllata*, of which plant cloves are the dried flower-buds, is a member of the natural order Myrtaceæ.

Characters.—The oil distilled in Britain from cloves is colourless, of a pale yellow colour when recent, but gradually becomes reddish-brown. It has in a high degree the odour and taste of cloves. It is heavier than, and therefore sinks in, water. Specific gravity, 1·05. A solution in alcohol gives a blue tinge with solution of ferric chloride. If it be shaken with an equal volume of ammonia, the oil forms a yellowish mass.

Use.—In preparing sections for the microscope, oil of cloves is of great value, since it clears up and renders transparent the various tissues.

Therapeutics.—Oil of cloves is an aromatic volatile oil seldom used in veterinary practice. Internally, it is stomachic, carminative, antispasmodic, and stimulant. As a corrective to prevent the griping caused by purgatives, it is sometimes given along with them, and is also added to mixtures used in cases of diarrhœa accompanied by pain.

Dose.—		
Man	½ to 3	minims.
Dog	½ to 4	,,
Pig	2 to 10	,,
Horse	15 to 60	,,

[1] The United States Pharmacopœia has Oleum Cari, which is a more correct rendering.

OLEUM CINNAMOMI (A. and B.).

Oil of Cinnamon.

Characteristics and Tests.—It is a volatile oil distilled from the bark of *Cassia cinnamon*, and should be preserved in well-stoppered bottles in a cool, dark place. When fresh, it is yellow, but becomes reddish. It has the odour and taste so well known. The average specific gravity, according to the British Pharmacopœia, is 1·03, but of the United States Pharmacopœia 1·06. If to 1 c.c. dissolved in 5 c.c. of alcohol (90 per cent.) a solution of ferric chloride be added, a pale green but not a blue colour should result (absence of cinnamon-leaf oil).

Dose.—*Man* - - - - ½ to 3 minims.

OLEUM CROTONIS (A.[1] and B.).

Croton Oil.

Natural Order.—Euphorbiaceæ.

Characters.—This poisonous oil is expressed in Britain from the seeds of *Croton Tiglium*, Linn. (B. and T., *Med. Pl.*, vol. iv., plate 239). It varies from a brownish-yellow to a dark reddish-brown colour, is fluorescent, and of a viscid consistence. The viscidity is increased by age. The odour is faint, peculiar, somewhat rancid, and disagreeable. The taste is oily and acrid. Croton oil is entirely soluble in absolute alcohol, freely soluble in ether and chloroform. The specific gravity is 0·95. An alcoholic solution does not redden blue litmus.

Preparation.—Linimentum Crotonis (1 volume in 8—*i.e.*, 1 fluid part of croton oil and 3½ fluid parts each, of oil of cajuput, and of alcohol, 90 per cent.).

Therapeutics.—Croton oil is a rapidly-acting drastic cathartic. Its irritant effect is chiefly a direct inflammation caused in the mucous membrane. This is accompanied by watery exudation, augmented peristalsis, and increased glandular activity. For horses its action is too violent for all but very exceptional cases. For cattle it is indicated for obstinate constipation, and inflammation of the brain, when it is necessary to act copiously on the bowels.

[1] In the United States Pharmacopœia it is designated Oleum Tiglii, Croton Oil.

Croton oil is a powerful irritant when in contact with the skin, and its action is too violent for horses and dogs, though for cattle it is sometimes used in cases of chronic glandular enlargements and rheumatic swellings of the joints. When the skin is thin, the oil may be absorbed, causing its cathartic action. Great care is essential in the employment of this powerful oil.

Dose.—*Man* - - - - ½ to 1 minim.
Dog - - - - ½ to 2 minims.
Pig - - - - 1 to 3 ,,
Sheep - - - - 1 to 5 ,,
Horse - - - - 5 to 20 ,,
Ox - - - - 10 to 40 ,,

OLEUM EUCALYPTI (A. and B.).

Oil of Eucalyptus.

Natural Order.—Myrtaceæ.

Characters.—The oil, distilled from the fresh leaves of *Eucalyptus Globulus*, Labillardière (B. and T., *Med. Pl.*, vol. ii., plate 109), *Eucalyptus oleosa*, F. v. Mueller, *Eucalyptus amygdalina*, and probably other species of eucalyptus, is colourless or of a pale straw-colour. It becomes both darker and thicker by exposure. It should be kept in well-stoppered bottles in a cool and dark place. Oil of eucalyptus possesses an aromatic odour, a spicy and pungent flavour, and leaves a sensation of coldness in the mouth. In reaction it is neutral. The specific gravity is about 0·92. The oil is soluble in about an equal weight of alcohol.

Therapeutics.—Oil of eucalyptus is a powerful antiseptic, more than three times as strong as phenol in preventing the development of bacteria, and not so poisonous. It is also superior to phenol in not being caustic when applied to the skin, and it does not produce much irritation of a mucous membrane. It is very useful as an antiseptic in the form of ointment or solution. Vaseline is an excellent basis for oil of eucalyptus, and lard also is a good medium. Solutions of the oil have a powerful effect in checking fœtor of decomposing discharges, and both the ointment and the solution have great healing power.

Internally, the action of the oil is nearly the same as that of turpentine. It is antipyretic and antiperiodic.

Dose.—*Man* - - - - ½ to 3 minims.
Dog - - - - 1 to 4 ,,
Pig - - - - 2 to 10 ,,
Horse - - - - 20 to 60 ,,

OLEUM GAULTHERIÆ (A.).

Oil of Wintergreen.

Description.—This is a volatile oil distilled from the leaves of *Gaultheria procumbens*, Linné (Ericaceæ), and it consists almost totally of methyl salicylate, of which the formula is $CH_3C_7H_5O_3$, and is nearly identical with oil of betula. It should be kept in carefully-closed bottles, and in the dark. It is a colourless, yellow, or even red liquid, with aromatic odour and sweet aromatic taste. Specific gravity, 1·180 at 15° C. Boils at about 219° C. It turns a ray of polarized light a little to the left. Has properties similar to methyl salicylate and oleum betulæ volatile.

Preparation.—Spiritus Gaultheriæ.

OLEUM HEDEOMÆ (A.).

Oil of Hedeoma.

Description.—Oil of Hedeoma, or Pennyroyal, is a volatile oil distilled from the plant of that name. It should be preserved in well-stoppered bottles in a cool, dark place. It is a pale-yellowish, limpid fluid, with pungent mint-like odour and taste, and of specific gravity 0·935 at 15° C. It forms a perfectly clear solution with twice its volume of a mixture of 3 volumes of alcohol and 1 of water, and this solution is only slightly acid to litmus. It is also readily soluble in disulphide of carbon or glacial acetic acid.

OLEUM JUNIPERI (A. and B.).

Oil of Juniper.

Natural Order.—Coniferæ.

Characters.—The oil, distilled in Britain from the full-grown but unripe green fruit of *Juniperus communis*, Linn. (B. and T., *Med. Pl.*, vol. iv., plate 255), is colourless or of a pale greenish-yellow colour, and possesses the characteristic odour of the fruit, and a warm, aromatic and bitter taste. The specific gravity is about 0·8775. The oil is soluble, giving only a small amount of turbidity in four times its own volume of a mixture of equal parts of absolute alcohol and alcohol (90 per cent.).

Preparation.—Spiritus Juniperi (50 c.c. oil of juniper to make 1,000 c.c. with alcohol, 90 per cent.).

Therapeutics.—Oil of juniper has stomachic, stimulant, antispasmodic, and diuretic properties. It is administered as a diuretic in dropsy dependent upon cardiac or hepatic mischief.

Dose.—*Man* - - - - ½ to 3 minims.
Dog - - - - 1 to 4 ,,
Pig and Sheep - - 4 to 15 ,,
Horse - - - - ½ to 1 drachm.
Ox - - - - ½ to 1½ drachms.

OLEUM LAVANDULÆ (A.[1] and B.).

Oil of Lavender.

Natural Order.—Labiatæ.

Characters.—The oil, distilled in Britain from the flowers of *Lavandula vera*, De C. (B. and T., *Med. Pl.*, vol. iii., plate 199), or, according to the United States Pharmacopœia, *Lavandula officinalis*, Chaix, is pale yellow or nearly colourless, and possesses the very fragrant characteristic odour of the flowers, and a hot, bitter, aromatic taste. Specific gravity is 0·885, and the oil should be soluble in three times its volume of alcohol (70 per cent.).

Preparation.—Linimentum Camphoræ Compositum (60 minims in 1 pint).

Therapeutics.—Oil of lavender is an aromatic volatile oil, having a similar action to that of the other members of the same class of oils.

Dose.—*Man* - - - - ½ to 3 minims.
Dog - - - - 1 to 5 ,,
Pig - - - - 2 to 15 ,,
Horse - - - - ½ to 1½ drachms.

OLEUM LIMONIS (A. and B.).

Oil of Lemon.

Characteristics.—The oil obtained from fresh lemon-peel is pale yellow, has the odour of lemon, and a bitter aromatic taste, and specific gravity 0·858. It should rotate the plane of a ray of polarized light no less than 59° to the right in a tube of 100 millimetres length.

Dose.—*Man* - - - - ½ to 3 minims.

[1] In the United States Pharmacopœia it is Oleum Lavandulæ Florum.

OLEUM LINI (A. and B.).

Linseed Oil.

Natural Order.—Linaceæ.

Characters.—The oil, expressed in Britain without heat from linseed, is viscid, yellow, with a faint odour and bland oleaginous taste. Linseed oil gradually thickens by exposure to the air, yielding a hard transparent varnish. Specific gravity, 0·935. Soluble in 10 parts of alcohol (90 per cent.), and in oil of turpentine.

Therapeutics.—Linseed oil is emollient and laxative in action. It is administered as a mild cathartic for debilitating diseases of horses, cattle, and dogs. In cases of irritability of the intestines, when it is desired to unload the bowels, linseed is a useful aperient. In pregnant animals, in irritant poisoning, and when other purgatives have been given without effect, the oil is a bland and safe agent. In choking, it affords relief in virtue of its emollient properties. In colic, it is commonly given with sulphuric ether and tincture of opium. It proves a suitable medium for the administration of oil of turpentine and croton oil, and it may be injected into the rectum to soften the impacted fæces and allay irritability thereby or otherwise produced.

Externally, it proves useful as an application for irritable cracked surfaces, and it forms a useful basis for applying astringent and other applications in eczema and other diseases of the skin.

Dose.—

Cat	1 drachm.
Dog	1 to 2 fluid ounces.
Sheep and Pig	2 to 6 „ „
Horse	½ to 1 pint.
Ox	1 to 2 pints

OLEUM MENTHÆ PIPERITÆ (A. and B.).

Oil of Peppermint.

Natural Order.—Labiatæ.

Characters.—The oil, distilled in Britain from fresh flowering peppermint, *Mentha piperita*, Sm. (B. and T., *Med. Pl.*, vol. iii., plate 203), may be colourless, pale yellow, or greenish-yellow when recent, but becomes gradually thicker and of a red hue if kept. Peppermint oil has the odour of peppermint, and a strong

penetrating aromatic taste, which is followed by a sensation of coldness in the mouth. Specific gravity is 0·91. Soluble in four times its volume of alcohol (70 per cent.). If the oil be cooled to 8·3° C., and a few crystals of menthol dropped in, a large separation of menthol will occur.

Therapeutics.—Oil of peppermint has an action similar to that of the other aromatic oils, and is often added as a corrective and carminative to purgative medicines.

Dose.—

Man	½ to 3	minims.
Dog	½ to 3	,,
Pig	2 to 6	,,
Horse	20 to 60	,,

OLEUM MORRHUÆ (A. and B.).

Cod-liver Oil.

Class.—*Gadus Morrhua*, Linn. (Brandt and Ratzeburg, *Med. Zool.*, vol. ii., table ix., Fig. 3), the cod, from the liver of which the oil is extracted, is a member of the Class Pisces, Order Teleostei, family Gadidæ.

Characters.—The oil, extracted from the fresh liver of the cod by the application of a heat not exceeding 82·2° C., and from which solid fat has been separated by filtration at about 5° C., is of a pale yellow colour, and possesses a slight fishy odour and a bland fishy taste. Specific gravity is 0·925. It easily dissolves in ether and chloroform, and slightly in alcohol (90 per cent.).

Test.—If a drop of sulphuric acid be added to a few drops of the oil placed on a porcelain slab, a violet colour is produced, which soon passes to a yellowish or brownish-red. If nitric acid be carefully added on to the top of some in a test-tube, a little albumin is produced at the surface of contact. If the oil be kept at 0° C. for two hours, no solid fat should separate.

Therapeutics.—Cod-liver oil has nutritive and alterative properties. Increasing the richness of the chyle, it improves the quality of the blood, and is thus hæmatinic and tonic. It is more easily absorbed than other oils, and has some special virtue owing to the traces of iodine, bromine, phosphates, and other salts which it contains.

Cod-liver oil is sometimes given to horses after debilitating diseases and in broken wind. To oxen also it is sometimes given, more especially after affections of the lungs and in tuberculosis.

For dogs and cats it is far more commonly administered than in cattle and equine practice. In distemper, debility, rickets, and in many chronic diseases it is of great benefit to these animals. The best time to administer the oil is during or shortly after a meal. It is generally given in gruel. A good mixture for the small animals may be made by adding 10 minims of pure ether to each drachm of the oil, and this will be more readily retained by them.

Dose.—

Cat	1 fluid drachm.
Man and Dog	1 to 4 fluid drachms.
Pig	2 to 6 ,, ,,
Sheep	1 fluid ounce.
Horse	2 to 3 fluid ounces.
Ox	3 to 6 ,, ,,

OLEUM MYRCIÆ (A.).

Oil of Myrcia.

Description.—This is a volatile oil distilled from the leaves of *Myrcia acris*, De Candolle (Myrtaceæ). Keep in well-closed bottles in a cool, dark place. It is a brownish-yellow fluid, with clove-like odour and spicy taste, having specific gravity 0·977 at 15° C. With an equal volume of alcohol, glacial acetic acid, or carbon disulphide, it yields slightly turbid solutions, and the alcoholic solution is slightly acid to litmus.

OLEUM OLIVÆ (A. and B.).

Olive Oil.

Characters.—The oil, expressed from the ripe fruit of *Olea Europæa*, Linn. (B. and T., *Med. Pl.*, vol. iii., plate 172), Nat. Ord., Oleaceæ, is of a pale yellow or greenish-yellow colour, and possesses a very faint agreeable odour and a bland oleaginous taste. At a temperature of 10° C. it becomes pasty, at about 2·2° C. the oil partially congeals, and at 0° C. it becomes of a granular consistence. Specific gravity, 0·9165.

Therapeutics.—Olive oil has nutritive, emollient, and laxative properties. It enters the blood from the lacteals or lymphatics, and is to be regarded as a food. In cases of poisoning by corrosives it has a soothing action on the intestinal tract, and it retards the solution and absorption of preparations of arsenic. Corrosive alkalies combine with it, forming soap.

Dose.—*Dog* - - - - 1 to 2 fluid ounces.
Pig - - - - 2 to 6 ,, ,,
Horse - - - - 1 to 1½ pints.

OLEUM PHOSPHORATUM (A. and B.).

Phosphorated Oil.

Mode of Preparation.—1. British Pharmacopœia: Heat a sufficient quantity of oil of almonds in a porcelain dish to a temperature of 149° C., and keep up this heat for fifteen minutes. Then let it cool, and filter it through paper. Place 99 parts by weight of this oil into a stoppered bottle capable of holding more, and add to it 1 part by weight of pure dry phosphorus. Immerse the bottle in hot water, until the oil has become heated to 82·2° C., removing the stopper two or three times, in order to allow the expanded air to escape. Then shake the oil and phosphorus together until the latter is entirely dissolved.

Characters.—Phosphorated oil is clear, straw-coloured, and phosphorescent in the dark. It contains about 1 per cent. of phosphorus.

Mode of Preparation.—2. United States Pharmacopœia: Expressed oil of almond is placed in a flask, and heated on a sand-bath to 250° C. for a quarter of an hour, then cooled and filtered. Place 90 grammes of this oil with 1 gramme of phosphorus, previously well dried by filtering paper, into a dry, tared bottle which will hold 120 c.c., insert the stopper, and heat the bottle in a water-bath until the phosphorus melts. Then shake it so that it may dissolve, cool, add sufficient ether to make the whole weigh 100 grammes, shake again, and preserve in small glass-stoppered bottles completely full of it, and keep in a cool, dark place.

Characteristics.—It has the odour of phosphorus and ether, but is not phosphorescent in the dark, and should contain no undissolved phosphorus.

Therapeutics.—Phosphorus is a powerful nerve tonic, aphrodisiac, and stimulant, and has also alterative properties. It has been very little used as yet in veterinary practice. Phosphorated oil is recommended by Mr. J. B. Gresswell in conjunction with strychnine in motor paralysis in horses, and it may be administered in doses of 20 minims.

Dose.—*Man and Dog* - - - 1 to 3 minims.
Pig - - - - - 5 to 20 ,,
Horse - - - - - 10 to 40 ,,

OLEUM PICIS LIQUIDÆ (A.).

Oil of Tar.

Description.—A volatile oil distilled from tar, almost colourless when fresh, but soon becoming reddish-brown, and having a strong tarry odour and taste. Its specific gravity is about 0·97 at 15° C. It is readily soluble in alcohol, and the solution is acid to litmus.

OLEUM PIMENTÆ (A. and B.).

Oil of Pimenta.

Description.—This is a volatile oil distilled from pimenta, and it must be preserved in well-stoppered bottles in a cool, dark place. Colourless or pale yellow, with a strong clove-like odour and spicy taste, and becoming darker and thicker when kept. Specific gravity, 1·05 at 15° C. With an equal volume of alcohol it yields a clear solution, slightly acid to litmus. It also forms a clear solution with an equal volume of glacial acetic acid, and also a nearly clear one with carbon disulphide. If mixed with an equal volume of a strong solution of hydroxide of sodium, it yields a semi-solid mass. If 2 drops be dissolved in 4 c.c. of alcohol, and a drop of solution of ferric chloride be added, a bright green hue results, and if a drop from the same solution be diluted with four times its bulk of water before being added, the colour produced is first blue, then green, and then yellow. If 1 c.c. of the oil be mixed with 20 c.c. of hot water, it gives a scarcely perceptible acid reaction to litmus; and if, after cooling, the liquid be passed through a wet filter, the clear filtrate should yield, with a drop of ferric chloride solution, nearly a transient grayish-green, and not a blue or violet (as with carbolic acid).

Dose.—

Man	- - - -	½ to 3 minims.
Dog	- - - -	1 to 4 ,,
Pig	- - - -	3 to 10 ,,
Horse	- - - -	20 to 60 ,,

OLEUM PINI (B.).

Oil of Pine.

Description.—Oil of pine is distilled from the fresh leaves of *Pinus pumilio*, Haenke (Lamb, *Gen. Pin.*, i., plate 2).

Characteristics.—Oil of pine is nearly colourless, and has a pleasant aromatic odour and a pungent taste, and specific gravity 0·8675.

Tests.—It should rotate the plane of a ray of polarized light about 7·5° to the left at 60° F. (15·5° C.) in a tube 100 millimetres long. Not more than 10 per cent. should distil below 329° F. (165° C.).

OLEUM RICINI (A. and B.).

Castor Oil.

Natural Order.—Euphorbiaceæ.

Characters. — The oil, expressed from the seeds of *Ricinus communis*, Linn. (B. and T., *Med. Pl.*, vol. iv., plate 237), is viscid and colourless, or of a pale straw-yellow colour. It has scarcely any odour, and the taste, which is at first mild, becomes subsequently acrid and unpleasant. Castor oil is entirely soluble in 1 volume of absolute alcohol, and in 5 volumes of alcohol (90 per cent.). It dries and becomes varnish-like if exposed in a thin layer to the air. Specific gravity 0·960. It should be kept in well-stoppered bottles.

Therapeutics.—Castor oil is a mild purgative, acting rapidly and certainly, without causing griping. It is generally convenient for administration to young animals and to those debilitated, or in the pregnant condition. It is not so suitable for horses as for cattle, sheep, and dogs. For the dog it is usually prescribed with spirit or with mucilage, in order to obviate the nauseating effect which it sometimes is otherwise apt to cause. Castor oil is the laxative employed in irritable conditions of the alimentary canal, such as diarrhœa, dysentery, and enteritis. It is also commonly given when a bland purgative is required in cases of inflammation of the kidneys, and in those instances where other purgatives have already been given without effect, or where it is required to administer them for a lengthened period. For the pig it is a very suitable purgative.

Dose.—

Man	1 to 8	fluid drachms.
Cat	1 to 8	,, ,,
Dog	½ to 1½	,, ounces.
Pig	1 to 3	,, ,,
Sheep	1½ to 3	,, ,,
Calf	3 to 6	,, ,,
Horse	½ to 1½	pints.
Ox	½ to 2	,,

OLEUM ROSÆ (A. and B.).

Oil of Rose.

Synonym.—Otto of Rose.

Description.—The oil is distilled from the fresh flowers of *Rosa damascena*, Linn., Miller (Redouté, *Les Roses*, plate 109. Nat. Ord., Rosaceæ).

Characteristics.—It is a pale yellow, crystalline semi-solid, with the fragrant odour of roses and a sweet taste. Its specific gravity at 30° C. is 0·858.

Tests.—The congealing and melting points should be betwixt 19·4° and 22·2° C.

OLEUM SABINÆ (A.).

Oil of Savine.

Description.—A volatile oil distilled from savine. The bottles containing it should be well stoppered, and kept in the dark. It is colourless or yellowish, becoming darker and thicker if kept, has a turpentine-like smell, and a bitter camphor-like taste. Specific gravity 0·925 at 15° C. It is soluble in an equal volume of alcohol (unlike oil of juniper and oil of turpentine), and the solution is neutral, and it is soluble in an equal volume of glacial acetic acid.

Dose.—*Dog* - - - - 1 to 6 minims.
Pig - - - - 3 to 15 ,,
Horse - - - - ½ to 1½ drachms.

OLEUM SANTALI (A. and B.).

Oil of Sandal-Wood.

Characteristics and Tests.—It is the oil distilled from the wood of *Santalum album*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 252. Nat. Ord., Santalaceæ). It is thick, pale yellow, with aromatic odour and spicy taste, and its specific gravity is 0·977. It forms a clear solution with six times its volume of alcohol (70 per cent.), and thus indicates absence of cedar-wood oil, and it should be neutral or only slightly acid.

Therapeutics. — Oil of sandal-wood has, like copaiba, a stimulant and disinfectant effect on the genito-urinary tract. It has also diuretic and expectorant properties. It has been given to bulls suffering from gonorrhœa with great advantage, and it

may also be administered in cases of vaginitis in mares and cows. It is more easily taken than copaiba, and the dose may be repeated once daily for several days.

Dose.—*Man* - - - - 5 to 30 minims.
Horse - - - - 4 fluid drachms.
Ox - - - - 6 „ „

OLEUM SINAPIS VOLATILE (A. and B.).

Oil of Mustard.

Natural Order.—Cruciferæ.

Characters.—The oil, distilled with water from black mustard-seeds after maceration with water, is colourless or of a pale yellow appearance. The specific gravity is about 1·024. It distils at about 149·7° C., and the first and last portions of the distillate should be of the same specific gravity as the oil itself (thus showing that it is free from ethylic alcohol and petroleum). It dissolves readily in alcohol and ether, and to a small extent in water. Oil of mustard has an intensely penetrating and very characteristic odour, and a very acrid, burning taste. If applied to the skin it produces almost instant vesication. It should be kept in well-stoppered bottles in a cool, dark place.

OLEUM TEREBINTHINÆ (A. and B.).

Oil of Turpentine.

Natural Order.—Coniferæ.

Characters.—The oil is distilled, usually by the aid of steam, from the oleo-resin, turpentine, which is obtained from *Pinus Sylvestris*, Linn. (B. and T., *Med. Pl.*, vol. iv., plate 257), and other species of Pinus, and is rectified if necessary. Oil of turpentine is limpid, colourless, possesses a strong, peculiar odour, which varies in the different kinds, and has a pungent and bitterish taste. It is soluble in its own volume of glacial acetic acid. It boils at about 160° C., and almost entirely distils below 180° C., leaving little or no residue.

Therapeutics:

Externally.—When applied to the skin or exposed mucous surfaces, oil of turpentine acts as a local stimulant and counter-irritant, having also antiseptic and disinfectant properties. It is largely employed in making various counter-irritant lini-

ments. As an external application it is for most purposes more suitable for cattle than for horses, in which, if much used, it is liable to cause blemishing. For cases of chronic rheumatic affections of the muscles or joints, for bruises and sprains after the acute inflammatory stage is passed, and for painful neuralgic affections, liniment of turpentine is a suitable application. In cases of inflammation of the respiratory organs, and in colic of the spasmodic or flatulent variety, it is commonly used as a counter-irritant. For all such purposes the ammonia and turpentine liniment serves well; but belladonna, opium, aconite, or other sedative agents may be added when necessary, as in painful muscular rheumatism or neuralgic affections. For destroying pediculi on the skin, for applying to foul sores, ulcers, or other such purposes, a mixture of 1 part of oil of turpentine to 3 or 4 of linseed or olive oil, vaseline, or lard, gives a suitable strength.

Internally.—Oil of turpentine is a powerful carminative, acting as a stimulant to the muscular coat of the large intestine, causing contraction and expulsion of gas and fæces in cases of atony or tympanitic distension of this part of the bowel, and it also acts as a disinfectant and vascular stimulant. In larger doses purgation is produced. It is destructive to worms, and is consequently a valuable anthelmintic. It has a sedative action on the cerebral and spinal centres, and this is manifested after the reflex stimulant effect caused by its action on the vessels and nerves of the stomach. The heart's action is lessened, and the blood-pressure falls. From this latter effect oil of turpentine proves to be a very valuable hæmostatic in cases of bleeding from internal organs. On the bronchial walls it acts as a vascular stimulant. It is excreted by the skin, kidneys, and respiratory passages. Being liable to cause irritation and congestion of the urinary organs, it is not much employed in disease of these and other internal organs. In small doses it causes diuresis, and it is hence sometimes given in hæmaturia with advantage when administered with care, and likewise in small doses in inflammation of the kidneys; but in this and similar disorders it is quite as likely to do harm as good, unless its effects be watched very carefully, and in any case only a few doses should be given, and these should be diminutive.

Oil of turpentine is given in a great variety of diseases in veterinary practice as an antispasmodic and carminative. For spasmodic and flatulent colic and indigestion in horses, for

tympanitis and dysentery in cattle, it is administered with benefit. In cases of colic, dysentery, and protracted diarrhœa, it is usually combined with opium, catechu, or other agents. For chorea in dogs it is sometimes given as an antispasmodic with advantage. As a stimulant it proves valuable in cases of pulmonary congestion, restoring the flagging circulation. After the early stages of some of the specific fevers, as influenza, strangles, and scarlet fever in horses, it acts as a stimulant and antiseptic. In cases of purpura hæmorrhagica in horses, one may prescribe oil of turpentine with tincture of perchloride of iron, the mixture having a good effect. As an expectorant it is often given in cases of chronic bronchitis, and in the later stages of inflammation of the lungs it may be at times a useful remedy. As a hæmostatic and astringent it is given in cases of passive hæmorrhages from the internal organs. For melæna in horses and cattle it may be combined with opium and tannic acid or galls. For hæmaturia of cattle it may be given with tannic and diluted sulphuric acids. As a diuretic, turpentine is given in cases of cardiac dropsy, and sometimes in small doses in suppression of the urine, dependent upon weakened action of the central organ of circulation. It is given in cases of puerperal fever in cows, and is mostly combined with solution of ammonia or of carbonate of ammonia, or with an alcoholic stimulant.

As an anthelmintic, oil of turpentine is largely used in horses, cattle, sheep, pigs, and dogs.

Before oil of turpentine is administered as an anthelmintic it is customary to open the bowels by a cathartic, and then to allow a long fast. Male fern is often given with turpentine for tapeworm in the horse, and the following formula of Mr. J. B. Gresswell useful:

℞. Extracti filicis liquidi, ʒss.
Olei absinthi, ʒss.
Olei terebinthinæ, ℥ss.
Olei lini, ʒiv.ss.

This mixture may be followed by the administration of 3 ounces of chloride of sodium and 1 ounce of ginger. For tapeworm in dogs, areca-nut and male fern are prescribed with oil of turpentine.

To round worms turpentine proves very destructive when given by the mouth; but if the worms are lodged in the lower part of the bowel, it may be administered in the form of an enema. For hoose, and in cases of worms in the air-passages of calves and

lambs, oil of turpentine given by the mouth proves very useful. Intratracheal injection of 1 drachm of oil of turpentine, 20 minims of phenol, together with 30 minims of chloroform, is said to be efficacious in destroying *Strongyli Micruri* in the air-passages of calves.

Dose.—*Man* - - - 2 to 10 minims, but as an anthelmintic 3 to 4 fluid drachms.

As a stimulant, antispasmodic, and anthelmintic :

Dog - - -	30 to 80 minims.	
Sheep and Pig -	1 to 3	fluid drachms.
Horse - - -	1 to $2\frac{1}{2}$	,, ounces.
Ox - - -	1 to 3	,, ,,

As a diuretic :

Dog - - -	10 to 40	minims.
Pig - - -	$\frac{1}{2}$ to 1	fluid drachm.
Horse - - -	4 to 6	,, drachms.
Ox - - -	4 to 8	,, ,,

OLEUM THEOBROMATIS (A. and B.).

Oil of Theobroma.

Description.—Oil of theobroma, or cacao butter, is a concrete oil prepared by pressing the warm crushed seeds of *Theobroma Cacao*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. i., plate 38. Nat. Ord., Sterculiaceæ). It is a yellowish solid and breaks smoothly, with cocoa-like odour and agreeable taste, free from rancidity. It softens at 26·6° C., and melts at about 32·5° C.

OPIUM (A.[1] and B.).

Opium.

Natural Order.—Papaveraceæ.

Mode of Preparation. — Opium is the juice obtained by incision from the unripe capsules of the poppy, *Papaver somniferum*, Linn. (grown in Asia Minor), and inspissated by spontaneous evaporation. The unripe capsules are incised, or rather deeply scratched. A milky juice exudes, becomes inspissated by spontaneous evaporation, and is scraped off and made into lumps. As these ought to consist only of the tears of thickened juice from

[1] In the United States Pharmacopœia it is represented by Opii Pulvis, Powdered Opium.

the incisions, the lumps should tear with an irregular surface, and when drawn across a piece of paper should leave a light-brown interrupted streak. If vegetable extracts are also present the lumps have a more even fracture, and make a more even streak on a piece of paper. Any ordinary variety of opium may be employed for the preparation of alkaloids. For other purposes opium obtained in Asia Minor should be used. The strength also should be such that, after the opium has been dried and powdered, the powder, after being heated to 100° C., so long as it loses moisture, should yield not less than 9·5 per cent., and not more than 10·5 per cent., of anhydrous morphine. Commercial opium contains usually about 15 per cent.

Characters.—Opium occurs in round, irregular, or flattened masses or lumps, which generally vary in weight from about 4 ounces to 2 pounds. The substance is usually enveloped in portions of poppy-leaves, and here and there the surface is covered with the reddish-brown chaffy fruits of a species of Rumex. When fresh, opium is plastic, and can be torn without difficulty. An internal surface as thus exposed is somewhat moist, coarsely granular, reddish or chestnut-brown, and shines when rubbed smooth with the finger. By being kept, opium becomes harder, and darkens to a blackish-brown colour. The odour is characteristic, strong, and narcotic. Opium is very poisonous, and possesses a bitter and nauseous taste.

Therapeutics:

Action.—On the bowels opium has an anodyne and astringent action. When given in large and frequent doses, it paralyzes the intestines.

The principal action of opium is on the nervous system. Animals show wide dissimilarity in their degree of susceptibility to its influence. Thoroughbred and other excitable horses are more readily influenced than cart-horses and those of a sluggish temperament. Ruminants are not very susceptible to its action, whereas dogs are as readily influenced by it as men. The cerebral convolutions are at first excited, but the period of exaltation is succeeded by depression, during which drowsiness followed by sleep supervenes. When an excessive dose has been taken the stage of excitement is absent, and there is great depression of the cerebrum, during which the animal becomes comatose, and insensible to external stimuli. Opium, then, has a stimulant, anodyne, hypnotic, and narcotic action on the brain; and these

effects, it may be remarked, are more marked in man than in animals. The pupils are contracted under the influence of opium, owing to its action on the basal ganglia of the brain. The motor centres of the brain and cord are first stimulated and then depressed; but muscular irritability is not completely lost, even when large doses have been taken. The various centres in the medulla oblongata are markedly affected by opium, the respiratory one being depressed, and death resulting from its paralysis. The cardiac centre is first excited and then depressed, and the vaso-motor one is also depressed.

On the respiratory functions opium is powerfully depressant. The bronchial secretions are diminished or inspissated by its action on the glands of the mucous membrane, and the activity of the pulmonary circulation is diminished.

Uses.—Opium is one of the most valuable and commonly prescribed of medicinal agents.

It is largely employed to relieve pain and spasm. In peritonitis it is of great efficacy in quieting the peristaltic action of the bowels and relieving the acute agony, and in many diseases of the intestines themselves it is constantly given to ease acute suffering. In enteritis, gastritis, irritability of the stomach, and in acute inflammation of the pleura, it gives great relief. As an antispasmodic and anodyne, it proves useful in cases of colic, whether of the spasmodic or flatulent type; and in cases of diarrhœa and dysentery it allays irritation, diminishes secretion, and calms the movements of the intestines. The antispasmodic and anodyne effects of opium are enhanced by combining with it belladonna, Indian hemp, conium, or chloral hydrate. Having a soothing effect on the vessels and circulation, it is given in various passive hæmorrhages, as a hæmostatic in cases of melæna, whilst in muco-enteritis the hypodermic injection of morphine and atropine is strongly recommended to diminish the rapid exudation of blood and serum into the walls of the intestines. Opium is not given when there is evidence of deficient action of the kidneys, because, if so, as in nephritis or albuminuria, poisoning may occur, owing to a diminished secretion from those organs. On account of its soothing action on the bronchi, lungs, and on the respiratory centre, the drug is administered for cough and dyspnœa; but caution is necessary, as these symptoms may be beneficial manifestations. When the cough is due to remote irritation, or to excessive irritability of the nerves and centre, the drug can be

administered, as also when it is due to conditions such as a growth in the bronchi, or the lungs, or to pressure on these parts. Opium is generally prescribed with expectorants, such as ammonia and ipecacuanha, which prevent dangerous depression of the local nerves and centre. For idiopathic tetanus in young animals, the hypodermic injection of morphine is often very serviceable, and this treatment may be combined with the administration of bromide of potassium or monobromide of camphor. In acute cases of tetanus in adults, the local injection of morphine into those muscles in which the spasmodic attacks are especially marked is often effectual in giving temporary relief. In acute inflammatory diseases opium is not suitable for administration. In 'diabetes insipidus' in horses it is often beneficial, but it is not so much given now as formerly in this disease—iodine, iodides, arsenic, and other remedial agents, being more employed. To prevent abortion, and relieve post-partum pains, opium is employed in preference to any other agent.

Locally, opium is employed to relieve pain. For painful wounds and bruises, for inflammatory and painful affections of the skin, it is a useful anodyne. For conjunctivitis also it is a good local application. For wounds and bruises a proportion of 10 drops of the tincture to each fluid ounce of water forms a suitable strength, and for conjunctivitis 5 drops, together with 5 drops of solution of acetate of lead to each fluid ounce of water, make a suitable lotion. For piles the ointment of opium and galls, or equal parts of this and of ointment of hamamelis, will prove useful. The enema opii is indicated in cases of inflammation of the kidneys, bladder, uterus, and rectum.

Dose.—

Man and Cat[1]	½ to 2 grains.
Dog	½ to 5 ,,
Pig	3 to 20 ,,
Sheep	5 to 30 ,,
Horse	1 to 2 drachms.
Ox	1½ to 4 ,,

[1] Cats do not die as a result of comparatively large doses of laudanum mixed with milk, whereas both cats and dogs are easily killed by small doses of strychnine or of chloroform. Rabbits can take belladonna rather freely Travellers have been poisoned by wild honey, the bees, however, being uninjured by the poisonous flowers from which they collected it.

OXIDUM ARSENIOSUM.[1]

Arsenious Oxide.

Formula.—As_4O_6.

Mode of Preparation.—Arsenious oxide is an anhydride, obtained by roasting arsenical ores. It is purified by sublimation.

Characters and Tests.—Arsenious oxide occurs as a heavy white powder, or in sublimed masses, which usually present a stratified appearance, which is caused by the fact that they consist of separate layers differing from one another in degree of opacity. If slowly sublimed in a glass tube, this oxide forms minute, brilliant, and transparent crystals of octahedral character. It is sparingly soluble in cold water, more so in boiling water. The aqueous solution is odourless and tasteless, and gives with ammonio-nitrate of silver a canary-yellow precipitate, which is insoluble in water but readily dissolved by ammonia and by nitric acid. If the oxide is sprinkled on a red-hot coal, it gives rise to an alliaceous odour. At a temperature not exceeding 204·4° C. it is entirely volatilized.

Therapeutics.—Externally, arsenious oxide is irritant, caustic, and antiseptic. It is used in the form of a paste (made of 1part of the oxide, 1 part of charcoal, 5 parts of red sulphuret of mercury and water) to destroy warts, and sometimes also for limited malignant growths. Arsenic, being absorbed from the unbroken skin, requires to be used with caution.

Internally, arsenic stimulates the nerves and vessels of the mucous membrane of the stomach, and in larger doses irritates them, causing pain and gastro-intestinal inflammation. Solution of arsenious oxide is the best preparation of arsenic for internal purposes. With iron, arsenic often has a good effect in anæmia, and is one of the best hæmatinics and tonics. In irritative dyspepsia it is best given as Fowler's solution, with alkalies and bitters, and is especially useful in this disorder in dogs. Increasing the vital activity of the organs of the body, arsenic acts as a general tonic and as an alterative. It is, like quinine, anti-periodic, and is hence useful in malaria. It has also a decided effect on the nervous system, being found in the gray matter of the cord in cases of poisoning by arsenic. It diminishes the

[1] It is called Acidum Arseniosum in the British Pharmacopœia, and Acidum Arsenosum in the United States Pharmacopœia.

sensibility and reflex irritability of the centres of the cord, and afterwards affects the motor nerves and muscles. In chorea it is often of benefit after other drugs have failed. Affecting the metabolism of the liver, it also often proves useful in cases of diabetes in horses. In many forms of skin diseases in the various animals, owing to its action on the integument, it is greatly employed. In psoriasis, chronic eczema, and acne it is especially valuable. In farcy it also has often a very good effect. It must be remembered that when arsenic is taken in too large doses or for too long a time, it causes debility, disturbance of nutrition, and nervous derangement. Its action must therefore be carefully watched.

Dose.—

Man	$\frac{1}{60}$ to $\frac{1}{15}$ grain.
Dog	$\frac{1}{60}$ to $\frac{1}{10}$,,
Pig	$\frac{1}{8}$ to $\frac{3}{4}$,,
Sheep	$\frac{1}{4}$ to 1 ,,
Horse	1 to $2\frac{1}{2}$ grains.
Ox	$1\frac{1}{2}$ to 4 ,,

OXIDUM CHROMICUM.[1]

Chromic Oxide.

Formula.—CrO_3.

Mode of Preparation.—Chromic oxide is an anhydride, and is obtained as follows: Mix together gradually and with care 50 fluid ounces of distilled water and 42 fluid ounces of sulphuric acid. Dissolve in this mixture 30 ounces of bichromate of potassium, and set aside for twelve hours, and then decant the liquor from the crystals of acid sulphate of potassium which have separated. Heat the liquor to about 85° C., and add 15 fluid ounces of sulphuric acid, and water in sufficient quantity to just redissolve any crystals of chromic acid that may have been formed. Allow the liquor to cool. Collect and drain the crystals, and dry them on porous tiles at a temperature not exceeding 37·8° C. in an air-bath. By evaporating the remaining liquor more crystals can be obtained.

Characters and Tests.—Chromic oxide occurs in the form of crimson acicular crystals, which are very deliquescent, inodorous, and corrosively caustic. At a high temperature it melts, and at a still higher decomposes, giving off oxygen gas, and leaving a greenish-black residue. If chromic oxide is warmed with hydrochloric acid, chlorine is evolved, and a green residue remains.

Chromic oxide is soluble in water, forming a deep orange-red solution. If it is placed in contact with alcohol, glycerin, and some other organic matters, sudden combustion or explosion may ensue. A solution of 1 or 2 grains in

[1] It is called Acidum Chromicum in both the British and the United States Pharmacopœias.

2 or 3 ounces of water should afford only a faint opalescence with chloride of barium.

Preparation.—Liquor Acidi Chromici (1 part in 4).

OXYMEL (B.).

Mode of Preparation.—Liquefy by heat 8 parts by weight of clarified honey, and mix with it 1 fluid part of acetic acid and 1 fluid part of distilled water, or enough of the latter to yield oxymel with specific gravity 1·32.

Dose.—*Man* - - - - - - 1 to 2 fluid drachms.

OXYMEL SCILLÆ (B.).

Oxymel of Squill.

Mode of Preparation.—Digest 75 grammes bruised squill for seven days in a mixture of 75 c.c. acetic acid and 240 c.c. distilled water. Press and filter. Mix the resulting 300 c.c. with 810 c.c. clarified honey, or with enough to yield a liquid with specific gravity 1·32.

Therapeutics and Doses.—The uses and doses of oxymel of squills are the same as those of acetum scillæ.

Dose.—*Man and Dog* - - - - ½ to 1 fluid drachm.
Pig - - - - - - 1 to 2 ,, drachms
Horse - - - - - - ½ to 1½ ,, ounces.

PARAFFINUM DURUM (B.).

Hard Paraffin.

Synonyms.—Paraffin ; Paraffin Wax ; Solid Paraffin.

Mode of Preparation.—Hard paraffin, a mixture of several of the harder members of the paraffin series of hydrocarbons, is usually obtained by distillation from shale, separation of the liquid oils by refrigeration, and purification of the solid product.

Characters and Tests.—Hard paraffin is colourless, semi-transparent, crystalline, inodorous, tasteless, slightly greasy to the touch, insoluble in water, slightly soluble in absolute alcohol, freely soluble in ether. A solution in alcohol should not turn blue litmus red. At about 55·8° C. it melts and burns with a bright flame, leaving no residue. The average specific gravity is 0·88.

PARAFFINUM LIQUIDUM (B.).

Liquid Paraffin.

Description.—Liquid paraffin is a clear oily liquid, and is obtained from petroleum, after the more volatile portions have been distilled away.

Characteristics.—It is devoid of colour, odour, taste, or fluorescence. It boils at a temperature not lower than 680° F., and its specific gravity is 0·8875.

Tests.—If 3 c.c. be heated with the same amount of sulphuric acid in a test-tube placed in boiling water for 10 minutes, and often shaken, the layer of acid should not be of a deeper colour than pale-brown. Again, if a little alcohol (90 per cent.) be boiled with it, blue litmus should not be reddened.

The absence of sulphur compounds can be proved by mixing 4 c.c. of it with 2 of absolute alcohol, and 2 drops of a saturated solution of oxide of lead in solution of hydroxide of sodium, when the mixture should remain colourless at 158° F. (70° C.) for ten minutes.

Actions and Uses.—Since it does not become rancid, it is preferable to lard as a basis for ointments for local purposes; but as it is only very slightly absorbed, it is unsuitable for those intended to act upon the system. Hard paraffin is useful on account of its high melting-point and freedom from liability to spread through the dressings. Liquid paraffin is used for dissolving menthol, cocaine, and other drugs, when applied as spray.

PARAFFINUM MOLLE (B.).

Soft Paraffin.

Synonyms.—Petrolatum; Pétroléine; Unguentum Paraffinum.

Mode of Preparation.—This semi-solid mixture, which is known in commerce by various names, contains some of the more fluid members of the paraffin series of hydrocarbons, and is usually procured by purifying the less volatile portions of petroleum.

Characters.—Soft paraffin is white or yellowish, translucent, soft, greasy, and free from acidity, alkalinity, or any unpleasant odour or flavour, even when warmed to 48·9° C. The specific gravity at the melting-point is about 0·855. The melting-point is about 37·2° C., or higher. It volatilizes without giving acrid vapours, and burns with a bright flame, leaving no residue. Soft paraffin is insoluble in water, slightly soluble in absolute alcohol, freely in ether, chloroform, benzol, etc. It is not saponified by solutions of alkalies. If solution of sodium hydroxide be added, the aqueous liquid gives no precipitate or oily matter with excess of acid (thus showing that fixed oils, fats, and resin are not present).

Therapeutics.—Hard and soft paraffin are sometimes used instead of lard as a basis for ointments. Not being absorbed by the skin, paraffin is only used in making those ointments which are not intended to enter the system and produce a specific effect.

PEPSINUM (A. and B.).

Pepsin.

Mode of Preparation.—The fresh and healthy stomach of the pig, sheep, or calf recently killed, should be cut open and laid on a board with the inner surface upwards. Food, dirt, or other impurity must be removed. The exposed surface should then be slightly and rapidly washed with a little cold water. The cleansed mucous membrane is then to be scraped with a blunt knife, or by other suitable means, with some pressure. The viscid pulp obtained must then be immediately spread over the surface of glass or glazed earthenware, and quickly dried at a

temperature not exceeding 37·8° C. The dried residue is then to be reduced to powder and placed in a stoppered bottle.

Characters and Tests.—Pepsin is a light yellowish-brown powder, with a faint but not disagreeable odour, and a slightly saline taste. It should dissolve 2,500 times its weight of hard-boiled white of eggs. There should not be the least indication of putrescence. It is to some extent soluble in water, and in about 100 parts of alcohol (90 per cent.).

Therapeutics.—Pepsin is a valuable remedy in cases of indigestion in dogs, and it is best administered to them, either with or immediately before or after meals, on meat, or in solution with 5 to 10 minims of diluted hydrochloric acid, and 10 minims of Spiritus chloroformi, or else as a pill. For calves and foals it may be useful, together with minute doses of diluted hydrochloric acid, in indigestion and diarrhœa.

Dose.—

Dog	2 to 8 grains.
Man	5 to 10 ,,
Pig	4 to 15 ,,
Foal or Calf	20 to 40 ,,
Horse	½ to 2 drachms.

PHENACETINUM (B.).

Phenacetin.

Formula and Preparation.—Para-acet-phenetidin, or phenacetin, has formula: $C_2H_5O \cdot C_6H_4 \cdot NHCOCH_3$, and it is prepared by acting on paraphenetidin, a substance produced from para-nitro-phenol, with glacial acetic acid.

Characteristics.—It has the form of white glistening scaly crystals, without either odour or taste, neutral in reaction, and melting at 275° F. (135° C.), very slightly soluble in cold water, more soluble in boiling water, and in 20 parts of alcohol (90 per cent.), and in sulphuric acid forming a colourless solution.

Tests.—Let a portion weighing 0·1 gramme be boiled with 2 c.c. of hydrochloric acid for half a minute, and to the liquid which results add ten times its volume of water, cool, filter, and then add solution of chromic acid, wherefrom a deep-red colour results. If heated in air, it burns and leaves no ash. It is proved free from acetanilide by adding solution of bromine to a cold saturated aqueous solution, when no turbidity occurs. The absence of paraphenetidin is proved by mixing 0·3 gramme of

phenacetin with 1 c.c. of alcohol (90 per cent.), adding 1 drop of volumetric solution of iodine, and boiling, when no red tint should be formed.

Actions and Uses.—It has antipyretic, anodyne, and hypnotic qualities like phenazone and acetanilide. It is fairly safe, and not merely transient in effect, and useful in pyrexial and neuralgic affections, and in locomotor ataxy.

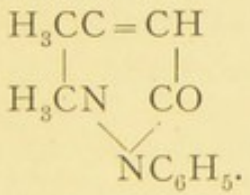
Dose.—*Man and Dog* - - 5 to 10 grains.
Horse - - - - ½ to 2 drachms.
Ox - - - - 1 to 3 „

PHENAZONUM (B.).

Phenazone.

Synonym.—Antipyrin.

Preparation and Formula.—Phenazone, or phenyl-dimethyl-iso-pyrazolone, may be prepared by acting on phenyl-hydrazine with aceto-acetic ether, by which method phenyl-methyl-iso-pyrazolone is formed, and this is in turn to be acted upon by methyl iodide. Its constitution is:



Characteristics.—It has the form of scaly crystals, devoid of smell and colour, with a bitter taste, and melts at 235·4° F. (113° C.) It is soluble in its own weight of water, in 1⅓ parts of alcohol (90 per cent.), or of chloroform, and in 40 parts of ether.

Tests.—If a portion of nitrate of sodium weighing 0·1 gramme be added to 12 c.c. of a 1 per cent. aqueous solution of phenazone, a liquid is yielded, nearly devoid of colour, but turning deep green if 1 c.c. of diluted sulphuric acid be added. If to an aqueous 1 per cent. solution an equal volume of nitric acid be added, it becomes yellow, and if warmed, crimson. Again, if to a highly diluted aqueous solution a portion of solution of perchloride of iron be added, a deep red colour is yielded, almost disappearing with excess of diluted sulphuric acid. A 5 per cent. aqueous solution gives with solution of perchloride of mercury a white precipitate soluble by boiling and reappearing on cooling. The aqueous solution should be neutral, and not affected by sulphide

of hydrogen. The addition of 2 drops of fuming nitric acid to 2 c.c. of a 1 per cent. aqueous solution should cause a green coloration which should become red if boiled with four more drops of the acid.

Actions and Uses.—Strong antipyretic, sedative and anodyne action. In febrile conditions it reduces the temperature within an hour—*e.g.*, in acute specific diseases and tuberculosis. It is less useful in ague and rheumatism. Causes free perspiration, and sometimes sickness and erythematous eruptions. As an anodyne, it is useful in cases of megrim, neuralgia, locomotor ataxy, gout, and rheumatism. A few drops of spirit of peppermint may be given with it. If the stomach does not tolerate the drug, it may be given subcutaneously as a 5 per cent. solution, or by the rectum. Large doses may cause fatal collapse.

Dose.—*Man and Dog* - - 5 to 20 grains.
Pig - - - - 15 to 50 ,,
Sheep - - - - 20 to 60 ,,
Horse - - - - 1 to 4 drachms.
Ox - - - 2 to 4½ ,,

PHOSPHORUS (A. and B.).

Characters and Tests. — Phosphorus, a non-metallic element obtained from bones, is a semi-transparent, colourless, wax-like solid, which emits white vapours and shows light when exposed to the air. The specific gravity is 1·77. At common temperatures the element is soft and flexible. At 43·3° C. it melts, and at a temperature slightly higher it ignites in the air, burning with a luminous flame and producing dense white fumes. It is insoluble in water, but soluble in 350 parts of absolute alcohol, 80 of olive oil, and the same of ether, in 25 of chloroform, in half its weight of carbon bisulphide, and in boiling oil of turpentine.

Therapeutics.—Phosphorus is used in the preparation of phosphoric acid and phosphorated oil. The latter has been found useful, when given with strychnine, in cases of motor paralysis.

Externally, phosphorus is irritant and caustic. Internally, it augments metabolism, and has alterative and aphrodisiac properties. When given continuously, it leads to fatty degeneration of the protoplasm of the body.

Dose.—*Man, Dog, and Pig* - - - $\frac{1}{100}$ to $\frac{1}{20}$ grain in pill or solution.
Horse - - - - - $\frac{1}{8}$ to 1½ grains.
Ox - - - - - - $\frac{1}{2}$ to 2 ,,

PHYSOSTIGMATIS SEMINA (A.[1] and B.).

Calabar Beans.

Natural Order.—Leguminosæ.

Characters.—The ripe seeds of *Physostigma venenosum*, Balfour (B. and T., *Med. Pl.*, vol. ii., plate 80), vary from about 1 inch to 1¼ inches long. The seed is ¾ inch broad, ½ inch or somewhat more in thickness, oblong and more or less reniform in shape, and provided with a long, broad, blackish furrow running entirely along its convex rim. The testa is hard, brittle, roughish, deep chocolate-brown or brownish-red in colour, and encloses a closely-adhering nucleus, which principally consists of two hard white brittle cotyledons, separated from each other by a somewhat large cavity. The seed is inodorous, is exceedingly poisonous, and has no marked taste beyond that of an ordinary bean, and hence great risk of death may arise in the case of those unacquainted with this danger. It yields its properties to alcohol, and imperfectly to water. The cotyledons, when moistened with solution of hydroxide of potassium, acquire a permanent pale yellow colour.

Dose.—Of the powdered seed:

Dog	- - - -	1 to 3	grains.
Pig	- - - -	2 to 6	,,
Horse	- - - -	10 to 30	,,

Of extract of Physostigma:

Dog	- - - -	$\frac{1}{16}$ to ¼	grain.
Pig	- - - -	⅛ to ½	,,
Horse	- - - -	1 to 2	grains.

PHENOL (A. and B.).[2]

Chemical Composition.—The formula is C_6H_5OH.

Mode of Preparation.—Phenol, often known as carbolic acid, is obtained from coal-tar oil by fractional distillation, and is subsequently purified.

Those portions of coal-tar oil which distil at temperatures between 148·5° C. and 204° C., are mixed with a strong boiling solution of hydroxide of potassium. By this means carbolate of

[1] In the United States Pharmacopœia the heading is Physostigma.

[2] Called in both Pharmacopœias Acidum Carbolicum, Carbolic Acid.

potassium is formed, and this is then decomposed by hydrochloric acid. The phenol which is liberated is rectified by distillation off chloride of calcium, whereby it is deprived of moisture.

Characters.—Phenol is colourless, or, if it has been exposed to moist air, slightly reddish or brownish, and exists in the form of separate pulverulent crystals, possessing a characteristic odour and taste, or in that of acicular crystalline masses. It exerts a powerfully caustic action on skin and mucous membranes, and is a highly poisonous body, even in very small amounts.

In odour and taste phenol resembles creosote, as it does also in other respects. It melts at 38·8° C., and boils at 182° C. Specific gravity at melting-point is about 1·063.

Solubility.—At 15·5° C. 100 parts of phenol can be liquefied by the addition of about 10 parts of water, should form a clear liquid with 35, and be completely dissolved by about 1,200 parts of water. The crystals readily absorb moisture on exposure to the air, being liquefied, and often becoming pinkish. The aqueous solution ought to be clear and nearly colourless.

Phenol is also freely soluble in alcohol, ether, benzol, chloroform, carbon disulphide, glycerin, in the fixed and the volatile oils, and in solutions of alkalies.

Tests:

Positive.—A very small quantity (about a grain) of hypochlorite of calcium, added to a little aqueous solution of phenol, produces after agitation, the addition of a little ammonia, and gentle heat, a bright blue colour with a tinge of green.

Phenol coagulates solutions of albumin and of collodion, and liquefies camphor.

With solution of perchloride of iron it yields a deep purple colour, and with solution of ammonia, together with a little chlorinated soda, it becomes blue after a time, or at once if gently heated.

With excess of an aqueous solution of bromine, a cold saturated aqueous solution of phenol gives a white precipitate.

A small piece of deal dipped into phenol, and afterwards into hydrochloric acid, and then dried by exposure to the air, acquires a greenish-blue colour. One volume of phenol added to $\frac{1}{10}$ volume of water and 1 volume of glycerin yields a clear fluid, not made turbid by 3 volumes of water (absence of cresol).

Negative.—Phenol does not immediately redden blue litmus. It does not affect the plane of polarization of a ray of polarized light.

PHENOL LIQUEFACTUM (B.).[1]

Liquefied Phenol.

Synonym.—Liquor Acidi Carbolici; Acidum Carbolicum Liquefactum.

Mode of Preparation.—To 100 parts by weight of phenol 10 parts by weight of water are added.

Characters.—It is a colourless or very slightly reddish or brownish liquid, which boils at about 182° C.

It dissolves about 22·5 per cent. of water at 15·5° C., forming a nearly clear solution, from which any slight impurity, contained previously in the acid, separates in the form of dark oily drops. The specific gravity is about 1·0665 at 15·5° C.

Therapeutics:

Action.—Phenol has great antiseptic and deodorizing powers. If mixed with solutions of albumin it precipitates the latter. Low organisms are killed by it, and it is also a poison to all animals. If mixed with albuminous fluids it preserves them, because the bacteria which produce decomposition cannot live in its presence. Similarly the fermentation of sugar by yeast is arrested. A less amount than is requisite for destroying these low forms of vegetable and animal life is effectual in arresting their development. Its action, however, in this respect differs in regard to time and strength necessary for destroying the action of organic ferments in each case. It prevents the conversion of starch into sugar, of albumin into peptones, and the decomposition of amygdalin with formation of hydrocyanic acid.

Applied to the skin or mucous membranes, it diminishes sensibility and causes a white stain, which in the case of the skin subsequently turns brownish, and after a time the epidermis comes off. If applied to a large surface of skin, it may be absorbed, and cause poisoning, weakness, delirium, collapse, and death. In the mouth it causes a burning sensation, and if swallowed is an irritant poison, causing gastro-enteritis, abdominal pain, and perhaps vomiting and purging, delirium, convulsions, collapse, and death. The pupils are contracted as in opium-

[1] Called in the British Pharmacopœia Acidum Carbolicum Liquefactum.

poisoning. The blood after death is very dark, and its coagulability is greatly lessened.

Phenol paralyzes both muscles and nerves when applied directly to them. After absorption it acts chiefly on the medulla oblongata, but also on the spinal cord, first stimulating and then paralyzing them. Through its action on the cord, it evokes in frogs convulsions (like those caused by strychnine), followed by paralysis. It likewise first stimulates and then paralyzes both the respiratory and vaso-motor centres, the breathing and pulse being at first accelerated and the blood-pressure augmented; but as the centres are paralyzed, there is a corresponding slowing and lessening. If it be injected into the blood, it immediately paralyzes the vaso-motor centre, causing the blood-pressure to fall markedly without much alteration in the action of the heart, and stimulation of sensory nerves or asphyxia does not then raise the blood-pressure, as either would if the centre were not paralyzed by the phenol.

Phenol also affects the cerebrum, as is shown by headache, giddiness, lassitude, and unconsciousness; whilst in animals it lessens sensibility and motor power. It stimulates perspiration and causes salivation. Moderate doses cause death by paralysis of respiration, whilst larger doses paralyze the heart in addition, and hence artificial respiration in the latter case has no effect, but in the former may prevent a fatal issue.

Phenol reduces the temperature in healthy and in febrile conditions, though it has but little effect on very high fever. It is excreted by the kidneys, and if bromine water be added to the urine, a white precipitate falls. Sometimes it causes the urine to be darkly coloured and brown, due probably to hydroquinone.

Part appears in the urine as sulpho-carbolates, and all the sulphates may be thus converted. The hydroquinone is also combined with sulphuric acid, and this compound is devoid of colour; but on being kept it becomes free, is further oxidized, and causes the urine to become brown, as above stated.

Horses can take liquefied phenol in medium doses fairly well. Dogs, however, are very susceptible to its action, when it is absorbed through the skin or taken internally. Strong applications of this liquid have a very deleterious action on the dog, and may even lead to a fatal result.

Uses:

Internally.—Phenol has been more extensively tried as a remedy in veterinary than in human medicine; but has been given to men

in a dose of about 1 minim, seldom repeated. It is a deadly poison, and hence the utmost care is needful.

To the horse it has been given with good results in the treatment of anthrax fever, malignant strangles, and purpura hæmorrhagica. In pyæmic and septicæmic conditions it has also proved of some benefit. In the treatment of glanders and farcy it has no permanent value.

In cattle plague it has been used with encouraging results, life being lengthened even when not saved, thereby indicating that, if the conditions were favourable, it is highly probable the animals could be cured by it. One hundred and five grains were injected by Mr. Crookes into the blood of a cow suffering from cattle plague, with little apparent injury, and the animal made a gradual recovery. M. Bouley, when investigating malignant pustule, found that all the cattle inoculated with the virus of this disease died. When, however, animals were given 2 or 3 drachms of liquefied phenol daily, four out of five of them recovered. For Texas fever, which is due to the same virus, this liquid likewise has been found of great value. Personally, the writers have had more experience with sulphite of sodium in the treatment of anthrax in its various forms in horses, cattle, pigs, and sheep. In the treatment of these diseases it is difficult to say which of these two antiseptics is of greater value ; but the sulphite is safer.

For pleuro-pneumonia of cattle phenol appears to be of little or no value, or even harmful. In foot-and-mouth disease it appears to act beneficially, as also in tabes mesenterica.

For dyspepsia and flatulence the sulpho-carbolate of sodium is to be preferred, but minute doses of phenol have been given in such cases. In diarrhœa and dysentery the liquid acts as a valuable adjuvant, when used together with other remedies. To dogs phenol is not much given, as it is not borne well by these animals.

As an inhalation, 2 drachms of phenol added to a quart of water at about 70° C. proves very useful in cases of influenza, strangles, scarlet fever, purpura hæmorrhagica, œdematous laryngitis, acute and chronic bronchitis, and especially in acute laryngitis.

As an intratracheal injection it has been employed in the case of calves suffering from the presence of *Strongyli micruri* in the wind-pipe and bronchial tubes. For this purpose a mixture of 2 drachms of oil of turpentine, 20 minims of liquefied phenol, and

1 drachm of tincture of opium is recommended by Mr. Parsons. Mr. Penhale advised ½ drachm of chloroform in lieu of the opium.

Treatment in Cases of Poisoning by Phenol in Man.—The stomach should be emptied by the stomach-pump or by emetics, and olive oil or other demulcent given. Afterwards 10-grain doses of sulphate of sodium may be given, so as to produce the sulpho-carbolate.

Externally, phenol is very largely used. It may at times be employed, when no better means is applicable, for producing local anæsthesia for opening a small abscess or the like slight operation.

A mixture containing 10 minims to each fluid ounce of oil relieves the pain resulting from burns. For toothache a little cotton-wool soaked with liquefied phenol may be inserted into the cavity of a carious tooth. Phenol is useful for ulcers and wounds, and for destroying condylomata. It has been applied to the throat in diphtheria (though tincture of iodine or solution of corrosive sublimate is better), for ulceration, and for aphthæ. It has been injected in chronic synovitis, inflamed glands, boils, hydrocele, erysipelas, and poisoned wounds; but, as a rule, this course is dangerous.

For the relief of itching in chronic eczema and urticaria, a mixture of 2 parts of phenol with about 100 of lard or vaseline is useful, and in papular eczema a lotion of 1 part of phenol, 1 of boric acid, and 200 parts of alcohol. It is beneficial as a destroyer of the organisms of favus, tinea versicolor, and ringworm. Its most important property is to destroy the organisms productive of putrefaction in albuminous fluids, and to prevent the bad results which would arise from the absorption of putrid discharges. The decomposition in wounds is caused by minute organisms, such as bacteria. Sir Joseph Lister, to whom so much of the antiseptic treatment is due, advised that in performing operations the skin should first be washed with an aqueous solution of phenol (1 in 40), the instruments being also dipped in the same, and that the incision should be made under a spray of phenol (1 in 60), which is continued during the operation. A 2½ per cent. solution is used as a lotion to purify the sponges and cleanse the hands of the operator and dressers.

A strip of lint soaked in a solution of phenol in olive oil (1 in 10), or a drainage-tube similarly treated, is gently introduced into the wound, and is left there protruding from it for two or

three days. Over this and covering the wound is placed a protective of varnished linen or oiled silk dipped in an aqueous solution of phenol (1 in 40). Above this are laid eight successive layers of antiseptic gauze—*i.e.*, gauze steeped in a mixture of 1 part of phenol, 4 of resin, and 4 of paraffin, or carbolized tow. Between the sixth and seventh layers mackintosh or waterproof tissue is applied, so as to distribute such discharge as oozes out, and then the last layer of gauze. Carbolized bandages are bound round to keep the dressings in position. We do not now use phenol so largely, other drugs being as good.

If the discharge be great, the dressings should be renewed once daily under the spray at first, and then every other day, and so on. Roch has shown that a solution of phenol in oil has no antiseptic power, and hence catheters should be first washed with a weak aqueous solution of perchloride of mercury, and then oiled.

Influenza may be arrested or mitigated by the application of a phenol spray to the nostrils, and the use of a gargle containing the same. Other kinds of sore throat may also be gargled with a 1 per cent. solution, and care must be taken not to swallow the fluid.

When a cold begins in the nose, the solution used for spraying may contain 1 per cent., but if the solution be injected by a small ear-syringe $\frac{1}{4}$ to $\frac{1}{2}$ per cent. will suffice. In cases of phthisis a mixture of 1 part of phenol with 3 of creosote has been used for continuous inhalation, by means of the oro-nasal respirator. Phenol solution is used as an injection to wash out serous cavities, after the fluids have been abstracted—*e.g.*, the cavity of the pleura or of an abscess. It has been applied to the uterus in chronic inflammation, excoriation, catarrh, cancer, and as an injection in leucorrhœa.

Phenol proves very valuable in healing abscesses, burns, wounds, broken knees, foul sores, and discharging surfaces. The strength of a lotion for general purposes should be that of about 1 in 40 of water. For ulcers and foul surfaces a proportion of 1 in 20 or 25 of water will not be too strong.

As an injection into the uterine cavity and vagina in cases of metritis, and retention of decomposing placental membranes, 1 part to 60 of water furnishes a very serviceable proportion. In cases of leucorrhœa a lotion of the same strength proves a useful injection.

In the preparation of lambing oil no agent acts better than a

solution of phenol. The following formula of the late Mr. D. Gresswell will be found to answer this purpose well:

℞. Phenol liquefacti, ʒii.
Glycerini, ʒii.
Olei Lavandulæ, ♏xx.
Mix and add water to 1 pint.

In the treatment of ringworm 20 to 40 minims of phenol to the ounce of lard or other ointment is useful for the purpose of destroying the vegetable fungus of this disease. Some practitioners make a 10 per cent. solution in diluted acetic acid for this purpose. In treating actinomycosis, iodized phenol has proved very useful when injected into the tumour in the tongue of the beast suffering from this disease. The best method of employing the mixture is that of incising the growth, and then painting the cut edges with this powerful parasiticide. Iodized phenol (1 part of iodine to 4 of phenol) may be used; but an equally useful, though less strong, application for the purpose of painting the edges of the incised tumours may be made of 1 part of iodine, 4 of phenol, and 4 of glycerin, or, if preferred, the stronger application may be employed (J. B. Gresswell, *Vet. Journal*).

As a caustic it is applied to bites by rabid animals. For stings of bees, wasps, and scorpions a solution of phenol acts very beneficially in causing subsidence of the swelling and irritation set up.

The liquid is largely used in the preparation of sheep dips, for destroying ticks and the acari of scab. For mange in horses preparations of phenol are also used; but it is better for this purpose merely to add a small quantity of phenol to ointments containing stavesacre and sulphur rather than to use strong solutions of this parasiticide. For dogs phenol should not be used in treating mange, since equally efficacious and at the same time less risky applications of sulphur and stavesacre, or green iodide of mercury, are preferable remedies. If, however, phenol should be used in treating mange, one may employ a solution of 1 part of phenol to 30 of oil.

The powder is a very convenient form for disinfecting, and Calvert's or MacDougall's powder may be sprinkled daily in the stables. The solution of phenol is especially useful for washing the harness, fittings, and other implements of horses, which have died of anthrax and other serious contagious disorders. For whitewashing the walls as a disinfectant, liquefied phenol in

aqueous solution is very valuable, and it may be employed as a powder, solution, or vapour. It must be remembered that crude phenol should be employed with more caution than is generally observed. When used too freely or without proper care and necessary precautions, in town stables where the ventilation is bad, it frequently causes very depressing effects, and consequently a low form of fever is not uncommon among the horses. It is our custom to rely more on weak chloride of lime solution or other efficacious disinfectants, and when we do employ phenol not to use the crude variety. The symptoms we have observed in horses as the result of the abuse of impure phenol as a disinfectant in town stables are extremely weak and thready pulse, chocolate-coloured urine, and blood extravasations in the mucous membranes.

By the addition of a pint of phenol to a bucketful of lime-wash a very good means of diffusing the disinfectant and cleansing the stable thoroughly is afforded. A pint of phenol mixed with a gallon of water may be used for washing over the woodwork during the prevalence of any infectious or contagious disorder, and after its subsidence.

Dose of Liquefied Phenol:

Man and Dog	½ to 1 minim.
Pig and Sheep	2 to 8 minims.
Horse	4 to 20 ,,
Ox	5 to 30 ,,

PHYSOSTIGMINÆ SULPHAS (A. and B.).

Sulphate of Physostigmine.

Synonym.—Sulphate of Eserine.

Formula and Composition.—Sulphate of physostigmine is the sulphate of an alkaloid obtained from Calabar bean, and its formula is: $(C_{15}H_{21}N_3O_2)_2,H_2SO_4,xH_2O$.

Characteristics.—The salt has the form of very small yellowish-white crystals, which redden on exposure to air and light, possess a bitter taste, are very deliquescent, highly soluble in water, and soluble in alcohol (90 per cent.).

Tests.—An aqueous solution is neutral, and gives the tests for sulphates. If shaken with a diluted solution of hydroxide of potassium, it turns red. If mixed with solution of ammonia and

evaporated on a water-bath, a blue residue remains, and if this be dissolved in a highly diluted acid, it is dichroic, being red by reflected and blue by transmitted light. Again, when to a very small piece a few drops of fuming nitric acid are added, a yellow liquid is formed, and if this be evaporated on a water-bath, it becomes darker, and when dry, green. A physiological test may be seen by applying a few drops of a very highly diluted solution to the eye, thereby causing a contraction of the pupil, thus distinguishing it from a similar aqueous solution of sulphate of atropine, which evokes, on the contrary, a dilatation of the pupil, and it will be recollected that in opium-poisoning also contraction of the pupil occurs. If burned with free access of air, no ash is left.

Action.—Calabar bean stimulates muscle-fibre, both voluntary and involuntary. It also paralyzes the nerve-centres. Physostigmine, or eserine, as it is also called, has the same twofold action; but calabarine evokes convulsions as strychnine does. Physostigmine in addition produces an increased flow of saliva in the first instance, which is subsequently arrested by the general vascular contraction which is brought about. The drug increases stomach movements, and the peristaltic action of the intestines, then causes diminution of the lumen of the intestinal canal, temporarily almost to obliteration, and at last dilatation ensues. The secretions are probably also augmented. If given to horses either subcutaneously or intratracheally, after the lapse of less than an hour, or even within a few minutes, the time varying with the dose, a great amount of fæces and gas may be expelled. Indeed, only a small dose is necessary to produce such action of the involuntary muscle in the walls of the digestive tube, as to cause increase in peristaltic action accompanied by abdominal pain. Hence, the alkaloid has been hypodermically administered in cases of impaction of the bowels in horses and oxen, whereby movement of the obstruction is generally effected. Diarrhœa also occurs, and the intestine may be contracted to a very small size.

Under the influence of large doses of the alkaloid, an animal manifests slight tremulousness, which increases until the whole frame becomes limp and flaccid, the pupils contract, salivation is produced, and slowness of the pulse and spasmodic breathing are caused. The excitability of the muscles is increased, but their capacity for doing more work is not enhanced. General paralysis follows, the posterior columns of the cord being first acted upon, and then the anterior columns. If the dose taken be very large,

the bowels and bladder are emptied involuntarily, all reflex excitability of the cord is destroyed, respiration becomes slower and slower, and at length ceases, and death results from cessation of respiration. Immediately after death the pupils dilate; but the muscles appear to be unaffected, since they contract when cut, and respond to irritation of their nerves. Moderate doses lessen the rapidity of the heart's action, and render it stronger; but larger and poisonous quantities make it beat more quickly and less vigorously.

In an animal under the influence of physostigmine, the respiratory movements cease before the reflex action of the cord is destroyed. The motor nerves are not usually affected until very late. The sensory nerves are partially paralyzed by the local application of physostigmine in a concentrated form, but not when it is injected into the blood. When applied locally to the eye, physostigmine causes contraction of the pupils, and diminishes intra-ocular tension.

Uses.—In tetanus of the traumatic and idiopathic varieties in horses, Calabar bean given by the mouth, and physostigmine given hypodermically, have been largely tried. Authorities are, however, not agreed as to the beneficial action of the bean and its alkaloid in this disease. There is no doubt that, if administered at frequent intervals, the spasmodic seizures are held in check by the paralyzing influence of the drug, but unfortunately it does not seem to have any permanent beneficial effect. The employment of physostigmine, preferably given by hypodermic injection, is of greater efficacy than that of the bean, which contains also calabarine, which itself produces convulsions.

Of late, sulphate of physostigmine injected hypodermically has been recommended by Dieckerhoff in cases of impaction of the bowels in horses and cattle. We have tried it in several instances, but have never had any decided good results by this method. When, however, small quantities of a solution of sulphate of eserine were injected into the jugular vein, the results were always satisfactory. This latter method of treatment in horses and cows in the cases tried by us caused copious voiding of fæces in ten to fifteen minutes after injection. Physostigmine causes contraction of the pupil, and may be locally applied for this purpose in cases of glaucoma, a few drops of a solution of 1 to 2 grains of sulphate of physostigmine to each fluid ounce of water being placed in the corner of the eye.

Dose.—(*a*) Powdered Calabar bean :

Man	- - -	$\frac{1}{60}$ to $\frac{1}{20}$ grain.
Dog	- - -	$\frac{1}{4}$ to 1 ,,
Horse	- - -	2 to 5 grains.
Pig	- - -	1 to 3 ,,
Ox	- - - -	3 to 7 ,,

(*b*) Physostigmine by the mouth :

Dog	- - -	$\frac{1}{60}$ to $\frac{1}{40}$ grain.
Horse	- - -	$\frac{1}{10}$ grain.
Ox	- - - -	$\frac{1}{8}$,,
Horse and Ox	- -	$\frac{1}{16}$,, (hypodermically).

(*c*) Sulphate of physostigmine :

Man	- - -	$\frac{1}{60}$ to $\frac{1}{20}$ grain.
Dog	- - -	$\frac{1}{100}$ to $\frac{1}{30}$,,
Horse and Ox	- -	$\frac{1}{2}$ to $1\frac{1}{2}$ grains (hypodermically).

(*d*) Sulphate of physostigmine intravenously in cases of obstinate impaction of the bowels :

Horse and Ox	- -	$\frac{1}{2}$ to 1 grain.

(*e*) Salicylate of physostigmine (U.S.P.) :

Dog	- -	$\frac{1}{100}$ to $\frac{1}{30}$ grain.
Horse	- -	1 to $1\frac{1}{2}$ grains (intratracheally or subcutaneously).
Ox	- -	1 to 3 grains (hypodermically).

PICROTOXINUM (A. and B.).

Picrotoxin.

Description.—It is a neutral substance with formula $C_6H_{10}O_4$, prepared from the fruits of *Anamirta paniculata*, Colebrooke (Bentl. and Trim., *Med. Pl.*, vol. i., plate 14), Nat. Ord., Menispermaceæ. Colourless prismatic crystals devoid of smell and with a bitter taste, melting at 192·2° C. Soluble in 330 parts of cold or 35 of boiling water, and in 13 of cold or 3 of boiling alcohol (90 per cent.). Soluble in 10 parts of solution of hydroxide of potassium, and this solution, on boiling, immediately reduces Fehling's solution. If heated on platinum foil, the crystals melt to a yellow liquid, which with more heat chars, and at length disappears. It is soluble in sulphuric acid, forming a yellow solution. An aqueous solution does not give a precipitate with solutions of mercuric, or platinic, chloride, or of tannic acid, thus proving absence of alkaloids.

Actions and Uses.—Picrotoxin, or cocculus, very cautiously applied to the unbroken skin, kills pediculi. Internally, it strongly stimulates the various medullary centres, causing disturbance of respiration and circulation, and spasms of the flexor muscles. It has been given in order to lessen and control the night-sweating in phthisis and chronic nervous diseases.

Dose.—*Man* - - - - - - $\frac{1}{100}$ to $\frac{1}{25}$ grain.

PILOCARPINÆ NITRAS (B.).

Nitrate of Pilocarpine.

Formula.—$C_{11}H_{16}N_2O_2,HNO_3$.

Mode of Preparation.—Pilocarpine is an alkaloid obtained from extract of jaborandi by shaking it with chloroform and alkali, and evaporating the solution thus obtained. The nitrate of pilocarpine is made by neutralizing pilocarpine with nitric acid and purifying by recrystallization.

Characters.—Nitrate of pilocarpine is a white crystalline powder, or consists of acicular crystals. It is soluble in 8 or 9 parts of water at the ordinary temperature, slightly soluble in cold and freely soluble in hot alcohol (90 per cent.). It causes contraction of the pupil of the eye.

Tests.—If strong sulphuric acid be added, a yellowish solution is formed, which, with bichromate of potassium, gradually acquires an emerald-green colour. Nitrate of pilocarpine leaves no ash when burned with free access of air.

Therapeutics.—The hypodermic injection of nitrate of pilocarpine has been recommended for azoturia in horses.

Alopecia has been treated by Scheffer by hypodermic injections of pilocarpine. The sweat-glands are embryologically and structurally similar to hair-follicles. In several diseases in which the skin excretes extensively, there is an increased production of soft new hair in parts.

The alopecial patch is well cleansed with 90 per cent. alcohol, and a syringe holding 12 minims is filled in its upper third with $HgCl_2$ (1 in 1,000), the second third being nitrate of pilocarpine (1 in 200) and the lower third same as the first.

The needle is inserted just under the epidermis, so as to be parallel to the scalp. It is then emptied, and leaves a lentil-sized swelling. This process is repeated round the margin of the patch, and also in a circle within it, the punctures being at distances of 1 centimetre. The process is repeated every alternate day for a week. An anæmic zone first appears, and this is followed by a marked vascularity for several hours. About seven minutes after the injection, drops of sweat come on the vascular zone, and remain for an hour. The alopecia is arrested, and hair gradually spreads from the circumference to the centre. After

four applications hair may be seen, but the treatment should be continued.

Dose.—*Dog* - - $\frac{1}{20}$ to $\frac{1}{3}$ grain.
Man - - $\frac{1}{20}$ to $\frac{1}{2}$ „
Sheep - - 1 grain (gramme 0·06).
Horse - - as purgative, 2 to 5 grains (gramme 0·12 to 0·3); hypodermically, 2 to 3 grains; as diaphoretic (but dangerous), 5 to 12 grains (gramme 0·36 to 0·72).
Ox - - as purgative, 5 to 10 grains (gramme 0·3 to 0·6).

PILULA ALOES BARBADENSIS (B.).[1]

Pill of Barbadoes Aloes.

Mode of Preparation.—Mix together thoroughly so as to form a pill mass the following ingredients: 40 grammes Barbadoes aloes in fine powder, 20 grammes hard soap in powder, 2·5 c.c. oil of caraway, 20 grammes or more confection of roses.

Dose.—*Man and Dog* - - - - 4 to 8 grains.

PILULA ALOES SOCOTRINÆ (B.).

Pill of Socotrine Aloes.

Mode of Preparation.—The same quantities of the same ingredients as above, except that Socotrine aloes and oil of nutmeg are used instead of Barbadoes aloes and oil of caraway. The dose also is the same as of the above pill-mass.

PILULA COLOCYNTHIDIS COMPOSITA (B.).

Compound Pill of Colocynth.

Mode of Preparation.—Rub well together 5 c.c. oil of cloves, 5 grammes potassium sulphate finely powdered, add 20 grammes of powdered colocynth pulp, mix, add 40 grammes Barbadoes aloes and 40 grammes scammony resin. Mix well, adding enough distilled water to form a mass.

Dose.—*Man and Dog* - - - - 4 to 8 grains.

[1] In the United States Pharmacopœia the Pilula Aloes is made by beating together with water 13 grammes of Purified Aloes and 13 grammes of finely-powdered Soap, and dividing into 100 pills.

PILULA COLOCYNTHIDIS ET HYOSCYAMI (B.).

Pill of Colocynth and Hyoscyamus.

Mode of Preparation. — Mix so as to form a mass 50 grammes of compound pill of colocynth and 25 grammes of extract of hyoscyamus.

Dose.—*Man and Dog* - - - - 4 to 8 grains.

PILULA HYDRARGYRI (B.).

Mercury Pill.

Mode of Preparation. — Mercury or blue pill is made by rubbing 40 grammes of mercury with 60 grammes of confection of roses until the globules of mercury are not visible, and adding 20 grammes liquorice root finely powdered, mixing well.

Dose.—*Man and Dog* - - - - 4 to 8 grains.

PILULA HYDRARGYRI SUBCHLORIDI COMPOSITA (B.).

Compound Pill of Mercurous Chloride.

Mode of Preparation.—Compound calomel pill is made by mixing to form a mass 25 grammes mercurous chloride, 25 grammes sulphurated antimony, 50 grammes guaiacum resin powdered, 10·3 grammes castor oil, and 3 c.c. alcohol or more (90 per cent.).

Dose.—*Man and Dog* - - - - 4 to 8 grains.

PILULA OPII COMPOSITA (B.).[1]

Compound Opium Pill.

Mode of Preparation.—Mix to form a mass 10 grammes opium powdered, 30 grammes hard soap powdered, 10 grammes syrup of glucose. As this pill contains 20 per cent. of opium, it seems best to call it as above, and not as it is more generally known, compound soap pill.

Dose.—*Man and Dog* - - - - 2 to 4 grains.

[1] In the British Pharmacopœia it is known as Pilula Saponis Composita. The Pilulæ Opii of the United States Pharmacopœia are made by beating together with water 6·5 grammes of Powdered Opium and 2 grammes of powdered Soap, and dividing into 100 pills. Each pill contains 0·065 gramme of Opium.

PILULA QUININÆ SULPHATIS (B.).

Pill of Sulphate of Quinine.

Mode of Preparation.—Mix 4 grains of glycerin with 1 grain of powdered tragacanth. Rub 30 grains of sulphate of quinine with 1 grain of powdered tartaric acid. Make a pill mass out of the two mixtures.

Dose.—*Man and Dog* - - - - 2 to 8 grains.

PIMENTA (A. and B.).

Pimento.

Natural Order.—Myrtaceæ.

Characters.—The dried, unripe, full-grown fruit of *Pimenta officinalis*, Lindley (B. and T., *Med. Pl.*, vol. ii., plate 111), is a dry, light, roundish body, $\frac{1}{5}$ inch or more in diameter. It is crowned with the remains of the calyx, which is generally seen as a raised scar-like ring. The pericarp is roughish on its outer surface owing to the presence of oil-glands. It is brittle, dark-brown, crowned by a raised ring (the remains of the four-toothed calyx) around the remnant of the style. Each fruit is divided in its interior by a very thin lighter-coloured partition into two cells, each of which contains a black or brown, circular, somewhat compressed reniform seed. The odour is aromatic. The taste both of the pericarp and of the seed is warm, aromatic, and peculiar, and like that of cloves. Of the two the pericarp imparts the stronger taste.

Therapeutics.—The uses of pimento are the same as those of the other aromatics. Powdered pimento is given in spasmodic and flatulent colic with other remedies as a carminative.

Dose.—*Dog* - - - - 7 to 20 grains.
Sheep and Pig - - $\frac{1}{4}$ to 1 drachm.
Horse - - - - 2 to 5 drachms.
Cattle - - - - 3 to 6 ,,

PIPER NIGRUM (A. and B.).

Black Pepper.

Natural Order.—Piperaceæ.

Characters.—The dried unripe fruit of *Piper Nigrum*, Linné (B. and T., *Med. Pl.*, vol. iv., plate 245), is roundish, and usually about $\frac{1}{8}$ inch in diameter, inferior, and one-celled. The pericarp is thin, blackish-brown, wrinkled, and contains a hard, smooth, roundish seed of a yellowish-brown or

gray colour, which fills the interior. The odour is aromatic. The taste is excessively pungent and bitterish. When black pepper is eaten, the mucous membrane of the mouth is greatly irritated, and an almost instantaneous flow of saliva ensues. From pepper a tasteless alkaloid, piperin, is obtained ($C_{17}H_{19}NO_3$),[1] which yields piperic acid and piperidine.

Therapeutics.—Black pepper is given in cases of indigestion, in virtue of its action as a local stimulant and aromatic on the mouth, stomach, and intestine. When applied locally, it has rubefacient, anodyne, and counter-irritant properties; but is now rarely or never used for external purposes.

Dose.—

Dog	3 to 10 grains.
Sheep and Pig	5 to 20 ,,
Horse	½ to 1½ drachms.
Ox	1 to 2 ,,

PIX BURGUNDICA (A. and B.).

Burgundy Pitch.

Natural Order.—Coniferæ.

Characters.—Burgundy pitch is the resinous exudation obtained from the stem of *Picea excelsa*, Link. (Bentl. and Trim., *Med. Pl.*, vol. iv., plate 261), or, according to the United States Pharmacopœia, *Abies excelsa*, Poiret, melted and strained. It is hard, brittle, but gradually takes the form of the vessel in which it is kept. It is somewhat opaque and dull reddish-brown or yellowish-brown. The fracture is clean and conchoidal. Burgundy pitch has an agreeable and aromatic odour, especially when heated, and a sweet aromatic and not bitter taste. It is readily soluble in glacial acetic acid.

Preparation.—Emplastrum Picis (1 part in 2).[2]

Therapeutics.—Burgundy pitch has a slightly stimulant action on the skin, and is used for making stimulant and adhesive plasters.

PIX CARBONIS PRÆPARATA (B.).

Mode of Preparation.—Commercial coal-tar is placed in a shallow vessel, and submitted to a temperature of 48·9° C. for one hour, stirring often.

Actions and Uses.—Externally, it is a vascular stimulant and absorbent in dry skin diseases—*e.g.*, psoriasis and chronic eczema, and a sedative in pruritus. Internally, it is a stimulant, and disinfectant in chronic bronchitis. Given in form of pills, capsules, syrup, or as tar-water (made by shaking 1 pint of tar with ½ gallon of water, and after settlement pouring off the clear fluid).

[1] Isomeric with Morphine.

[2] Melt 13 ounces Frankincense, 26 Burgundy Pitch, 4½ Resin, 4½ Beeswax, add 2 Olive Oil and 2 fluid ounces Distilled Water, and stir whilst evaporating to suitable thickness.

PIX LIQUIDA (A. and B.).

Tar.

Natural Order.—Coniferæ.

Characters.—Tar is a bituminous liquid obtained from the wood of *Pinus sylvestris*, Linn. (B. and T., *Med. Pl.*, vol. iv., plate 257), or *Pinus palustris*, Miller, and other species of Pinus, by destructive distillation. Generally known as Stockholm tar, it is a dark-brown or blackish semi-liquid substance, possessing a peculiar aromatic odour. Water agitated with it acquires a pale-brown colour, sharp empyreumatic taste, and acid reaction. With solution of ferric chloride it becomes red. It is soluble in ten times its volume of alcohol (90 per cent.). Specific gravity 1·085.

Preparation.—Unguentum Picis Liquidæ.[1]

Therapeutics.—When taken internally, tar acts as a disinfectant and deodorant, and is still sometimes prescribed as such in cases of chronic bronchitis.

Externally, it acts as a vascular stimulant, antiseptic, and tissue alterative in cases of certain dry skin diseases, more especially in chronic eczema and pityriasis. In virtue of its disinfectant and deodorant properties, it is useful in cases of thrush in the frog and in foot-rot in sheep, and is a common ingredient in the so-called hoof-ointments prepared for promoting the growth of healthy horn in horses' feet. As an antiparasitic, it enters into the composition of some ointments for mange and phtheiriasis.

Dose.—

Dog	10 to 30 minims.
Pig	½ to 1 fluid drachm.
Horse	1 to 5 ,, drachms.

PLUMBI ACETAS (A. and B.).

Acetate of Lead.

Formula.—$Pb(C_2H_3O_2)_2,3H_2O$.

Mode of Preparation.—Mix 2 pints of acetic acid and 1 pint of distilled water, add 24 ounces of oxide of lead in fine powder, and dissolve with the aid of a little heat. Filter, evaporate until a pellicle forms, and add a little acetic acid, if the fluid has not a distinctly acid reaction. Then set aside, in order

[1] Melt 2 parts by weight of Beeswax at a gentle heat, add 5 of Tar, and stir until cold.

that crystals may be formed. Finally, drain and dry the crystals on filtering-paper without heat.

Characters and Tests.—Acetate of lead exists in white crystalline masses. It is slightly efflorescent, has an acetous odour, and a sweet astringent taste. It is soluble in less than 3 parts of cold water and in 30 of alcohol (90 per cent.). A solution in distilled water is clear, or has only a slight milkiness, which disappears on the addition of acetic acid. An aqueous solution slightly reddens litmus, gives a yellow precipitate with iodide of potassium, and a white precipitate with sulphuric acid, acetic acid being set free. One gramme of an aqueous solution needs for total precipitation 53·1 c.c. decinormal volumetric solution of sulphuric acid.

Therapeutics.—Externally, acetate of lead is astringent, antiphlogistic, and sedative. Solution of subacetate of lead is the preparation usually employed for external purposes (see Liquor Plumbi Subacetatis). For ulcers, powdered acetate or carbonate of lead may be sprinkled over the diseased tissue. As an injection, 3 to 5 grains of acetate of lead to each ounce of water is very useful in cases of gonorrhœa, or in discharges from the vagina. For relieving the pain in burns and scalds, a mixture of 1 part of the solution of subacetate of lead to 5 of linseed oil is convenient.

Internally, acetate of lead is the most suitable salt of the metal for administration. It has powerful hæmostatic and astringent properties. On the intestine it acts by diminishing the secretions, contracting the vessels, and diminishing the peristaltic action. On this account it is a valuable remedy for cases of protracted diarrhœa and dysentery, and is best combined with opium. As a hæmostatic it is not much employed, though its action in this respect is good. It has, however, been prescribed in melæna or hæmorrhage from the bowels, and also in hæmaturia.

Having a cumulative action, it should not be given for long, and its administration must be discontinued if any bad effects, as dyspeptic symptoms, loss of appetite, colic, or constipation, supervene. The liver, kidneys, central nervous system, and the bones are the chief seats of the deposition of lead in the body.

Dose.—

Dog	1 to 2 grains.
Man	1 to 5 ,,
Lamb	3 to 5 ,,
Pig and Calf	4 to 15 ,,
Sheep	7 to 20 ,,
Horse	½ to 1 drachm.
Ox	½ to 1¼ drachms.

PLUMBI OXIDUM (A. and B.).

Oxide of Lead.

Synonym.—Litharge.

Formula.—PbO.

Mode of Preparation.—It is made by acting with air on melted lead.

Characters and Tests.—Oxide of lead occurs in heavy scales of a pale brick-red colour. It is completely soluble without effervescence in diluted nitric and acetic acids, and each solution, when neutral, gives a copious

yellow precipitate with iodide of potassium. A solution of oxide of lead in diluted nitric acid, when supersaturated with ammonia and then cleared by filtration, does not exhibit a blue colour (absence of copper). Carbonates and iron should also be absent.

Therapeutics.—Oxide of lead or litharge is only employed for external purposes. It is sometimes used for dusting ulcerated surfaces in virtue of its astringent properties; but, being liable to absorption, it is not so suitable as the oxide of zinc.

PODOPHYLLI RESINA (B.).[1]

Resin of Podophyllum.

Natural Order.—Ranunculaceæ.

Mode of Preparation.—Exhaust 1 pound of podophyllum rhizome in No. 40 powder with 3 pints or a sufficiency of alcohol (90 per cent.) by percolation. Place the tincture in a still, and draw off the greater part of the spirit. Slowly pour the liquid which remains after the distillation of the tincture into 3 times its volume of water, to which has been added $\frac{1}{24}$ of its volume of hydrochloric acid, constantly stirring. Let the mixture stand for twenty-four hours to deposit the resin. Finally, wash the latter on a filter with distilled water, and dry it in a stove at a temperature not above 37·7° C.

Characters.—Resin of podophyllum is an amorphous powder which varies in colour from pale yellow to deep orange-brown. It is soluble in rectified spirit and in ammonia, and is precipitated from its solution in the former by the addition of water, and from solution in the latter by acids. It is partly soluble in pure ether. Taste bitter. It should not give more than 1 per cent. of ash when burnt.

Therapeutics.—Podophyllin is a powerful hepatic stimulant, and in large doses a violent purgative. It is seldom prescribed in veterinary practice except for dogs, on which it acts powerfully as a hepatic stimulant. For horses and cattle it may be given in association with calomel or aloes. For dogs it may be combined with calomel, gray powder, or jalap.

Dose.—

Man	$\frac{1}{4}$ to 1 grain.
Dog	$\frac{1}{2}$ to 2 grains.
Pig	1 to 3 ,,
Horse	10 to 30 ,,
Ox	$\frac{1}{2}$ to $1\frac{1}{2}$ drachms.

[1] Resina Podophylli in the United States Pharmacopœia.

PODOPHYLLI RHIZOMA (A. and B.).[1]

Podophyllum Rhizome.

Natural Order.—Ranunculaceæ.

Characters.—The dried rhizome and rootlets of *Podophyllum peltatum*, Linn. (B. and T., *Med. Pl.*, vol. i., plate 17), or the American May-apple, sometimes called Mandrake in the United States, over which it is extensively diffused and whence it is imported, occur in flattened cylindrical pieces of different lengths, and from about $\frac{1}{5}$ to $\frac{1}{3}$ inch thick. At varying intervals are seen large irregular tuberosities where the rhizome is thickened. These are marked above by a depressed circular scar, and give off below a number of very brittle brownish rootlets. The latter are very readily broken off, leaving little round white scars or spots, which make podophyllum easily distinguishable from roots similar in other points. Externally, the rhizome and rootlets are dark reddish-brown or reddish-yellow, and are smooth or somewhat wrinkled. The pieces break with a short fracture, exposing an internal whitish surface. The powder is mealy, yellowish-gray, faintly narcotic, and sweetish in odour, and in taste bitterish, subacrid, and nauseous. The most important constituents are podophyllin,[2] which is a resinous substance, and berberine, which is a yellow alkaloid having little physiological action.

Therapeutics.—See preceding heading.

Dose.—

Dog	3 to 10 grains.
Pig	5 to 20 ,,
Horse	1 to 3 drachms.

POTASSII BICARBONAS (A. and B.).

Bicarbonate of Potassium.

Synonym.—Potassium Hydrogen Carbonate.

Formula.—$KHCO_3$.

Mode of Preparation.—Bicarbonate of potassium may be obtained by saturating a strong aqueous solution of carbonate

[1] In the United States Pharmacopœia it is Podophyllum.

[2] The resin yields podophyllotoxin, which consists of picropodophyllic acid, which is inert, and picropodophyllin, which is crystalline, and the active constituent.

of potassium with carbonic acid gas, and recrystallizing the salt which separates.

Characters and Tests.—Bicarbonate of potassium occurs in the form of colourless monoclinic rhombic prisms. The salt is not deliquescent and is not corrosive. The taste is saline and feebly alkaline. It is dissolved by 4 parts of cold water, nearly insoluble in alcohol (90 per cent.). Diluted hydrochloric acid, when added to it, causes strong effervescence, and forms a solution with which perchloride of platinum gives a yellow precipitate of the double chloride of platinum and potassium.

A quantity of bicarbonate of potassium which weighs 20 grains neutralizes 14 grains of citric acid or 15 grains of tartaric acid.

General Action of the Salts of Potassium.—Potassium salts are more readily absorbed and more easily excreted than sodium salts. When applied to muscle in large doses, they lessen its power, and may finally paralyze it. In addition to their action on muscle, they depress the nervous and cardiac tissues, paralyzing the nerve-centres after a primary transitory excitement. In large doses a rapid fall of the blood-pressure and pulse-rate is induced, but in smaller doses a slight fall of both pulse-rate and pressure is followed by a rise of both (Brunton).

Externally, hydroxide of potassium is powerfully caustic and irritant, and the carbonates and the liquor potassii hydroxidi are antacid.

Internally, hydroxide of potassium and the bicarbonate of potassium are antidotic to poisoning by caustic acids. Liquor potassii hydroxidi and bicarbonate of potassium are stomachic, stimulating the flow of gastric juice. For this reason they are often given in dyspepsia. The sulphate and tartrate of potassium are saline purgatives. The bicarbonate, carbonate of potassium, and solution of hydroxide of potassium, increase the alkalinity of the blood, and are often prescribed in acute rheumatism (articular and muscular). Potassium salts, being rapidly excreted, chiefly by the kidneys, act on the renal epithelium, and several of them on this account possess diuretic properties. With this view, the acetate, carbonate, bicarbonate, and sulphate are often prescribed. In cases of gravel the bicarbonate is given as an alkalinizer of the urine. Lastly, several of the salts, notably the iodide, act in medicinal doses as saline expectorants. The bicarbonate is the salt selected as a stimulant of the liver. The potassium salts, in virtue of their excretion by the liver, stomach, and respiratory

passages and skin, act also as stimulants of the various secretions of these organs.

Therapeutics of Bicarbonate of Potassium.—Bicarbonate of potassium has antacid and stomachic properties. It is mildly diuretic, and is an alkalinizer of the blood and urine. It is also a saline expectorant and biliary stimulant.

Externally, solutions of bicarbonate of potassium are sometimes used to relieve itching in several skin diseases, as eczema. Internally, the salt is given in dyspepsia, rheumatism, urticaria, and eczema, and in cases of acid deposits, and of calculi in the kidney or bladder. In dyspeptic cases bicarbonate of potassium is best given about a quarter of an hour before meals.

Dose.—

Man	5 to 30 grains.
Dog	10 to 40 ,,
Pig	½ to 1½ drachms.
Sheep	½ to 2 ,,
Horse	½ to 1 ounce.
Ox	½ to 1½ ounces.

POTASSII BICHROMAS (A. and B.).

Bichromate of Potassium.

Formula.—K_2CrO_4,CrO_3.

Mode of Preparation.—Roast chrome ironstone with lime in the presence of air, and add a salt of potassium to the chromate formed, and then an acid.

Characters and Tests. — Bichromate of potassium occurs in the form of large, red, transparent, triclinic, four-sided tabular crystals. It is anhydrous, soluble in 10 parts of cold water, and fuses below redness. At a higher temperature it is decomposed, yielding green oxide of chromium and yellow chromate of potassium. These may be separated by dissolving the chromate of potassium in water. An aqueous solution of the salt gives a yellowish-white precipitate with chloride of barium, and a purplish-red precipitate with nitrate of silver, and both these precipitates are totally soluble in diluted nitric acid (absence of sulphate and chloride).

An aqueous solution also, when digested with sulphuric acid and rectified spirit, or many other organic compounds, acquires an emerald-green colour.

Preparation.—Oxidum Chromicum.

Therapeutics.—Bichromate of potassium has been recommended in cases of grease in horses in doses of 5 grains, and a 1 per cent. solution has been applied locally to the affected part.

Dose.—

Man	1/10 to ⅓ grain
Horse	2 to 7 grains.

POTASSII BROMIDUM (A. and B.).

Bromide of Potassium.

Formula.—KBr.

Mode of Preparation.—Place 2 pints of solution of hydroxide of potassium into a glass or porcelain vessel, and add 4 ounces or a sufficiency of bromine in successive portions, with constant agitation, until the mixture has acquired a permanent brown tint. Evaporate the fluid to dryness; reduce the residue to a fine powder, and mix this intimately with 2 ounces of wood charcoal in fine powder. Throw the mixture in small quantities at a time into a red-hot iron crucible, and when the whole has been brought to a state of fusion, remove the crucible from the fire and pour out its contents. When the fused mass has cooled, dissolve it in the water, filter the solution through paper, and set it aside to crystallize. Drain the crystals and dry them in a warm place. By evaporating and cooling the mother-liquor more crystals may be obtained. Bromide of potassium should be kept in a stoppered bottle.

Characters and Tests.—The salt occurs in colourless cubical crystals, has no odour, but a pungent, saline, and slightly bitter taste. It is soluble in 2 parts of cold water and in 200 parts of alcohol (90 per cent.). An aqueous solution yields a white precipitate with tartaric acid. When to a solution of bromide of potassium in water a little chlorine is added, either as a gas or in aqueous solution, bromine is set free, and chloride of potassium is found. If now chloroform is thoroughly shaken with the liquid mixture, the bromine is dissolved in the chloroform, which is coloured red and falls to the bottom.

A solution of the salt mixed with mucilage of starch, and a drop of an aqueous solution of bromine or chlorine, does not exhibit any blue colour, as it would if iodide of potassium were also present. With saccharated solution of lime, or with solution of nitrate of barium, the aqueous solution of bromide of potassium only gives a slight opacity. Diluted sulphuric acid causes no immediate yellow coloration. Addition of ferric chloride to a cold aqueous solution should cause no reddening (so proving the absence of thiocyanates).

Therapeutics:

General Action of the Bromides.—Bromide of potassium is the

salt generally prescribed to obtain the therapeutic action of bromine, but bromides of sodium and ammonium are very similar in their action. The bromides pass through the organs as bromide of sodium, and act especially upon the nervous system. Under their influence there is great diminution of reflex action. This is attributable chiefly to diminished activity of the brain and cord, but also to depression of the peripheral nervous filaments. The motor nerves are soothed, and the muscular power is impaired.

The bromides, by diminishing the activity of the brain, act as hypnotics, and are extensively given in many nervous diseases to soothe the excited nerve-centres.

The vital centres in the medulla are depressed by the bromides, the respiration is quieted, and the heart's action is slowed and weakened. The spinal centres and spinal nerves and the muscles are depressed, and the testicular, ovarian, and uterine functions are diminished.

Uses.—Bromide of potassium and the other bromides are given for epilepsy and convulsions in men, horses, and dogs. In inflammation of the brain in horses, in excited conditions from fright, and in tetanus, they are often of value. For hysteria bromides are highly efficacious. In palpitation of the heart in race-horses the bromides have a very beneficial effect. In one day a mare with palpitation of heart and excited and fluttering pulse took 1½ ounces of this salt with beneficial result.

Large doses of bromides may be given in the treatment of the opium habit in mankind. The patient is totally stupefied for several days, and then the opium is rapidly withdrawn safely. A lady took by accident 2½ ounces of sodium bromide in about two days and a little over, and was cured of her morphine craving. It has also cured the chloral craving, and also the uncontrollable vomiting of a neurasthenic female patient, and also a morphine and cocaine sufferer, also a woman with a nine years' morphine habit.

Church says the drug should be given only in the daytime; 120 grains of sodium bromide in half a tumbler of water every two hours until an ounce is given in the first day. The second day a smaller amount is given in the same way, and also perhaps on the third day. Macleod says the rule is to cease giving the bromide after twenty-four hours, when the patient cannot be roused, or when aroused is incoherent. If the sleep continues or becomes deeper no more bromide will be necessary.

There is a tendency to aspiration-pneumonia, so that feeding by the mouth becomes doubly dangerous. Any septic condition in the pharynx or the antra communicating with the mouth should debar this treatment, as also should any weakness of the respiratory and cardiac centres, which are mainly acted upon.

Bromipin is a compound of bromine with sesame oil. One fluid drachm of a 10 per cent. solution contains 6 grains of bromine, corresponding to 8 grains of bromide of potassium. For epilepsy and neurasthenia 2 to 4 drachm doses may be given, and Wulff advises 1 to 3 drachm doses for sea-sickness.

Dose of Bromide of Potassium :

Man	5 to 30 grains.
Dog	5 to 50 ,,
Pig	½ to 2 drachms.
Sheep	1 to 3 ,,
Horse	2 to 8 ,,
Ox	½ to 1½ ounces.

POTASSII CARBONAS (A. and B.).

Carbonate of Potassium.

Formula.—K_2CO_3 (with either 1 or 2 molecules of water of crystallization).

Mode of Preparation.—Carbonate of potassium is obtained from commercial pearl-ash, the product of the lixiviation of wood-ashes, by treating the pearl-ash with its own weight of distilled water, and evaporating the solution so formed just to dryness, with brisk agitation. Also by acting on crude sulphate of potassium with crude carbonate of calcium and carbon.

Characters and Tests.—Carbonate of potassium is a white crystalline powder, alkaline and caustic to the taste, very deliquescent, readily soluble in an equal weight of water, but insoluble in alcohol (90 per cent.). With diluted hydrochloric acid the salt effervesces, giving off carbonic acid gas, and forming a solution which, with perchloride of platinum, gives a yellow precipitate of the double chloride of potassium and platinum. When exposed to a red heat, carbonate of potassium loses about 16 per cent. of its weight. When supersaturated with nitric acid and evaporated to dryness, the residue is almost entirely soluble in water, only a little silica (an impurity) remaining undissolved.

The solution thus obtained is precipitated only faintly by chloride of barium or nitrate of silver.

A quantity of carbonate of potassium weighing 20 grains neutralizes 17 grains of citric acid and 18 grains of tartaric acid.

Uses.—Are the same as those of the bicarbonate, but the doses are less.

Dose.—

Man and Dog	5 to 20 grains.
Pig	¼ to 1 drachm.
Sheep	½ to 1 ,,
Horse	2 to 6 drachms.
Ox	4 to 8 ,,

POTASSII CHLORAS (A. and B.).

Chlorate of Potassium.

Formula.—$KClO_3$.

Mode of Preparation.—Mix 53 ounces of slaked lime with 20 ounces of carbonate of potassium (or of chloride of potassium), and triturate them with a few fluid ounces of distilled water for the purpose of making the mixture slightly moist. Place 80 ounces of dioxide of manganese in a large retort or flask, and pour upon it 24 pints of hydrochloric acid diluted with 6 pints of water. Heat the retort or flask gently on a sand-bath, and conduct the chlorine gas as it is disengaged, first through a bottle containing 6 ounces of water, and then into a large carboy, in which has been placed the mixture of carbonate of potassium and slaked lime. When all the chlorine has come over, remove the contents of the carboy, and boil them for twenty minutes with 7 pints of distilled water. Filter and evaporate the fluid mixture until a film forms on the surface, and then set it aside to cool. The crystals thus obtained must be purified by dissolving them in 3 times their weight of boiling distilled water, and then allowing crystallization to take place again.

Characters. — Chlorate of potassium consists of colourless rhomboidal crystalline plates. The taste is cool, saline, and characteristic. The salt is soluble in 16 parts of cold and 3 parts of boiling water.

Tests.—If triturated with sulphur or with sulphides, chlorate of potassium explodes with great violence. An aqueous solution of chlorate of potassium is not affected by nitrate of silver nor by oxalate of ammonium. If heated chlorate of potassium fuses, giving off oxygen gas and leaving a white residu which, if the decomposition has been completed, consists mainly or entirely of chloride of potassium. This readily forms with water a neutral solution which gives a white precipitate with nitrate of silver, and a yellow precipitate with perchloride of platinum. If carefully moistened with hydrochloric acid (precautions being taken against the violent action which may ensue), a yellowish gaseous mixture of chlorine and chloric oxide is evolved.

Therapeutics.—Small doses generally at first depress, and afterwards raise, the blood-pressure, and accelerate the pulse. Its action on the blood depends on that of the chlorine, but modified as thus combined. It is excreted un-

changed, and is chiefly used in ulcerated and aphthous conditions of the mouth, in stomatitis, foot-and-mouth disease, and sore throat. For these purposes it is employed locally as a gargle, and internally it is given by the mouth. After absorption into the blood, it is believed to give off its oxygen, and thus to be of benefit in some of the specific fevers. With this object it has been given for anthrax and anthracoid diseases in horses, cattle, and sheep; for influenza, strangles, scarlet fever, and purpura in horses, and other specific diseases. In acute and chronic bronchitis it acts by promoting expectoration.

Externally, solutions of chlorate of potassium (10 to 20 grains to the ounce of water) are sometimes applied as antiseptics to unhealthy wounds.

Dose.—*Man and Dog* - - - - - 5 to 15 grains.
Pig - - - - - - 5 to 20 ,,
Sheep - - - - - - 15 to 40 ,,
Horse - - - - - - 1 to 3 drachms.
Ox - - - - - - ½ to 1 ounce.

POTASSII CITRAS (A. and B.).

Citrate of Potassium.

Mode of Preparation.—Citrate of potassium, of which the formula is $C_3H_4 \cdot OH \cdot (COOK)_3$, is obtained by action on potassium carbonate with citric acid.

Characteristics and Tests.—It is a white powder of saline and slightly acid taste, deliquescent, and very soluble in water. It should give no reaction for lead, iron, calcium, magnesium, sodium, carbonate, or tartrate, and only very slight traces of chloride or sulphate.

Dose.—*Dog* - - - - - 5 to 20 grains.
Man - - - - - 10 to 40 ,,
Pig - - - - - ¼ to 1 drachm.
Horse - - - - - 2 to 4 drachms.

Actions and Uses.—Like the bicarbonate and the carbonate, citrate of potassium is an alkalinizer of the blood and urine, antacid, diuretic, and diaphoretic, a saline expectorant, and a biliary stimulant.

POTASSII FERROCYANIDUM (A.).

Ferrocyanide of Potassium.

Synonym.—Yellow prussiate of potash.

Formula.—$K_4FeC_6N_6,3H_2O$.

Mode of Preparation.—Ferrocyanide of potassium is obtained by fusing in an iron pot animal substances, such as the cuttings of horns, hoofs, and skins,

with carbonate of potassium and iron, lixiviating the crude product with water, and purifying the salt by crystallization.

Characters.—The salt occurs in large yellow crystals, which are not affected by exposure to the air. It is soluble in 4 parts of water at 15° C., and in 2 parts of boiling water, insoluble in alcohol. If heated to 100° C., it becomes anhydrous.

Tests.—An aqueous solution gives with persulphate of iron or other persalts of that metal a deep-blue precipitate. With sulphate of copper it yields a brick-red precipitate, and with acetate of lead a white one. If ferrocyanide of potassium be heated with diluted sulphuric acid, the gas hydrocyanic acid is evolved.

Preparation.—Acidum Hydrocyanicum Dilutum.

POTASSII HYDROXIDUM.[1]

Hydroxide of Potassium.

Synonyms.—Potassa Caustica; Caustic Potash.

Formula.—KHO (with not more than 10 per cent. of combined water and other constituents).

Mode of Preparation.—1. Boil down rapidly in a clean silver vessel 2 pints of solution of hydrate of potassium, until a clear fluid of such consistence remains that a drop of it, when removed on a warm glass rod, solidifies on cooling. Pour this oily fluid into suitable moulds, and when it has solidified, put it while still warm into stoppered bottles.

2. By the action of hydroxide of calcium on carbonate of potassium.

Characters.—Hydroxide of potassium occurs commercially in hard white pencils or cakes. It is a very deliquescent, powerfully alkaline and corrosive salt. An aqueous solution acidulated with nitric acid yields with perchloride of platinum a yellow precipitate. With nitrate of silver and chloride of barium only scanty white precipitates are produced.

Therapeutics.—Hydroxide of potassium is a powerful caustic. Internally, medicinal doses are antacid and diuretic; poisonous doses being irritant and corrosive.

As a caustic, when it is desired to burn deeply, this hydroxide is used for snake-bites, bites of rabid animals, and for removing warts and fungous growths. Mixed with lime it is the so-called Vienna paste, a preparation not so apt to spread to the surrounding tissues. When caustic potash is employed for such purposes,

[1] In the British Pharmacopœia it is designated Potassa Caustica, Potassium Hydroxide, and in the United States Pharmacopœia simply Potassa.

care must be taken not to allow it to spread over the neighbouring tissues.

Internally, solution of hydroxide of potassium is used for the same purposes as the bicarbonate and carbonate (see Liquor Potassii Hydroxidi).

Dose of Solution of Caustic Potash:

Man and Dog - -	5 to 25 minims.
Pig - - - -	½ to 1 fluid drachm.
Horse - - - -	½ to 1 „ ounce.
Ox - - - -	½ to 1¼ „ ounces.

POTASSII IODIDUM (A. and B.).

Iodide of Potassium.

Formula.—KI.

Mode of Preparation.—Place 1 gallon of solution of hydroxide of potassium in a glass or porcelain vessel, and add about 21 ounces of iodine in small amounts at a time with constant agitation, or a sufficient quantity to impart to the solution a permanent brown tint. Evaporate the fluid to dryness in a porcelain dish. Pulverize the residue, and then mix the powder intimately with charcoal. Throw the mixture in small quantities at a time into a red-hot iron crucible, and, when it has been brought to a state of fusion, remove the crucible from the fire, and pour out its contents. When the fused mass has cooled, dissolve it in 2 pints of boiling distilled water, and filter through paper. Wash the filter with a little boiling distilled water, so as to dissolve what may be undissolved, and add what now goes through to the former filtrate. Then evaporate the whole, until a film forms on the surface, and set it aside to cool. Drain the crystals which are formed, and dry them quickly in a warm place. Evaporate the mother-liquor, and cool in order to obtain more crystals. The salt should be preserved in a stoppered bottle.

Characters.—Iodide of potassium crystallizes in colourless, generally opaque, cubic crystals. It is readily soluble in less than its weight of water, and in 12 parts of alcohol (90 per cent.). Generally the salt has a feebly alkaline reaction. The taste is sharp, saline, and bitter.

Tests.—An aqueous solution mixed with mucilage of starch gives a blue colour on the addition of a minute quantity of chlorine, either in the porous state or in aqueous solution. With tartaric acid it gives a crystalline precipitate. The addition of

tartaric acid and mucilage of starch to an aqueous solution does not give rise to the production of a blue colour. Solution of nitrate of silver, added in excess, forms a yellowish-white precipitate of iodide of silver. This precipitate, when agitated with ammonia, yields by subsidence a clear liquid, in which excess of nitric acid causes very little turbidity. An aqueous solution of iodide of potassium merely gives a faint precipitate with saccharated solution of lime.

Therapeutics :

Action.—Iodides of potassium and sodium are readily absorbed, and are eliminated rapidly by the kidneys, salivary glands, skin, and mucous membranes. The action of the former depends partly upon the iodine and partly upon the potassium of which it is composed. Iodine is supposed to be set free in the blood and taken up by the albuminous substances of the tissues, which thus undergo more rapid change.

Uses.—In virtue of their effect upon the metamorphosis of albuminous substances, iodides are given to promote absorption of effused fluids and solid exudations in animals. In elephantiasis or chronic weed; in pleurisy, to promote absorption of effused fluid; in glandular enlargements, especially those of a scrofulous character, and in chronic rheumatic affections, it is often prescribed. As an expectorant it is given in chronic bronchitis where there is deficient secretion. In chronic poisoning by lead or by mercury, to eliminate the toxic agent from the system, and in dropsy, as a diuretic, iodide of potassium is a useful agent.

Externally, it is sometimes employed in the making of liniments intended for the reduction of enlargements, and for this purpose it is probably of some value.

Dose.—

Dog	1 to 9	grains.
Man and Pig	5 to 20	,,
Sheep	10 to 35	,,
Horse	¼ to 2	drachms.
Ox	½ to 3	,,

POTASSII NITRAS (A. and B.).

Nitrate of Potassium.

Formula.—KNO_3.

Mode of Preparation.—The nitrate of potassium of commerce should be purified, if necessary, by crystallization from

solution in distilled water. It can also be prepared by acting on chloride of potassium with nitrate of sodium.

Characters.—Nitrate of potassium consists of white crystalline masses or fragments of striated six-sided rhombic prisms. The salt is colourless, gives rise to a peculiar cool saline taste without bitterness, and is soluble in 4 parts of cold and half its weight of boiling water.

Tests.—If thrown on to a fire it deflagrates. If warmed with sulphuric acid and copper wire in a test-tube, nitrate of potassium evolves ruddy fumes. The sulphuric acid acting on the salt produces nitric acid, which is acted upon by the copper. An aqueous solution, acidulated with hydrochloric acid, yields a yellow precipitate with perchloride of platinum. It is not affected by chloride of barium nor by nitrate of silver.

Therapeutics.—Externally, nitrate of potassium has a refrigerant and stimulant action. Internally, it is alterative, refrigerant, and febrifuge. Toxic doses cause death by gastro-enteritis, and arrest of the circulation. When nitrate of potassium is injected into the blood, it retards the pulse-rate, lowers the temperature, and causes dyspnœa and death with convulsions. In virtue of its supposed action on the blood, it is sometimes given in the specific fevers, as influenza and scarlet fever. In some inflammatory diseases, especially in laminitis, the salt has been administered with advantage in full doses. In inflammatory disorders of the intestinal tract, kidneys, and bladder it is not indicated. In bronchitis it is very useful in increasing the bronchial secretion, and it is also given in laryngitis.

As an alterative it is often given, and is a common ingredient of alterative draughts, masses, and powders. As a diuretic it is given in dropsy, and when desirable to induce a more copious secretion of urine.

Dose.—As a febrifuge :

Dog - - - -	2 to 10 grains.
Pig - - - -	5 to 20 ,,
Horse - - - -	1 to 3 drachms.

As a diuretic :

Man and Dog - -	5 to 20 grains.
Pig - - - -	½ to 1 drachm.
Sheep - - - -	½ to 1½ drachms.
Horse - - - -	¼ to 1 ounce.
Ox - - - -	½ to 1½ ounces.

POTASSII PERMANGANAS (A. and B.).

Permanganate of Potassium.

Formula.—$K_2Mn_2O_8$.

Mode of Preparation.—Finely powder $3\frac{1}{2}$ ounces of chlorate of potassium, and mix it with 4 ounces of dioxide of manganese. Place the mixture in a porcelain vessel, and add to it a solution of 5 ounces of hydroxide of potassium in 4 ounces of distilled water. Evaporate the mixture to dryness in a sand-bath, stirring diligently to prevent spurting. Pulverize the residue, place the powder in a covered crucible, and then expose it to a dull red heat for an hour, or until it has assumed a semi-fused condition. Cool, pulverize, and then boil it with $1\frac{1}{2}$ pints of distilled water. Let the insoluble matter subside, decant the fluid, boil again with $\frac{1}{2}$ pint of the water, again decant, saturate the mixed liquids with carbonic acid, and evaporate until a pellicle forms. Then set the liquid aside to cool and crystallize. Drain the crystalline mass which is formed, boil it in 6 ounces of distilled water, and strain through a funnel of which the throat is lightly obstructed by a little asbestos. Let the fluid cool and crystallize. Then drain and dry the crystals by placing them under a bell-jar over a vessel containing sulphuric acid.

Characters and Tests.—Permanganate of potassium exists in the form of slender prismatic sparkling crystals of a dark purple colour. The salt is inodorous, and has a sweet astringent taste. It is soluble in 20 parts of cold water, and the solution is neutral to litmus. A single small crystal suffices to impart a rich purple colour to a fluid ounce of water. If this is mixed with a little rectified spirit and heated, it becomes yellowish-brown. If heated to redness, the crystals decrepitate, evolving oxygen gas and leaving a black residue. If water be added to this residue, potash is extracted by it, and may be recognised by its alkaline reaction, and by the fact that, when acidulated with hydrochloric acid, it yields a yellow precipitate with perchloride of platinum. Permanganate of potassium is readily discoloured by organic substances. Applied to abraded surfaces, it acts as a caustic. When sulphuric acid is added to it, ozone is given off. Great care must, however, be taken in mixing these two substances, especially if heat is applied, as the most violent, startling, and dangerous explosion is liable to occur.

Preparation.—Liquor Potassii Permanganatis, which contains $4\frac{1}{2}$ grains in 1 fluid ounce, 1 grain in 100 minims, and 1 gramme in 100 c.c.

Therapeutics.—Permanganate of potassium readily gives up oxygen, and thus it destroys organic matter. It is in virtue of its deodorizing and disinfectant properties, that it is chiefly used, being very little employed for internal purposes. When mixed with cobra poison out of the body, it readily destroys its poisonous nature. It has also been injected locally by M. L. Peringuey and ourselves as a very strong and nearly saturated solution in cases of bites by the puff-adder with striking results.[1] As a disinfectant, permanganate of potassium is used as a lotion for foul wounds and sores; but it has little power as an antiseptic and disinfectant compared with bichloride of mercury and other powerful antiseptics. Solutions are also used with benefit as gargles in cases of aphthous conditions of the oral cavity, and in leucorrhœa and gonorrhœa. In foul-smelling discharges from the uterus and vagina injection of the solution is useful.

Dose.—*Man and Dog* - - - 1 to 3 grains.
Pig - - - - - 2 to 5 ,,
Horse - - - - 15 to 30 ,,

POTASSII SULPHIDUM ET POTASSII SULPHAS.

Sulphide and Sulphate of Potassium.

Synonyms.—Potassa Sulphurata of the British and United States Pharmacopœias; Sulphurated Potash; Hepar Sulphuris.

Mode of Preparation.—The above substance, which is more generally known as sulphurated potash, is really a mixture of tersulphide of potassium, and possibly of other sulphides of potassium in slight quantity, with some sulphate of potassium. It is prepared as follows: Mix 10 ounces of powdered and dried carbonate of potassium with 5 ounces of sublimed sulphur in a warm mortar. Introduce the mixture into a Cornish or Hessian crucible. Then heat the crucible, at first gradually until effervescence has ceased, and finally to dull redness, so as to produce perfect fusion. Then pour the liquid contents of the crucible out on a clean surface, and cover them quickly with an inverted porcelain basin, so as to exclude currents of air while solidification is taking place. The solid product should, when cold, be broken into fragments, and immediately enclosed in a green glass bottle, which is furnished with an air-tight stopper. The reaction is probably as follows:

$$10S + 4K_2CO_3 = 3K_2S_3 + K_2SO_4 + 4CO_2.$$

Characters.—Sulphurated potash occurs as solid greenish fragments. If recently broken they are of a liver-brown appearance. Sulphurated potash

[1] See *Medical Press and Circular*, June, 1886; or *Veterinary Journal*, June, 1886.

is alkaline and acrid to the taste. It readily forms with water a yellow solution, which has the odour of sulphuretted hydrogen, and evolves this gas freely when excess of hydrochloric acid is added to it, sulphur being at the same time deposited. The acid fluid, when boiled and filtered, gives a yellow precipitate of the double chloride of platinum and potassium, when perchloride of platinum is added to it. When chloride of barium is added to another portion of the acid fluid, similarly boiled and filtered, a white precipitate is produced, as with all sulphates. About 50 per cent. of sulphurated potash is soluble in rectified spirit.

Preparation.—Unguentum Potassii Sulphidi et Potassii Sulphatis.

Therapeutics. — Internally, sulphurated potash, as this preparation is usually termed, increases peristaltic action, thus being laxative in effect. It has stimulant and alterative properties, and acts also upon the respiratory mucous membrane. It has been given in cases of chronic bronchitis and in some skin diseases, and in cases of lead poisoning. Externally, the ointment is used in mange, acne, and some chronic skin diseases. As an injection into the rectum for round worms, a solution containing 1 grain to the fluid ounce of water may be used in dogs.

Dose.—*Dog* - - - - - - - 3 to 8 grains.
Pig - - - - - - - 4 to 15 ,,
Horse - - - - - - - ½ to 1 drachm.
Ox - - - - - - - ½ to 1½ drachms.

POTASSII SULPHAS (A. and B.).

Sulphate of Potassium.

Formula.—K_2SO_4.

Characters and Tests.—Sulphate of potassium exists in the form of hard, colourless, six-sided pyramids. When heated it strongly decrepitates. It is sparingly soluble in water and insoluble in alcohol. An aqueous solution is neutral in reaction, and gives no precipitate with oxalate of ammonium. If it is acidulated with hydrochloric acid, and chloride of barium is added, a white precipitate is produced; while if perchloride of platinum is added to the solution thus acidulated, a yellow precipitate of the double chloride of potassium and platinum is produced.

Preparation.—Pulvis Ipecacuanhæ Co. (80 per cent. of K_2SO_4, and 10 per cent. each of opium and Ipecac.).

Therapeutics.—Sulphate of potassium is a saline purgative, but is seldom employed, the sulphate of magnesium or that of sodium being preferred for this purpose.

Dose.—*Dog* - - - - - - - 5 to 20 grains.
Pig - - - - - - - ¼ to 1 drachm.
Horse - - - - - - - 1 to 4 drachms.

Thrice these doses may be given for constipation as a laxative.

POTASSII TARTRAS (B.).

Tartrate of Potassium.

Description.—Normal potassium tartrate has the formula,

$$(CHOH)_2(COOK)_2,H_2O.$$

It is prepared by neutralizing acid potassium tartrate with potassium carbonate, has the form of small colourless 4- or 6-sided prisms. It is soluble in its own weight of water, and the aqueous solution should not be acid to litmus.

Action.—Diuretic and purgative.

Dose.—

Dog	15 to 45	grains.
Man	30 to 240	,,
Pig	½ to 1½	drachms.
Horse	½ to 1½	ounces.

PRUNI VIRGINIANÆ CORTEX (A. and B.).[1]

Virginian Prune Bark.

Description. — The above is the bark of *Prunus serotina*, Ehrhart (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 97. Nat. Ord., Rosaceæ), gathered in autumn.

Characteristics. — It occurs in curved or irregular pieces about $\frac{1}{12}$ inch thick. If young, it is often covered with a thin, smooth, reddish cork, but if this has been stripped off, a greenish-brown layer is shown. The bark has long lenticels across it from side to side, and, if broken, snaps off with a short and granular fracture. In the case of old bark, the external surface is rough and brown. If examined with the microscope, irregularly-shaped sclerenchymatous cells are seen arranged in numerous groups. The taste is astringent, bitter, and aromatic, and if the bark be macerated in water, a bitter almond-like odour is produced.

Actions and Uses.—Contains an aromatic oil which flavours, and also a little prussic acid, which is best developed in the syrup and tincture. These are useful for coughs.

PRUNUM (A. and B.).

Prune.

Description. — Prunes are the dried ripe fruits of *Prunus domestica*, Linn., var. Juliana, DeC. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 96. Nat. Ord., Rosaceæ). They are ovoid, about

[1] In the United States Pharmacopœia it appears as Prunus Virginiana, Wild Cherry, the bark of *Prunus serotina*.

3 centimetres long, black and shrivelled. The interior is brown, and has no special smell, but a sweet and acid taste.

Actions and Uses.—Prunes are demulcent and somewhat laxative, disguise the taste of senna, and may be used in the diet in cases of constipation.

PSORALEÆ SEMINA.[1]

Psoralea Seeds.

Natural Order.—Leguminosæ.

Habitat.—India.

Description.—The ripe seeds of *Psoralea Corylifolia*—the local name for which plant is Bawacho, Babchi, Bakchi, or Karpo Karischi—are oblong and flattened, and of a rough dark-brown appearance. The testa is from about 2 to 2½ lines in length. They have a faintly aromatic unctuous smell and a somewhat bitter taste, and contain oil, tannin, a resin, and a bitter principle.

Preparations.—*Tinctura Psoraleæ*, made thus: Take of

Powdered Psoralea Seeds, 1¼ ounces;
Alcohol (90 per cent.), 1 fluid pint.

Macerate the powdered seeds with 16 fluid ounces of the rectified spirit for four days, then pack closely in a percolator, and when the mixture ceases to drop add the remaining 4 fluid ounces of rectified spirit; press, add sufficient rectified spirit to make 1 pint of product, and filter.

Linimentum Psoraleæ, made thus: Take of

Tincture of Psoralea, 1 pint;
Gynocardic Acid, 600 grains;
Solution of Hydroxide of Potassium, 1 fluid ounce;
Tincture of Quillaia Bark, 12 fluid ounces;
Glycerin, 8 fluid ounces;
Distilled Water, enough to make 8 pints.

Melt the gynocardic acid over a water-bath, and saponify by the addition of the solution of hydroxide of potassium; then add the tincture of quillaia, and afterwards the glycerin and tincture of psoralea.

Finally, add the water in small quantities at a time with vigorous agitation.

Therapeutics.—The action of psoralea seeds is laxative, stimulant, and aphrodisiac. They are used in India by the lepers in combination with chaulmoogra, for which, as for other chronic skin diseases dependent upon general disturbance of the system, they are strongly recommended. The seeds are used by the Hindoo ladies as a remedy for loss of hair. The liniment has been employed with highly satisfactory results in cases of loss of hair arising from saddle-galls, broken knees, etc.

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[1] From notes kindly supplied to us by Mr. C. H. Huish.

PTEROCARPI LIGNUM (B.).

Red Sanders Wood.

Description.—The heart wood of Red Sandal-wood, *Pterocarpus santalinus*, Linn., f. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 82). It is imported as large heavy logs, reddish or blackish-brown externally, and deep red internally with lighter zones. If warmed, it has a slight aroma, and the taste is astringent. The colouring matter is soluble in alcohol (90 per cent.), but only slightly in water.

Use.—To colour the Tinct. Lavand. Co.

PULSATILLA (A.).

Pulsatilla.

Description.—The herb of *Anemone pulsatilla* and of *A. pratensis*, Linné (Ranunculaceæ), gathered soon after flowering. Must be kept carefully, and not longer than one year. The leaves are radical, petiolate, silky, twice or thrice deeply three-parted, with linear acute lobes appearing after the large purple flowers. Odourless, and with acrid taste.

Composition.—If the fresh plant be distilled with water, it gives an acrid *oily substance* with a burning, pepper-like taste. A similar oil can be obtained from *Ranunculus bulbosus*. If kept for some time, this oil is decomposed into anemonic acid and anemonin.

Action.—The oil is a vesicant. Anemonin subcutaneously injected causes local inflammation and gangrene, and, if given internally, vomiting and purging. The chief action of pure anemonin is that it depresses the circulation, respiration, and spinal cord (like aconite), causing slow and feeble pulse, slow respiration, coldness, paralysis of first the hind- and then the fore-legs, dyspnœa, and death without convulsions, whereas in poisoning by extract of pulsatilla convulsions are always caused. The anemonin paralyzes the motor centres in the brain, and thereby prevents convulsions.

Uses.—It is possibly diaphoretic and emmenagogue, and has been tried in amenorrhœa, dysmenorrhœa, catarrh of mucous membranes, bronchitis, and asthma.

Dose of Fluid Extract of Pulsatilla :

Man - - - - - - 2 to 5 minims.

PULVIS ANTIMONIALIS (A. and B.).

Antimonial Powder.

Mode of Preparation.—Mix thoroughly 1 part of oxide of antimony and 2 parts of phosphate of calcium (British Pharmacopœia); and in the United States Pharmacopœia it is 33 to 67, so that they are very nearly the same.

Therapeutics.—Antimonial powder is used for pretty much the same purposes as tartar emetic, and is convenient as a febrifuge for the dog.

Dose.—*Man* - - - - 3 to 6 grains.
Dog - - - - 3 to 10 ,,
Pig - - - - 5 to 20 ,,
Horse - - - - 1 to 2½ drachms.

PULVIS ELATERINI COMPOSITUS (B.).

Compound Powder of Elaterin.

Mode of Preparation.—Rub together in a mortar until a fine powder is produced 1 gramme of elaterin and 39 grammes of milk sugar.

Dose.—*Man and Dog* - - - 1 to 3 grains.

PULVIS GLYCYRRHIZÆ COMPOSITUS (A.[1] and B.).

Compound Liquorice Powder.

Mode of Preparation.—Reduce to fine powder separately, and then mix 50 grammes senna, 50 liquorice root, 25 grammes fennel fruit, 25 grammes sublimed sulphur, and 150 grammes refined sugar.

Dose.—*Man* - - - - 60 to 120 grains.

PULVIS IPECACUANHÆ COMPOSITUS (B.).[2]

Compound Powder of Ipecacuanha.

Mode of Preparation.—Mix thoroughly 1 part by weight of ipecacuanha in powder, 1 part of opium in powder, and 8 parts of sulphate of potassium in powder. Pass the mixed powder through a fine sieve, and finally rub it lightly in a mortar. Keep the powder in a stoppered bottle. It contains 10 per cent. of opium.

[1] The United States Pharmacopœia Compound Liquorice Powder is made by mixing 4 grammes of Oil of Fennel with about 250 grammes of Sugar, adding 250 grammes of Sugar, 236 grammes of Glycyrrhiza in No. 80 powder, 180 grammes of Senna, 80 grammes of Washed Sulphur, well mixing, and passing through a No. 60 sieve. It is preserved in well-closed vessels.

[2] The United States Pharmacopœia Pulvis Ipecacuanhæ et Opii is the same as the above, with the exception that instead of 8 parts of Sulphate of Potassium, it is the same proportion of Sugar of Milk in No. 30 powder that is used.

Therapeutics.—Compound powder of ipecacuanha is used in canine practice as a sedative and diaphoretic.

Dose.—*Man and Dog* - - - 5 to 15 grains.
Pig - - - - 10 to 40 ,,
Horse - - - - 1½ to 3 drachms.
Ox- - - - - ¼ to ¾ ounce.

PYROXYLINUM (A. and B.).

Pyroxylin.

Mode of Preparation.—Mix 5 fluid ounces of sulphuric acid with 5 fluid ounces of nitric acid in a porcelain mortar. Immerse 1 ounce of cotton in the mixture, and after it is thoroughly wetted by the mixture of acids, stir it for three minutes with a glass rod. Transfer the cotton to a vessel containing water, stir it well with a glass rod, decant the liquid, pour more water upon the substance, agitate again, and repeat the affusion, agitation, and decantation, until the washings no longer give a precipitate with chloride of barium. Drain the product on filtering-paper, dry on a water-bath, and keep it loosely packed in well-closed vessels containing no more than 25 grammes in a cool and dry place, remote from lights or fire.

Test.—Pyroxylin is readily soluble in a mixture of ether and alcohol (90 per cent.). It leaves no residue after being ignited by heat.

Preparation.—Collodium.

QUASSIÆ LIGNUM (A.[1] and B.).

Quassia Wood.

Natural Order.—Simarubaceæ.

Characters.—The chips, shavings, or raspings of the wood of *Picræna excelsa* (B. and T., *Med. Pl.*, vol. i., plate 57). The billets or logs, from which the smaller portions are cut off, vary in length and size, but frequently they are as thick as a man's thigh. They are covered by a dark-gray bark. The wood is dense, tough, but easily split, porous, and of a pale yellowish-white colour. A longitudinal section shows long cells containing crystals of oxalate of calcium. The chips are inodorous, but have an intense and purely bitter taste. An infusion does not become black or bluish-black on the addition of a persalt of iron.

Preparation.—Infusum Quassiæ.

Therapeutics.—Quassia is a bitter tonic and stomachic, and is prescribed as such for debilitated animals. As an anthelmintic

[1] The United States Pharmacopœia name is Quassia, the wood of *Picræna excelsa* (Swartz), Lindley (Nat. Ord., Simarubeæ).

it is destructive to round worms,[1] and may be administered by the mouth or in the form of enemata. Quassia contains no tannin.

Dose of Quassia Chips:

Dog	5 to 20 grains.
Pig	¼ to ½ drachm.
Horse	1 to 6 drachms.

Dose of Infusion of Quassia:

Dog	¼ to 1 fluid ounce
Pig	1 to 2 ,, ounces.
Sheep	1 to 3 ,, ,,
Horse	¼ to ½ pint.
Ox	½ to 1 ,,

QUILLAIÆ CORTEX (A.[2] and B.).

Quillaia Bark.

Description.—The above is the inner part of the bark of *Quillaja saponaria*, Molina (*Bot. Mag.*, plate 7,568. Nat. Ord., Rosaceæ).

Characteristics.—The bark is generally in the form of large flat pieces, about ⅛ inch thick, 2 feet long, and 4 inches wide. The external surface is brownish-white, or, if the outer bark has not been entirely stripped off, reddish, or even blackish-brown. On its inner surface it is smooth and yellowish-white. It breaks with a splintery laminated fracture, and, if examined with a magnifying-glass, glistening prismatic crystals are seen. The transverse section has fine radial and tangential lines. The taste is acrid and astringent, the odour slight. The powder is highly irritating to the nostrils.

Actions and Uses.—Emulsifies oils, resins, etc. Contains *saponin*, which causes it to act as an expectorant, like senega, and it is used for bronchitis, together with solution of coal-tar.

QUININÆ HYDROCHLORIDUM (A.[3] and B.).

Hydrochloride of Quinine.

Description. — Its formula is $C_{20}H_{24}N_2O_2,HCl,2H_2O$, and the alkaloid itself is prepared from the bark of various species of Cinchona and Remijia. The crystals are a little larger than those of sulphate of quinine. It is soluble in about 35 parts of cold water, in 3 parts of cold alcohol (90 per cent.), and highly soluble

[1] For oxyurides in horse or dog, first wash out the rectum with soap and water, and then inject ½ pint of infusion made by placing 1 drachm of quassia chips in ½ pint of cold water for half an hour, in the case of the dog, and in that of the horse, 2 quarts of the infusion made by infusing 8 drachms of quassia in that amount of cold water.

[2] The United States Pharmacopœia name is Quillaja.

[3] The United States Pharmacopœia name is Quininæ Hydrochloras.

in boiling water and alcohol (90 per cent.). If an equal weight of sulphate of sodium and of this substance be dissolved in ten times their united weight of hot water, and set aside at 15° C., it forms sulphate of quinine. If dried at 100° C., it loses 9 per cent. of water.

Dose.—As tonic :

Cat	- - -	1 to 2	grains.
Dog	- - -	1 to 5	,,
Man and Pig	- -	1 to 10	,,
Sheep	- - -	3 to 10	,,
Horse	- - -	15 to 45	,,
Ox -	- - -	½ to 1½	drachms.

As an antipyretic :[1]

Cat -	- - -	2 to 6	grains.
Man and Dog	- -	5 to 10	,,
Pig	- - -	10 to 30	,,
Sheep	- - -	15 to 40	,,
Horse	- - -	1½ to 3	drachms.
Ox -	- - -	2 to 4	drachms.

QUININÆ HYDROCHLORIDUM ACIDUM (B.).

Acid Hydrochloride of Quinine.

Composition and Formula.—This is an acid hydrochloride of quinine, which is the alkaloid obtained from the bark of various species of cinchona and remijia. $C_{20}H_{24}N_2O_2,2HCl,3H_2O$.

Characteristics.—It is a white crystalline powder, soluble in less than its own weight of water, and the solution is slightly acid.

Tests.—Those given by hydrochlorides are yielded, and there should be little or no sulphate reaction. One gramme dissolved in 20 c.c. of water should be completely neutralized by 2·5 c.c. of volumetric solution of soda. It can be transformed into sulphate of quinine by adding an equal weight of sulphate of sodium, and dissolving the mixture in ten times its weight of hot water, and then accurately neutralizing with solution of ammonia and setting aside to cool at 60° F., when the usual tests for that substance will be yielded. If dried at 212° F., it loses no more than 12 per cent. of water.

Dose.— *Man* - - - - - - 1 to 10 grains.

QUININÆ SULPHAS (A. and B.).

Sulphate of Quinine.

Formula.—$[(C_{20}H_{24}N_2O_2)_2H_2SO_4]_2,15H_2O$.

Mode of Preparation.—Sulphate of quinine is the sulphate of an alkaloid prepared from the powdered bark of various species

[1] The use of quinine for this purpose is not to be advised as a rule, because there are several better antipyretic remedies.

of cinchona and remijia by extraction with spirit after the addition of lime, or by the action of an alkali on an acidulated aqueous infusion, with subsequent neutralization of the alkaloid by sulphuric acid. The resulting salt must be purified.

Characters.—Sulphate of quinine occurs in the form of filiform, silky, snow-white crystals. The taste is purely and intensely bitter. At the ordinary temperature it is soluble to the extent of 1 in about 800 parts of water, and the solution possesses a bluish tint or fluorescent appearance. It is readily soluble in water acidulated with sulphuric acid.

Tests.—A solution of sulphate of quinine gives with chloride of barium a white precipitate insoluble in nitric acid. A solution treated first with solution of chlorine and afterwards with ammonia becomes of an emerald-green colour. A solution acted upon by ammonia yields a white precipitate of quinine, which is soluble in ether and in excess of the ammonia. A solution of sulphate of quinine in sulphuric acid has a feeble yellowish tint, and undergoes no further change of colour when gently warmed. A quantity of the freshly-prepared salt weighing 2·5 grammes should lose ·38 gramme of water by drying at 100° C. If ignited with free access of air, sulphate of quinine burns without leaving any residue. Sulphate of quinine should not contain more than 5 per cent. of sulphates of other cinchona alkaloids.

Preparation.—Ferri et Quininæ Citras (16 parts of quinine in 100).

Therapeutics:

Action.—Quinine lessens protoplasmic amœboid movements, and destroys low animal and vegetable organisms (Brunton). It diminishes the amount of oxidation in the body. Under its influence the oxygen of the red blood corpuscles is less readily given up, and the cells themselves increase in size. The white cells are paralyzed, and the number of them visible is greatly reduced. The ozonizing power of the blood is diminished, if this substance be added to it. Quinine diminishes or arrests fermentation, and is powerfully antiseptic.

In healthy animals quinine has only a moderate effect in reducing the temperature; but in pyrexia, especially of the specific fevers, it has a very marked one. On metabolism quinine has also an important lessening action. In moderate doses it lessens the amount of nitrogenous bodies in the normal urine; but, when given to animals affected with fever, it increases the amount

of nitrogen in this excretion. Quinine seems to diminish metabolism by interfering with the oxidation of the protoplasmic elements of the body and with oxygenation. It will thus be seen that the drug reduces temperature by causing diminution of heat produced, and not by effecting any means of additional loss of heat from the system. This diminution is not caused by any influence on the centres which regulate heat production, but through the tissues themselves. Furthermore, the zymotic factor in fevers, whether consisting in the growth and development of organic germs, or of a chemical ferment, is held in check, to some extent at any rate, by quinine.

On the alimentary canal it has a stomachic and tonic effect. The spleen is reduced in size, and becomes more firm. Moderate doses increase the force of the circulation, whereas large doses diminish the blood-pressure, dilating the vessels, lessen also the force and frequency of the systole, and lengthen the diastole. These effects are attributable to a direct action on the cardiac ganglia and muscle, on the vessels' walls, and on the vaso-motor centre, which is partly paralyzed. The pneumogastric nerve is paralyzed by toxic doses, though it is little influenced by moderate amounts.

Respiration is accelerated by moderate doses, but is diminished by large ones, through paralysis of the respiratory centre in the medulla oblongata. In quinine-poisoning death occurs through failure of respiration, caused by paralysis of this centre. Small doses are tonic to the nervous system, but large doses cause derangement of sight and hearing, and weakness of the muscles. Very large doses cause delirium and convulsions, and, if in sufficient amount, lead to a fatal result. The brain is stimulated by small doses, and depressed by large ones. On the spinal cord the drug acts by diminishing reflex excitability.

Uses.—Quinine is useful as a tonic in debility, more especially in animals suffering from chronic disease, or recovering from acute maladies. As a local application it is seldom employed in veterinary practice, but weak solutions have been recommended in treating conjunctivitis in human practice. As an antipyretic and antiseptic, it has been given in cases of influenza,[1] strangles, scarlet fever, purpura, and other fevers in horses, and in the treatment of distemper in dogs.

[1] In the early stages of influenza, quinine is out of the question, as it rather does harm than good.

Thirty grains of the sulphate were given by Dr. William Sykes, of Torquay, to an enteric patient, and in 2 hours 18½ minutes the temperature fell 1·6° F. For the first 17 minutes there was no change, and for the rest the fall was at the rate of 0·1° during each 7·59 minutes. The rate varied greatly, sometimes there being required 10, and in one case 12 minutes to get a fall of 1°, which, again, might occur in 1½ minutes, and once there was no change for 15 minutes. The fall was accompanied by profuse diaphoresis. At the end of the observations the temperature was 102°, the respirations 26, the pulse 92, and dicrotic. The temperature had fallen 1·6°, the breathing was 2 more in each minute, and the pulse 8 beats per minute slower.

Probably the defervescence is due to the diaphoresis and not on its causation. Slight movements in bed, whereby the surface became chilled, would temporarily stop the sweating, and then the difference in the rate of fall, its stationary and even retrogressive intervals, might be caused.

Most antipyretics in efficient doses cause violent sweating, and the toxins of the tubercle-bacilli similarly cause night-sweats, followed by a normal or subnormal temperature. We think that as a rule other drugs are preferable to quinine for reducing temperature in man and animals, and that it is generally unsuitable for fevers.

In canine practice this alkaloid is often prescribed as a tonic in cases of debility. In neuralgic affections it is given as an antiperiodic with great benefit. The other alkaloids are often substituted for quinine, more especially in equine practice. Quinidine, cinchonine, and cinchonidine, are favourite substitutes. Quinetum and its sulphate—which consist of the mixed alkaloids of cinchona bark, and contain 50 to 70 per cent. of cinchonidine, with some quinine and cinchona — are much cheaper than quinine, and appear to act equally as well. The doses of quinetum, sulphate of quinetum, and quinidine are the same as those of quinine.

Dose.—

Cat	1 to 2 grains.
Dog	1 to 5 ,,
Man	1 to 10 ,,
Pig	5 to 10 ,,
Sheep	5 to 15 ,,
Horse	15 to 40 ,,
Ox	30 grains to 1 drachm.

RESINA (A. and B.).
Resin.

Natural Order.—Coniferæ.

Mode of Preparation. — Resin is the residue left after the distillation of the oil of turpentine from the crude oleo-resin (turpentine) of various species of Pinus.

Characters.—Resin is translucent, yellowish, compact, brittle, pulverizable. It is soluble in alcohol (90 per cent.), ether, benzol, and carbon bisulphide. The odour and taste are faintly terebinthinate. Resin is easily fusible, and burns with a dense yellow flame and much smoke, and without any ash to speak of.

Therapeutics.—Resin, applied externally, has stimulant and astringent properties. Internally, it is stimulant, astringent, and diuretic. It is much used for making plasters, while the ointment of resin is a stimulating application for wounds and ulcers. Internally, resin is sometimes given as a diuretic in equine practice.

Dose.—

Dog	15 to 30 grains.
Pig	½ to 1 drachm.
Sheep	½ to 2 drachms.
Horse	¼ to 1 ounce.
Ox	½ to 1 ,,

RESINA COPAIBÆ (A.).
Resin of Copaiba.

Description.—The above is the residue left after the volatile oil has been distilled from copaiba. It is a yellow or brownish-yellow brittle resin, with a slight odour and taste of copaiba, and it is soluble in alcohol, ether, chloroform, carbon disulphide, benzol, or amylic alcohol.

RESINA SCAMMONIÆ (A. and B.).[1]
Scammony Resin.

Mode of Preparation.—Exhaust 150 grammes of scammony root, coarsely powdered by means of a sufficient amount of alcohol, and, having placed the tincture in a still, recover the greater part of the alcohol. Then gradually pour the remaining liquid into three times its volume of distilled water, stirring continuously. Let the mixture stand, so that the resin can subside, filter, wash the resin on the filter with boiling distilled water, and dry on a water-bath.

Characteristics.—It is in brown, brittle, translucent pieces, resinous in fracture, and with sweet smell. Does not form an

[1] In the British Pharmacopœia it is Scammoniæ Resina.

emulsion with water. The absence of guaiacum resin is shown by an alcoholic solution of it not giving a blue with ferric chloride solution, or with solution of hydrogen dioxide. It is distinguished from jalap resin by being almost totally soluble in ether.

Therapeutics.—It is used mainly as a purgative and anthelmintic in children, when there is no irritation of the stomach and bowels. Being an irritant cholagogue, it must not be used in man or animals if there be inflammation.

Dose.—*Man* - - - - 3 to 8 grains.
Cat and Dog - - - 3 to 10 ,,
Pig - - - - 5 to 20 ,,
Horse - - - - 1 to 3 drachms.

RESORCINUM (A.).

Resorcin.

Description.—The formula is $C_6H_4(OH)_2$. It is a diatomic phenol, and it should be kept in dark, amber-coloured vials. It is in colourless or faintly red needle-shaped or rhombic crystals. Odour peculiar, and taste sweet and then pungent. If exposed to light and air, it becomes red or brown. At 15° C. it is soluble in 0·6 part of water and in 0·5 of alcohol, highly soluble in boiling water or alcohol, also in ether or glycerin; but very slightly in chloroform. If heated to about 114·5° C. it melts, and at a higher heat it totally volatilizes. An aqueous solution is only faintly acid to litmus. If a few drops of perchloride of iron solution be added to 10 c.c. of a diluted aqueous solution of resorcin (1 in 200), the liquid turns blue.

Dissolve 0·1 gramme of resorcin in 1 c.c. solution of hydroxide of potassium, and add a drop of chloroform, and heat, when a crimson colour is yielded. Add then a little hydrochloric acid, and a pale yellow will result. Again, carefully heat 0·05 gramme resorcin with 0·1 gramme tartaric acid and 10 drops concentrated sulphuric acid. A thick carmine liquid will result, and addition of water will turn it yellow.

A concentrated aqueous solution of pure resorcin (1 in 2) is devoid of colour (absence of empyreumatic bodies), and with gentle heat does not emit the smell of phenol.

Actions and Uses.—Antiseptic but not irritant in about 6 per cent. solutions. Useful in some forms of chronic epithelial thickening as an ointment. Internally, it has an antipyretic action.

Dose.—*Dog* - - - - 1 to 5 grains.

RHEI RADIX (A.[1] and B.).

Rhubarb Root.

Natural Order.—Polygonaceæ.

Mode of Preparation.—The erect rhizome, or so-called root of *Rheum palmatum*, *Rheum officinale*, and probably other species, deprived more or less completely of its cortex, sliced, dried, and prepared in China and Thibet.

Characters.—Rhubarb root exists in somewhat cylindrical, barrel-shaped, conical, plano-convex, or irregular, pieces. The external surface is covered with a bright yellowish-brown powder, round or somewhat angular, smooth or more or less wrinkled, and marked beneath the powder with reddish-brown or dark rusty-brown lines, intermixed in a yellowish-brown substance, and frequently presenting small scattered star-like spots. The pieces are frequently bored with a hole, which may or may not contain the remains of the cord used to suspend them to dry. Rhubarb root is hard and compact. The fracture is uneven, the broken surface presenting a marbled appearance, and in some cases exhibiting a ring of star-like spots. The odour is peculiar and somewhat aromatic. The taste is bitter and slightly astringent. When chewed, rhubarb feels gritty between the teeth.

Rhubarb root contains oxalate of lime, and tannic and chrysophanic acids.

Therapeutics.—Rhubarb is a bitter, stomachic, and intestinal astringent in small doses. It is a stimulator of the movements of the intestine, and of the functions of the liver in large doses. On horses and cattle, however, it is of very little effect as a purgative. Its action is confined to the alimentary tract. In dogs it is usually prescribed with jalap, or calomel, or gray powder.

Dose.—*Man* - - - 3 to 10 grains, or for one single dose 15 to 30 grains.

Dog	- - -	10 to 30 grains.
Pig	- - -	1 to 2 drachms.
Horse	- - -	½ to 1 ounce.
Ox	- - -	1 to 1½ ounces.

As a purgative for foal, calf, or dog, 1 to 2 drachms (grammes 4 to 8).

[1] Called Rheum, Rhubarb, in United States Pharmacopœia, the root of *Rheum officinale*, Baillon.

ROSÆ GALLICÆ PETALA (A.[1] and B.).

Red-Rose Petals.

Natural Order.—Rosaceæ.

Mode of Preparation.—The fresh and dried unexpanded petals of *Rosa gallica*, Linn. (B. and T., *Med. Pl.*, vol. ii., plate 104)—the red or French rose—are obtained from plants cultivated in Britain. The flowers are collected when about the size of a nutmeg. The white claws are cut off, and they are then dried. In order to preserve the colour, the petals should be kept away from the light.

Characters.—Red-rose petals are velvety, and occur usually in little cone-like masses. Sometimes they are separate and crumpled. The colour, purplish-red, passing into brownish-yellow at the base of the petals, is retained. The odour, which is fragrant and rose-like, is especially developed by the drying. The taste is bitterish, feebly acid, and astringent.

Composition.—The petals contain a red colouring matter, a little gallo-tannic acid, fat, sugar, acids, and a trace of an aromatic volatile oil, gum, salts, etc.

Tests.—An infusion becomes bright red with acids, and green with alkalies.

Preparation.—Confectio Rosæ Gallicæ (1 part by weight of fresh petals to 3 of refined sugar, beaten together in a stone mortar).

SABINÆ CACUMINA (A.).[2]

Savin Tops.

Natural Order.—Coniferæ.

Mode of Preparation.—The fresh tops of *Juniperus Sabina*, Linn., are collected in spring, from plants cultivated in Britain, and dried.

Characters.—The twigs are densely covered with minute imbricated dark green (or, when dried, yellowish-green) leaves, which are in savin tops pressed close to the stem, while those of juniper tops, which are longer and more pointed, stand out at right angles to the stem. The leaves of savin tops have a large, oval, depressed, central gland on their back.

When the twigs are rubbed or bruised, a strong and peculiar odour is noticeable. The taste is acrid and bitter.

Composition.—The activity is due to the volatile oil, oleum sabinæ ($C_{10}H_{16}$). A resin and gallic acid are also present.

Therapeutics.—Externally, savin is irritant and vesicant. It is occasionally employed as a stimulant for wounds, and for promoting the discharge from blistered surfaces. Internally, large doses act as gastro-intestinal irritants. Being carried through the organs and excreted like oil of turpentine, medicinal doses have a stimulating effect on the genito-urinary organs, acting on the kidneys as a diuretic, and on the pregnant uterus as an ecbolic. Being so dangerous, savin should never be employed for causing expulsion of the fœtus. On account of its irritant qualities, savin is very little used; but the oil is sometimes employed as an anthelmintic in horses and cattle.

[1] Called in the United States Pharmacopœia Rosa Gallica.

[2] In the United States Pharmacopœia the name is Sabina, Savine.

For external purposes the ointment or decoction of savin is employed. The latter can be made of 1 part of savin, 2 parts of spirit, and 9 parts of water.

Dose of Savin Tops:[1]

Dog	3 to 15 grains.
Pig	5 to 20 ,,
Horse	1 to 3 drachms.

Dose of Oil of Savin:

Dog	1 to 6 minims.
Pig	4 to 15 ,,
Horse	½ to 2½ drachms.
Ox	1 to 4 ,,

SACCHARUM LACTIS (A. and B.).

Sugar of Milk.

Description.—Milk sugar, or lactose, has the formula $C_{12}H_{22}O_{11},H_2O$, and is prepared from the whey of milk. It is crystalline, grayish, hard, devoid of odour, and has a sweet taste. It is soluble in 7 parts of cold water, and 1 part of boiling water. When burnt in air, it should not yield more than 0·25 per cent. of ash.

SACCHARUM PURIFICATUM (B.).[2]

Purified Sugar.

Description.—Sucrose, $C_{12}H_{22}O_{11}$, is obtained from the juice of the sugar-cane. Colourless and odourless crystals. It is readily soluble in half its weight of water. If heated to 82·2° C., with solution of potassio-cupric tartrate, or with solution of sulphate of copper and excess of solution of hydroxide of potassium, it should only give the merest trace of a yellow precipitate (due to glucose). Also it should not contain calcium, chlorides, or sulphates.

SALICINUM (A. and B.).

Salicin.

Formula.—$C_6H_{11}O_5{\cdot}O{\cdot}C_6H_4{\cdot}CH_2OH$.

Natural Order.—Salicaceæ.

Mode of Preparation.—Salicin is a crystalline glucoside obtained by treating the bark of *Salix alba* and other species of Salix, and the bark of various species of Populus with hot water, removing tannin and colouring matter from the decoction, evaporating, purifying, and re-crystallizing.

Characters.—Salicin consists of colourless or white shining trimetric tabular crystals. The taste is very bitter. At the

[1] The dose of the Fluid Extract of Savin (United States Pharmacopœia) for man is about 5 to 15 minims.

[2] The United States Pharmacopœia name is Saccharum, Sugar, obtained from *Saccharum officinarum*, Linné, various species of Sorghum (Gramineæ), and one or more varieties of *Beta vulgaris*, Linné (Chenopodiaceæ).

ordinary temperature salicin is soluble in about 28 parts of cold water or in 60 parts of alcohol (90 per cent.). It is insoluble in ether.

Tests.—Salicin is coloured red by sulphuric acid. A small quantity of salicin, if heated with a little red chromate of potassium, a few drops of sulphuric acid and some water, yields vapours of salicylic aldehyde, which has the odour of meadow-sweet.

When heated, salicin melts, and emits vapours having the odour of meadow-sweet. If ignited in air, salicin leaves no residue.

Therapeutics.—Salicin is given for the same purposes as the salicylates (see Salicylic Acid). It has a similar, though weaker, action, and causes less cardiac and vascular depression. The dose is the same as that of salicylic acid.

Dose.—

Dog	3 to 20 grains.
Man	5 to 20 ,,
Pig	10 to 45 ,,
Sheep	½ to 3 drachms.
Horse	1½ to 5½ ,,
Ox	2 to 8 ,,

SALOPHEN.

Ghetti advises injections of salophen in cases of sciatica. An aqueous alkaline solution, of which 10 c.c. contain 1 gramme, was injected into the gluteal muscles every other day. After the sixth injection the pain was much less, and after the eleventh it had nearly disappeared. The patients had fifteen injections whilst kept in bed, and after fifteen more, left, feeling quite well. They were seen fourteen months later, and had been free from pain all the time.

When taken into the body, salophen probably splits into salicylic acid, of which it has 51 per cent., and acetylparamidophenol.

SALOL (A. and B.).

Synonym.—Salicylate of phenol.

Description and Formula.—This substance has the formula $C_6H_5.C_7H_5O_3$, or $C_6H_4{\cdot}OH{\cdot}COO{\cdot}C_6H_5$, and is obtained from acting upon phenol with salicylic acid, or by the action of their sodium salts with phosphoryl chloride or carbonyl chloride.

Characters and Tests.—Salol occurs as crystals devoid of colour, with a faint aromatic odour and only slight taste. It is almost insoluble in water, soluble in 10 parts of cold alcohol (90 per cent.), very soluble in boiling alcohol,

and also soluble in ½ part of ether or chloroform, and in fixed and volatile oils. It melts at 108·5° F. (42·5° C.). If to a solution of salol in alcohol a solution of bromine be added, a white precipitate is formed; whilst if a few drops of a diluted solution of perchloride of iron be added to a similar alcoholic solution, a violet colour is yielded. Again, if salol and hydroxide of sodium be melted together, and a little hydrochloric acid be added, a white precipitate is formed and phenol evolved. Water, after having been shaken with salol, should not give a red coloration with solution of perchloride of iron, proving the absence of free salicylic acid, and should not yield the reactions for either sulphates or chlorides. A solution of salol in alcohol should be neutral.

Actions and Uses.—Is not decomposed in the stomach; but is split up in the small intestine by the pancreatic ferments into salicylic acid and phenol. Is much used in enteric catarrh, appendicitis, typhoid fever, and other conditions when there is foulness of the intestinal contents. It is a strong antipyretic, and useful in some rheumatic affections, such as pharyngitis, when salicin and salicylate of sodium fail, as they sometimes do. In large doses it produces effects like those of other salicyl compounds, deafness, singing in the ears, great depression and vomiting. It is at last excreted as sulphocarbolic and salicylic acids. It disinfects the urinary tract and urine, may impart a green or black colour to that fluid, and may produce congestion of the kidneys, profuse sweating, and morbilliform eruptions.

Dose.—

Puppies	¼ to ½ grain (gramme 0·015 to 0·03).
Dog	1½ to 6 grains.
Man	5 to 15 ,,
Pig	5 to 20 ,,
Horse	¼ to 3 drachms.
Ox	½ to 4 ,,

SAMBUCI FLORES (A. and B.).

Elder Flowers.

Natural Order.—Caprifoliaceæ.

Description.—The flowers of *Sambucus nigra*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 137), or (United States Pharmacopœia) *Sambucus canadensis*, separated from the stalks. They are small, and the calyx is superior and five-toothed. The corolla is flat, rotate, five-lobed, white, and has five stamens inserted in the tube. The anthers are yellow. Bitter taste, and faint, sweet odour.

Uses.—For flavouring. It is mildly diaphoretic and diuretic.

SANTONICA (A.).

Santonica.

Natural Order.—Compositæ.

Characters.—The dried unexpanded flower-heads or capitula of *Artemisia maritima*, variety *Stechmanniana*, Besser (B. and T., *Med. Pl.*, vol. iii., plate 157)—of which Russia is the habitat—or (United States Pharmacopœia) *A. pauciflora*, Weber, are about $\frac{1}{10}$ inch in length, obtuse and oblong-ovoid in shape, pale greenish-brown in colour, and nearly smooth. In general appear-

ance they resemble seeds, and hence santonica has been called worm-seed. Each flower-head consists of an external involucre, composed of from twelve to eighteen imbricated scales or bracts, provided with a broad, thick, yellowish-green midrib. Enclosed within this are three to five somewhat tubular florets. The odour, which is especially marked when santonica is rubbed, is strong, peculiar, and somewhat like camphor. The taste also is camphoraceous and bitter.

Preparation.—Santoninum.

SANTONINUM (A. and B.).

Santonin.

Formula.—$C_{15}H_{18}O_3$.

Characters.—Santonin is a crystalline principle obtained from santonica. It exists in flat rhombic prisms, is feebly bitter in taste, and fuses and sublimes when gently heated. Santonin should be colourless, but is often yellow as the result of the action of sunlight. It is not dissolved by diluted mineral acids, scarcely at all soluble in cold water, sparingly in boiling water, but in 4 parts of chloroform and in 40 parts of cold and 3 parts of boiling alcohol (90 per cent.). If added to warm alcoholic solution of hydroxide of potassium, it imparts to it a violet-red colour. Ignited with free access of air, it burns without leaving any residue.

Therapeutics. — Santonin is an anthelmintic for round worms, but is not destructive to tapeworms. It is of greater efficacy in horses than in dogs. It is best given to the dog in a little butter placed at the back of the mouth, or in the form of a ball after fasting. An aperient, such as 4 fluid drachms of castor oil or a dose of calomel, should be administered to the dog about four or five hours after the santonin is given.

Dose.—

Dog	1 to 5 grains.
Man	2 to 5 ,,
Pig	2 to 10 ,,
Horse	15 to 40 ,,

SAPO MOLLIS (A. and B.).

Soft Soap.

Characters.—This soap, which is made with potash and olive oil, is of a yellowish colour. It is without odour, and of a gelatinous consistence. Soft soap is soluble in rectified spirit, and does not impart an oily stain to paper. When incinerated, it yields an ash which is highly deliquescent.

Preparation.—Linimentum Terebinthinæ.

SARSÆ RADIX (B.).[1]

Sarsaparilla.

Description.—This is the dried root of *Smilax ornata*, Hook. f. (*Bot. Mag.*, table 7,054), known as Jamaica Sarsaparilla, and obtained from Costa Rica. The roots are long, cylindrical, tough and flexible, brownish, folded together and bound with another root into bundles ½ metre long and about 11 centimetres in diameter. The roots are 5 millimetres thick, wrinkled lengthwise, and have many rootlets. A transverse section shows a brown cortex and yellow wood. It is odourless, and only a little bitter in taste.

Actions and Uses. — Possibly diaphoretic and diuretic. Smilacin (a crystalline principle allied to Saponin) is excreted in the urine. The concentrated compound solution should be freely used.

SCILLA (A. and B.).

Squill.

Natural Order.—Liliaceæ.

Mode of Preparation.—The bulb of *Urginea Scilla* is divested of its dry membranous outer scales, cut into slices, and dried. It is obtained from the Mediterranean coast.

Characters.—The slices, as generally seen, are flattish or somewhat four-sided, curved, yellowish-white or slightly pinkish, from about 1 to 2 inches in length, translucent, inodorous, of a mucilaginous and very bitter taste with a slight tinge of sweetness, brittle and easily pulverizable if quite dry, but tough and flexible when moist.

Composition. — From squill can be obtained a bitter non-nitrogenous glucoside, scillaïn, also scillipicrin, and scillitoxin, chemically similar, and a quantity of mucilage.

Dose of Squill in Powder :

Man	1 to 3 grains.
Dog	1 to 4 ,,
Pig	4 to 10 ,,
Horse	½ to 1½ drachms.

SCOPARII CACUMINA (A.[2] and B.).

Broom Tops.

Description.—The tops, fresh or dried, of *Cytisus scoparius*, Linné, Link. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 70). Nat. Ord., Leguminosæ. The stem is of dark-green hue, and has long, straight and thin alternately-placed branches, which, as well as the upper part of the stem, are winged, tough, flexible, and glabrous. The leaves are small, sessile, and simple above, and stalked and trifoliate below. The taste is bitter, and the odour of the fresh tops is peculiar; but when they are dry, smell is absent.

Actions and Uses.—Diuretic. Scoparin is purgative as well. Sparteine increases the force of the heart, but it seems not equal to digitalis. Broom

[1] The United States Pharmacopœia has Sarsaparilla, the root of *Smilax officinalis*, Kunth, and various species of Smilax.

[2] The United States Pharmacopœia name is Scoparius.

is used in cases of cardiac dropsy, together with digitalis and acetate of potassium. It is not to be used in acute renal dropsy.

Dose.—*Dog* - - - - - - - 15 to 30 grains.
Pig - - - - - - - ½ to 1 drachm.
Horse - - - - - - - ½ to 1 ounce.

SENEGÆ RADIX (A [1] and B.).

Senega Root.

Description.—The dried root of *Polygala Senega*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. i., plate 29). Nat. Ord., Polygaleæ. Yellowish slender roots, about 7·5 centimetres long, terminated at the top by a knotty crown bearing the bases of many aerial stems. The roots are often curved, not much branched, wrinkled lengthwise and sideways, keeled when dry, and snap off in short sections. A section shows a horny translucent cortex free from starch grains, and a white wood. Odour peculiar, taste at first sweet, then acrid.

Actions and Uses:

Externally.—Used as snuff, senega is a strong irritant, and causes sneezing, cough, and flow of mucous discharge. If solutions of saponin are injected under the skin, irritation and depression are caused locally and generally.

Internally.—Senega causes irritation of the stomach and intestines, large doses producing epigastric heat, sickness, and diarrhœa, and smaller doses disturbing digestion. It diminishes the frequency of the heart. It is probably excreted by the bronchial mucous membrane, and it stimulates the mucous secretion, and also causes cough and expectoration. It is useful in the second stage of acute bronchitis, chronic bronchitis, and bronchiectasis. It is not suitable in the first stage of bronchitis, phthisis, and when digestion is feeble. Saponin is excreted by the skin and kidneys, both of which it stimulates.

Dose.—*Dog* - - - - - - - ¼ to ½ drachm.
Pig - - - - - - - ½ to 1 ,,
Horse - - - - - - - ½ to 1 ounce.

SENNA ALEXANDRINA (A.[2] and B.).

Alexandrian Senna.

Description.—The dried leaflets of *Cassia acutifolia*, Delile (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 90)—Nat. Ord., Leguminosæ—are pale greenish, thin and brittle, about 1 inch in length. As a rule they are lanceolate, but may be oval-lanceolate, acute, entire and unequal at the base, and the greatest breadth is often below the middle. The surface is generally very finely pubescent, and the veins on the under-surface are distinct. The epidermis has unicellular and thick-walled hairs. The odour is faint, and the taste mucilaginous.

[1] Called Senega in the United States Pharmacopœia.

[2] Senna Alexandrina and Senna Indica are both described under one heading, Senna, in the United States Pharmacopœia.

SENNA INDICA (A. and B.).

East Indian Senna.

Description.—The dried leaflets of *Cassia angustifolia*, Vahl (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 91)—Nat. Ord., Leguminosæ—obtained from plants cultivated in Southern India. About 1½ inches long, lanceolate, acute, the greatest breadth being near the middle, unequal at the base, thin, entire, yellowish-green and smooth above, glabrous or slightly pubescent below.

Actions and Uses.—Senna stimulates the muscular part of the intestine, causing purgation in about five hours. It is the colon which is mainly excited to action, whereby the contents received from the ileum are passed on. Full doses cause evacuation and griping, but not inflammation, though the pelvic structures may become congested, producing the appearance of piles, and also of menstruation. It is often used to complete the effect of mercurial and other duodenal aperients given some hours previously. It does not cause subsequent constipation. Cathartic acid, the active principle, acts best with acids. This acid and chrysophanic acid enter the blood and are excreted by the renal and mammary glands, and the chrysophanic acid stains the urine yellow.

Senna acts as a purgative when injected into the veins of animals.

Doses of either Senna Alexandrina or Senna Indica:

Dog	½ to 2½ drachms.
Pig	1 to 5 ,,
Sheep	1½ to 8 ,,
Horse	1 to 3 ounces.
Ox	2 to 5 ,,

SEVUM PRÆPARATUM (A. and B.).

Prepared Suet.

Natural Order.—Ruminantia.

Mode of Preparation.—The internal fat of the abdomen of the sheep, *Ovis Aries*, Linné (Class, Mammalia; Order, Ruminantia), is purified by melting and straining.

Characters.—Prepared suet is white, smooth, almost without odour, melting at about 46·65° C., and resolidifying at 37·8° C. It is freely soluble

in petroleum spirit, slowly soluble in benzol, not soluble in cold alcohol, and to a small extent only in ether or boiling alcohol (90 per cent.).

Preparation.—Unguentum Hydrargyri.

Therapeutics.—Prepared suet is sometimes used in the preparation of ointments in the place of lard.

SINAPIS (A.[1] and B.).

Mustard.

Natural Order.—Cruciferæ.

Characters.—Black and white mustard-seeds, *Brassica nigra*, Koch, and *B. alba*, Boiss (B. and T., *Med. Pl.*, vol. i., plates 22 and 23), powdered and mixed, yield a greenish-yellow powder with an acrid, bitterish, oily, pungent taste. When dry the powder is without scent, but when moist exhales a pungent, penetrating, peculiar odour, which is very irritating to the nostrils and eyes.

Tests.—A decoction when cooled is not made blue by tincture of iodine, as it would be if adulterated with starch, nor does it turn brown on addition of boric acid.

Therapeutics.—When applied externally, mustard is rubefacient, stimulant, and vesicant. Compared with cantharides, it is more rapid, but more transient in effect. Unlike cantharides, it is not liable to inflame the kidneys. It is very extensively employed as a counter-irritant for inflammation of the throat, larynx, bronchi, lungs, and pleura. In colic, acute dyspepsia, gastritis, enteritis, and muscular rheumatism, it is useful for relieving pain. As a direct cardiac stimulant, it is applied over the region of the heart in syncope, coma, or asphyxia, whatever be the cause of those conditions. Mustard is made into a paste with hot water, to which ammonia solution or oil of turpentine may be added. Internally, mustard is stimulant, stomachic, carminative, diuretic, and aperient. It is rarely administered in veterinary practice, except as an emetic for dogs and cats which have accidentally swallowed poison or deleterious food.

Dose of Mustard Powdered:

As a stomachic:

Dog	15 to 20 grains.
Pig	¼ to 1½ drachms.
Sheep	½ to 1¾ ,,
Horse	¼ to 1 ounce.
Ox	½ to 1½ ounces.

As an emetic:

Cat	1 drachm.
Dog	2 to 4 drachms.

[1] Under two divisions in the United States Pharmacopœia—viz., Sinapis alba, the seed of *Brassica alba* (Linné), Hooker filius et Thompson, and S. nigra, the seed of *B. nigra* (Linné), Koch. Also in the British Pharmacopœia under three headings: Sinapis, Sinapis Albæ Semina, and Sinapis Nigræ Semina.

SODII BENZOAS (A. and B.).

Benzoate of Sodium.

Description.—Benzoate of sodium, C_6H_5COONa, is prepared by acting on benzoic acid with carbonate of sodium, and should be kept in well-stoppered bottles. It is a white powder, with slight smell of benzoin and a peculiar sweet saline taste, soluble in less than 2 parts of cold water, 24 of cold alcohol (90 per cent.), and in 12 of boiling alcohol (90 per cent.). An aqueous solution has a slightly alkaline reaction, and yields a yellowish precipitate with ferric chloride T.S. If to a strong aqueous solution a little diluted hydrochloric acid be added, a precipitate of benzoic acid results.

Therapeutics.—This salt has been given to lambs suffering from rheumatic arthritis; but it is not so efficacious in this disease as other remedies, such as salicylate of sodium with bicarbonate of potassium, coupled, of course, with other measures, medical and hygienic.

Dose.—*Man and Lamb* - - 5 to 30 grains.

SODII BICARBONAS (A. and B.).

Bicarbonate of Sodium.

Formula.—$NaHCO_3$.

Mode of Preparation.—Bicarbonate of sodium is obtained by saturating carbonate of sodium with carbonic acid gas or by acting on chloride of sodium with bicarbonate of ammonium.

Characters.—The salt is seen in the form of powder, or in that of small opaque irregular scales. Bicarbonate of sodium is white, and has a saline and not unpleasant taste. It imparts a yellow colour to flame, and is soluble in 11 parts of cold water. In diluted hydrochloric acid, bicarbonate of sodium dissolves with much effervescence, forming a solution which, with perchloride of platinum, yields no precipitate (absence of potassium). A solution of bicarbonate of sodium in cold water yields, with solution of perchloride of mercury, a white precipitate which becomes brownish (absence of sodium carbonate). When excess of nitric acid is added to an aqueous solution, scarcely any precipitate is produced by chloride of barium or nitrate of silver (absence of sulphates and chlorides). Addition of ferric chloride to an aqueous solution with a little hydrochloric acid causes no red colour (proving that a thio-

cyanate is not present). A quantity of bicarbonate of sodium weighing 20 grains neutralizes 16·7 parts of citric and 17·8 of tartaric acid.

Therapeutics.—Bicarbonate of sodium is antacid, and when taken internally increases the alkalinity of the blood. Its action resembles that of bicarbonate of potassium, but the salts of sodium have not the depressing action of the salts of potassium, and may consequently be given for a greater length of time. The salts of sodium are much less diffusible than those of potassium, and, unlike them, have no specific influence on any organ. Internally, bicarbonate of sodium is given in flatulence and dyspepsia. In acute rheumatism its effect is not so beneficial as that of the potassium salt, and, strange as it may at first sight seem, bicarbonate of potassium in the majority of cases seems to act more beneficially than the corresponding sodium salt. As an external application, solutions of about 2 or 3 grains to the ounce of water are useful in abating the itching in acute eczema and prurigo.

Dose.—

Man	5 to 30 grains.
Dog	9 to 40 ,,
Pig	½ to 1½ drachms.
Sheep	½ to 2 ,,
Horse	½ to 1½ ounces.
Ox	½ to 2 ,,

SODII BIBORAS.[1]

Biborate of Sodium.

Formula.—Borax, or bi- or pyro-borate of sodium occurs as such in nature, and has the formula, $Na_2B_4O_7,10H_2O$.

Mode of Preparation.—It can be prepared by boiling together in the correct proportions native boric acid and carbonate of sodium, or by boiling native calcium borate with solution of carbonate of sodium.

Characters.—Borax occurs in transparent colourless crystals, sometimes slightly effloresced. It has a faint alkaline reaction, and is soluble in 25 times its weight of cold, and in half its weight of boiling, water, and in its own weight of glycerin, but insoluble in alcohol.

Tests.—A hot saturated solution, when acidulated with any of the mineral acids, gives rise as it cools to a scaly crystalline

[1] In the United States Pharmacopœia it is known as Sodii Boras, and in the British Pharmacopœia as Borax.

deposit of boric acid. The salt itself burns with a yellow flame, but a solution of boric acid or a borate when added to spirit burns with a green flame. It turns turmeric paper brown. Absence of lead, copper, arsenium, iron, calcium, magnesium, carbonates, nitrates, or phosphates should be demonstrable, and there should only be the merest trace of chlorides or sulphates.

Borax is used in the preparation of boric acid.

Therapeutics.—The action of borax is similar to that of boric acid. It has mild but efficient antiseptic and disinfectant properties, and is antacid. It is not much employed therapeutically. In aphthous and diphtheritic conditions of the mouth, either borax in powder or glycerin of borax proves very useful as a dressing. As a lotion in itching skin affections, borax proves very soothing. Internally, this salt has been given along with other remedies in cases of dyspepsia.

Dose.—

Man	5 to 20 grains.
Dog	5 to 20 ,,
Pig	15 to 40 ,,
Horse	1 to 4 ,,

SODII BROMIDUM (A. and B.).

Bromide of Sodium.

Formula.—NaBr.

Mode of Preparation.—Bromide of sodium may be obtained by a process similar to that by which bromide of potassium is made, solution of hydroxide of sodium being used in the place of solution of hydroxide of potassium, and crystallization being conducted from warm solutions.

Characters.—Bromide of sodium is a granular white powder composed of small monoclinic crystals. It is slightly deliquescent, inodorous, and possesses a sharp and somewhat peculiar saline taste. It is readily soluble in less than twice its weight of water, and in 16 parts of alcohol (90 per cent.).

Tests.—To a flame the salt imparts an intense yellow colour. When an aqueous solution of bromide of sodium is mixed with a little chlorine water, bromine is set free and chloride of sodium formed. If now it is shaken with chloroform the latter takes up the bromine, and thereby acquires a red colour.

An aqueous solution of bromide of sodium mixed with mucilage of starch, and a little solution of chlorine or of bromine, should

not exhibit any blue colour, thus proving the absence of iodide of sodium as an impurity. Addition of ferric chloride should impart no red colour to an aqueous solution, proving the absence of a thiocyanate.

Therapeutics.—Bromide of sodium is given for the same purposes and in the same doses as the corresponding salt of potassium; but it does not appear to act so well.

Dose.—

Man	5 to 30 grains.
Dog	6 to 40 ,,
Pig	$\frac{1}{4}$ to $1\frac{1}{2}$ drachms.
Sheep	1 to 3 ,,
Horse	2 to 8 ,,
Ox	$\frac{1}{2}$ to $1\frac{1}{2}$ ounces.

SODII CARBONAS (A. and B.).

Carbonate of Sodium.

Formula.—$Na_2CO_3,10H_2O$.

Mode of Preparation.—Carbonate of sodium is generally obtained from chloride of sodium, either by reaction with bicarbonate of ammonium and subsequent ignition, or by conversion into sulphate of sodium, and the subsequent action of heat on a mixture of the sulphate with carbon and carbonate of calcium.

Characters and Tests.—Carbonate of sodium exists in transparent, colourless, laminar crystals of a rhombic shape. The salt is efflorescent, and has a harsh alkaline taste and a strong alkaline reaction. It is soluble in 2 parts of cold water. Like all salts of sodium and the metal sodium itself, it imparts a yellow colour to a colourless flame. It dissolves with effervescence in diluted hydrochloric acid, giving off carbonic acid gas, and forming a solution of chloride of sodium which does not give a precipitate with solution of perchloride of platinum. If heated it fuses, and then dries up, losing 62·93 per cent. of its weight. If excess of nitric acid is added, only very slight precipitation results from the subsequent addition of chloride of barium or nitrate of silver. Thus the absence of a sulphate or chloride is proved. Mercuric chloride solution gives to an aqueous solution at once a brownish-red precipitate, and not a white one turning into brown, as is the case with the bicarbonate. For neutralization 20 parts by weight require 9·8 of citric and 10·5 of tartaric acids.

Therapeutics.—Carbonate of sodium is given for the same

purposes, but in less doses than bicarbonate of sodium (see Sodii Bicarbonas).

Dose of Carbonate of Sodium :

Dog	5 to 25 grains.
Man	5 to 30 ,,
Pig	¼ to ½ drachm.
Sheep	½ to 1 ,,
Horse	2 to 5 drachms.
Ox	2 to 6 ,,

SODII CHLORIDUM (A. and B.).

Chloride of Sodium.

Synonym.—Common Salt.

Formula.—NaCl.

Characters.—Chloride of sodium exists in small white crystalline grains or transparent cubic crystals. It is free from moisture, has a purely saline taste, imparts a yellow colour to flame, and is soluble in less than 3 parts of water.

Tests.—An aqueous solution is not precipitated by perchloride of platinum, but gives with nitrate of silver a white precipitate of chloride of silver, which is soluble in ammonia, but insoluble in nitric acid.

Therapeutics.—Chloride of sodium is an important element of food, but it is not very largely employed medicinally. It is a good practice to always keep rock-salt in the manger or trough, as horses, cattle, and sheep are thus maintained in a more healthy condition. Horses are rendered less liable to become infested with intestinal worms by this practice. Small doses of salt are stomachic and alterative, larger ones are laxative or cathartic. As an emetic for dogs, from 1 to 3 drachms dissolved in warm water are generally requisite. It is a good plan to add 3 grains of sulphate of zinc when it is desired to induce more rapid emesis. As an anthelmintic, salt is often given internally to cattle and sheep; and, in the form of enemata, 2 ounces dissolved in a pint of water prove useful in dislodging rectal worms in horses. As a purgative, salt is also sometimes given to cattle and sheep. Externally, solutions of salt are slightly stimulant, and are of value as antiseptics. Pigs are very easily poisoned by salt.

Dose of Chloride of Sodium :

Dog	10 to 25 grains as alterative and 1 to 3 drachms as emetic.
Pig	5 to 10 grains.[1]
Sheep	½ to 2 drachms as alterative, but even to 1 ounce or more as a purgative.
Horse	½ to 1½ ounces.
Ox	½ to 1 pound as a purgative (grammes 250 to 500).

[1] Swine are easily poisoned by salt, and it is really best never to give them it, as mistakes might occur. Similarly, dogs and cats are prone to poisoning by chloroform and by strychnine. A cat may be poisoned by even $\frac{1}{30}$ grain of the latter.

SODII HYDROXIDUM.[1]

Hydroxide of Sodium.

Synonyms.—Soda Caustica; Caustic Soda.

Formula.—NaHO (Hydroxide of sodium generally contains some impurities).

Mode of Preparation.—Boil down rapidly in a silver or clean iron vessel 2 pints of solution of hydroxide of sodium, until a fluid of oily consistence—a drop of which when removed on a warm glass rod solidifies on cooling—is produced. Pour this fluid on a clean silver or iron plate or into moulds, and, as soon as it has solidified, break it into pieces, and preserve it in stoppered green-glass bottles.

Characters.—Hydroxide of sodium is hard, grayish-white, very alkaline, and, like hydroxide of potassium, corrosive. Like all substances containing sodium, it imparts a yellow colour to a colourless flame. An aqueous solution acidulated with nitric acid yields merely scanty white precipitates with nitrate of silver and with chloride of barium, thereby proving the absence of any chloride, and of any sulphate or of the corresponding acids.

Preparation.—Liquor Sodii Hydroxidi, which contains 18·8 grains in 1 fluid ounce.[2]

Therapeutics.—Hydroxide of sodium is sometimes used as a caustic, but is less powerful than hydroxide of potassium.

Dose[3] of the above Liquor Sodii Hydroxidi:

Dog	5 to 20	minims
Pig	¼ to ¾	fluid drachm.
Sheep	½ to 1	,, ,,
Horse	½ to ¾	,, ounce.
Ox	½ to 1	,, ,,

SODII IODIDUM (A. and B.).

Iodide of Sodium.

Formula.—NaI.

Mode of Preparation.—Iodide of sodium may be obtained by a process similar to that by which iodide of potassium is produced, except that solution of hydroxide of sodium is used in place of solution of hydroxide of potassium, the salt being crystallized at 20° C.

Characters.—Iodide of sodium is a dry, white, crystalline,

[1] It occurs in the United States Pharmacopœia under the title of Soda; but this might lead to error, because popularly carbonate of sodium is called by that name.

[2] This solution would be made by dissolving 39⅛ parts by weight of soda in 960⅞ of distilled water; but a form given in the United States Pharmacopœia is 56 of soda in 944 of water.

[3] These doses were computed for the Liquor Sodæ of the British Pharmacopœia of 1885. In the present British Pharmacopœia there is no such preparation. If the United States Pharmacopœia preparation be used, the doses are about ⅔ of those given above.

deliquescent powder, possessing a saline and somewhat bitter taste. It is readily soluble in less than its weight of water and in 3 parts of alcohol (90 per cent.).

Tests.—An aqueous solution is neutral in reaction, and, when mixed with mucilage of starch, it yields a blue colour on the addition of a little chlorine. The salt imparts an intense yellow colour to a flame. The addition of tartaric acid and mucilage of starch to an aqueous solution does not produce a blue colour. Solution of nitrate of silver, added in excess, gives a yellowish-white precipitate of iodide of silver, which, when well shaken with diluted solution of ammonia, yields by subsidence a clear liquid in which excess of nitric acid causes very little turbidity. An aqueous solution of iodide of sodium is only faintly precipitated by the addition of saccharated solution of lime.

Therapeutics.—Iodide of sodium is employed for the same purposes as iodide of potassium. It apparently irritates the stomach less than the salt of potassium, and may be given in somewhat larger doses.

Dose.—

Dog	2 to 10	grains.
Man	5 to 20	,,
Pig	5 to 20	,,
Sheep	10 to 30	,,
Horse	½ to 2½	drachms.
Ox	1 to 4	,,

SODII SALICYLAS (A. and B.).

Salicylate of Sodium.

Formula.—$(C_6H_4 \cdot OH \cdot COONa)_2, H_2O$.

Mode of Preparation.—Salicylate of sodium is obtained by the action of salicylic acid on either carbonate of sodium or on hydroxide of sodium.

Characters.—Salicylate of sodium exists in small, colourless, or nearly colourless, crystalline lustrous scales. It is inodorous, and has a sweetish saline taste. It is soluble in less than its own weight of cold water, and in 6 parts of alcohol (90 per cent.). In cold sulphuric acid it dissolves without coloration or effervescence.

Tests.—The solutions are neutral or faintly acid in reaction. When ignited, the salt evolves inflammable vapours, and a white residue remains, which effervesces with acids and imparts an intense yellow colour to flame. Perchloride of iron, added to a

concentrated solution, gives it a reddish-brown colour. If added to a diluted solution, perchloride of iron renders it violet. A 1 per cent. aqueous solution yields a yellowish-brown precipitate on addition of uranium nitrate solution, thus differing from carbolates and sulphocarbolates. It is soluble in cold sulphuric acid without either effervescing or becoming coloured, thus showing that no carbonate or organic impurity is present. If an aqueous solution be acidulated with nitric acid, and the precipitate be dissolved in rectified spirit, the mixture is not made more than faintly opalescent by chloride of barium or by nitrate of silver, thus indicating the absence of a sulphate or a chloride.

Therapeutics.—The action of salicylate of sodium is very like that of salicylic acid,[1] but the salt of sodium has no destructive power over lowly developed organisms. It is a very powerful antipyretic, and is especially valuable in acute rheumatism and other febrile conditions.

Dose.—

Dog	5 to 20 grains.
Man	5 to 30 ,,
Pig	10 to 40 ,,
Sheep	1 to 2½ drachms.
Horse	1 to 5 ,,
Ox	2 to 7 ,,

SODII SULPHAS (A. and B.).

Sulphate of Sodium.

Synonym.—Glauber's Salt.

Formula.—$Na_2SO_4,10H_2O$.

Mode of Preparation.—Sulphate of sodium may be obtained from the residue left in the manufacture of hydrochloric acid from chloride of sodium, by neutralizing it with carbonate of sodium, and crystallizing from solution in water, also by acting on any salt of sodium with sulphuric acid.

Characters.—Sulphate of sodium exists in transparent oblique monoclinic prisms. The salt has a saline and bitter taste, effloresces on exposure to the air, is soluble in less than half its weight of water at 27·5° C., but insoluble in spirit. An aqueous solution, heated to boiling, deposits anhydrous crystals. If exposed to heat in a porcelain crucible, sulphate of sodium loses 55·9 per cent. of water.

[1] *Vide* Acidum Salicylicum.

Test.—The salt imparts a yellow colour to flame.

Therapeutics.—Sulphate of sodium has a similar action as a purgative to that of sulphate of magnesium. Being less reliable than the latter salt, it is not much used, excepting as a cathartic for cattle. It has also alterative and diuretic properties. In the dog it causes emesis as well as catharsis, but it is seldom or never employed for this animal.

Dose.—*Man* - - - 30 to 120 grains, but for one administration ¼ to ½ ounce.

Dog - - - ½ to 2 drachms.

Sheep - - - 1 to 3 ounces.

Horse - - - 1½ to 4 „

Ox - - - - ½ to 1 pound.

SODII SULPHIS (A. and B.).

Sulphite of Sodium.

Formula.—$Na_2SO_3,7H_2O$.

Mode of Preparation.—Sulphite of sodium is obtained by the action of sulphurous acid on carbonate of sodium or on hydroxide of sodium.

Characters.—Sulphite of sodium exists in colourless, transparent, monoclinic prisms. It effloresces in dry air, is inodorous, and has a cooling, saline, and sulphurous taste. The salt is readily soluble in water, and very sparingly in alcohol. An aqueous solution has a neutral or faintly alkaline reaction, imparts an intense yellow colour to flame, and if treated with hydrochloric acid evolves sulphurous oxide gas, but does not become cloudy (proving that a thiosulphate is not present). One gramme in 50 c.c. of water decolourizes about 79·7 c.c. volumetric solution of iodine.

Therapeutics.—Sulphite of sodium is antiseptic and deodorant. It evolves sulphurous acid on addition of hydrochloric acid to the aqueous solution, and also when ingested into the stomach. It has been very extensively administered in veterinary practice in septic diseases, such as the specific fevers, as influenza, scarlet fever, strangles, purpura, and anthrax of horses; pleuro-pneumonia, cattle-plague, foot-and-mouth disease, and anthrax of cattle; in foot-and-mouth disease and anthrax of sheep; in swine fever; and in pyæmia and septicæmia of various animals. Although this salt has been so extensively given, there is still a difference of opinion regarding its value in septic diseases. It

is often prescribed as a preventive against invasion by the specific diseases, especially anthrax. In foot-and-mouth disease it is unquestionably of great value. (See Mr. J. B. Gresswell's article in the *Veterinarian* and *Veterinary Journal*, January, 1884, on the action of this salt.)

Dose of either Sulphite, Bisulphite, or Hyposulphite of Sodium:

Man	5 to 20 grains.
Dog	5 to 30 ,,
Pig	¼ to ½ drachm.
Sheep	½ to 1½ drachms.
Horse	½ to ¾ ounce.
Ox	½ to 1 ,,

SODII SULPHOCARBOLAS (A. and B.).

Sulphocarbolate of Sodium.

Mode of Preparation.—Sulphocarbolate of sodium, or sodium phenol - para - sulphonate, $C_6H_4OH{\cdot}SO_2ONa,2H_2O$, may be obtained by dissolving phenol in excess of sulphuric acid (whereby phenolsulphonic acid is formed), supersaturating the liquid with carbonate of barium, filtering, and treating the filtrate with carbonate of sodium until no more precipitation occurs. The filtrate from this mixture yields on evaporation crystals of sulphocarbolate of sodium.

Characters.—Sulphocarbolate of sodium exists in colourless transparent monoclinic prisms. The salt is odourless, or nearly so, and has a cooling, saline, and somewhat bitter taste. It is readily soluble in 6 parts of water, and in 150 parts of alcohol (90 per cent.). The solutions are neutral in reaction.

Tests.—If ignited, the salt gives off vapours of phenol and leaves a residue, sulphate of sodium, the solution of which in water gives with chloride of barium a white precipitate, which is insoluble in hydrochloric acid. It imparts an intense yellow colour to flame. The diluted aqueous solution is rendered violet by perchloride of iron. It does not, like a solution of a salicylate, give a yellowish-brown precipitate with uranium nitrate. It should not at once be rendered turbid by chloride of barium.

Therapeutics.—Sulphocarbolate of sodium is a safe and useful antiseptic, and has also alterative properties.

It has been given in indigestion in horses, in flatulent dyspepsia

in dogs, and in tympanitis in cattle. For influenza in horses it is in some cases advised by Mr. J. B. Gresswell, and also for tabes mesenterica in cattle.

Dose.—*Dog* - - - - 3 to 12 grains.
Man - - - - 3 to 15 ,,
Pig - - - - 5 to 20 ,,
Horse - - - - ½ to 1½ drachms.
Ox - - - - 1 to 2½ ,,

SODIUM (B.).

Sodium.

Description.—This metal should be kept under mineral naphtha in well-stoppered bottles. It is soft and easily cut, rapidly combines with oxygen if exposed to the air, and is violently acted on by water or alcohol, setting hydrogen free, which burns with a yellow flame, and forming a solution of hydrate of sodium thus: $Na + 2H_2O = NaHO + H + H_2O$. All substances containing sodium or salts of sodium impart a yellow tinge to flame. If 1 gramme be carefully added to water, the resulting solution needs 42·6 c.c. volumetric solution of sulphuric acid to be neutralized.

SPARTEINÆ SULPHAS (A.).

Sulphate of Sparteine.

Description.—It is the neutral sulphate of an alkaloid prepared from scoparius, and has the formula, $C_{15}H_{26}N_2H_2SO_4 + 4H_2O$. It has the form of colourless prismatic crystals, or of a white granular powder, devoid of odour, and with saline bitter taste. In damp air it attracts water, and is highly soluble in water and alcohol. If heated to 83° C., it loses water, all of which goes at 100° C., and at 136° C. it melts, and when ignited burns without residue. It is neutral to litmus.

Use.—It has been given in cardiac disease, because it increases the force of the heart, but it seems inferior to digitalis.

Dose.—*Man* - - - - - - - ½⅕ grain.
Dog - - - - - - - 1/15 to ¼ grain.

SPIRITUS ÆTHERIS (B.).[1]

Spirit of Ether.

Mode of Preparation.—Mix 500 c.c. of ether with 1,000 c.c. alcohol (90 per cent.).

Test.—The specific gravity is 0·8085.

[1] The Spiritus Ætheris of the United States Pharmacopœia is made by mixing 325 c.c. of Ether with 675 c.c. Alcohol, making 1,000 c.c. in all, so that the spirit contains 32·5 per cent. of Ether, whilst the British Pharmacopœia spirit has 33·3 or 33⅓ per cent.

Preparation.—Tinctura Lobeliæ Ætherea.

Therapeutics.—Spirit of ether is given for flatulent and painful dyspepsia in dogs, and for flatulent colic in horses.

Dose.—*Man* - - - 20 to 40 minims, or for a single dose 60 to 90 minims.
Dog - - - 10 minims to 1 fluid drachm.
Sheep and Pig - - 1 to 3 fluid drachms.
Horse and Ox - - 1 to 2½ „ ounces.

SPIRITUS ÆTHERIS NITROSI (B.).[1]

Spirit of Nitrous Ether.

Synonym.—Sweet Spirit of Nitre.

Composition.—Spirit of nitrous ether contains ethyl nitrite, aldehyde, and other substances.

Characters.—Spirit of nitrous ether is transparent and nearly colourless, but with a slight yellow tinge, mobile, inflammable, possessing a peculiar penetrating apple-like odour, and a sweetish, cooling, sharp taste.

Tests.—The specific gravity is about 0·840. If shaken with a little bicarbonate of sodium, spirit of nitrous ether does not effervesce, or does so only feebly. If it is agitated in a test-tube with a strong solution of sulphate of iron, and a few drops of strong sulphuric acid are poured down the sides of the tube, a deep olive-brown or black zone is produced, which widens as the tube is gently shaken.

Therapeutics.—Spirit of nitrous ether is a diffusible stimulant, carminative, and antispasmodic. It lowers arterial tension, and, by relaxing the renal vessels, acts as a diuretic. It has also antiseptic powers in febrile conditions, diminishing the production of heat in the system by its action on the blood, and by increasing the loss of heat through the kidneys, and also by its diaphoretic action on the skin.

It is administered as an antispasmodic and carminative in flatulent dyspepsia, hoven, and in colic of the spasmodic or

[1] The Spiritus Ætheris Nitrosi of the United States Pharmacopœia has a specific gravity of 0·82, and is an alcoholic solution of Ethyl Nitrite, $C_2H_5NO_2$, showing, when fresh and tested in a nitrometer, not less than 11 times its own volume of Nitrogen Dioxide, NO; whereas the British Pharmacopœia spirit contains about 6⅝ volumes, which corresponds to at least 2½ parts by weight of Ethyl Nitrite in 100 parts by weight of the spirit.

flatulent variety. As a febrifuge, it is often prescribed, together with solution of acetate of ammonium and other remedies, for catarrh and other febrile conditions. As a diffusible stimulant it is also frequently given to horses recovering from influenza and other debilitating diseases. As a diuretic it is generally given with oil of turpentine or oil of juniper.

Dose.—

Dog	- - -	10 to 50 minims.
Man	- - -	20 to 40 minims, or for a single dose 60 to 90 minims.
Pig	- - -	1 to 2½ fluid drachms.
Sheep	- - -	2 to 4 ,, ,,
Horse	- - -	1 to 3 ,, ,,
Ox	- - -	1 to 4 ,, ounces.

SPIRITUS AMMONIÆ AROMATICUS (A. and B.).[1]

Aromatic Spirit of Ammonia.

Synonym.—Sal volatile.

Mode of Preparation.—Place 4½ fluid drachms of volatile oil of nutmeg, and 6½ fluid drachms of oil of lemon, and 6 pints of alcohol (90 per cent.), with 3 pints of distilled water in a retort. Distil 7 pints, and then distil and separately collect an additional 9 fluid ounces. Place these 9 fluid ounces of distillate, together with 4 ounces of carbonate of ammonium and 8 fluid ounces of strong solution of ammonia, in a bottle which is capable of holding rather more than a pint. Cork the bottle securely, and gently warm it in a water-bath to 60° C., shaking from time to time until all the salt has dissolved. Filter, if necessary, when cold through a little cotton-wool, and gradually mix the filtrate with the 7 pints of distilled spirit. The product should measure 1 gallon.

Test.—The specific gravity should be 0·8955.

Therapeutics.—Aromatic spirit of ammonia, for the smaller animals especially, is a very convenient preparation. (See Solution of Ammonia.)

[1] The United States Pharmacopœia preparation differs from the above, containing in addition 1 c.c. of Oil of Lavender Flowers in 1,000 c.c., and its specific gravity is 0·905, as opposed to 0·8955 of the British Pharmacopœia spirit.

Dose.—*Dog* - - - 15 to 40 minims.
Man - - - 20 to 40 minims, but for a single dose 1 to 1½ fluid drachms.
Pig - - - 1¼ to 2½ fluid drachms.
Sheep - - - 1½ to 3½ „ „
Horse - - - ⅔ to 1½ „ ounces.
Ox - - - - 1 to 2 „ „

SPIRITUS ANISI (B.).[1]

Spirit of Anise.

Mode of Preparation.—Add enough alcohol (90 per cent.) to 50 c.c. of oil of anise to yield 500 c.c. of the spirit.

Dose.—*Man and Dog* - - 5 to 20 minims.

SPIRITUS CAJUPUTI (B.)

Spirit of Cajuput.

Mode of Preparation.—To 50 c.c. oil of cajuput add sufficient alcohol (90 per cent.) to form 500 c.c. of the mixture. It is well to note that the above mode of preparation gives 5 times as much oil of cajuput as in the British Pharmacopœia of 1885.

Dose.—*Man* - - - - 5 to 20 minims.
Dog - - - - ½ to 1 fluid drachm.
Pig - - - - 1 to 2 „ drachms.
Horse - - - - ½ to 2 „ ounces.

SPIRITUS CAMPHORÆ (A. and B.).[2]

Spirit of Camphor.

Mode of Preparation.—Dissolve 1 ounce of camphor in enough alcohol (90 per cent.) to make 10 fluid ounces (or 50 grammes in sufficient to make 500 c.c.).

Therapeutics.—It is convenient for dogs.

Dose.—*Man and Dog* - - - 5 to 20 minims.
Pig - - - - - ¼ to 1 fluid drachm.
Horse - - - - ¼ to 1 „ ounce.

[1] The United States Pharmacopœia Spirit of Anise is made by mixing 100 c.c. of oil of anise with 900 c.c. of deodorized alcohol. It is therefore a stronger preparation.

[2] The United States Pharmacopœia and British Pharmacopœia spirits are of about the same strength.

SPIRITUS CHLOROFORMI (A.[1] and B.).

Spirit of Chloroform.

Synonyms.—Chloric Ether; Spirit of Chloric Ether.

Mode of Preparation.—Dissolve 1 fluid ounce of chloroform in 19 fluid ounces of alcohol (90 per cent.), or 50 c.c. in 950.

Test.—The specific gravity is 0·871.

Therapeutics.—See Chloroform.

Dose.—*Man* - - - - 5 to 20 minims, or for a single dose 30 to 40 minims.

Dog	- - -	½ to 1 fluid drachm.
Pig	- - -	1 to 3 ,, drachms.
Sheep	- - -	2 to 4 ,, ,,
Horse	- - -	1 to 2 ,, ounces.
Ox	- - -	1 to 3 ,, ,,

SPIRITUS CINNAMOMI (A. and B.).

Spirit of Cinnamon.

Mode of Preparation.—To 50 c.c. oil of cinnamon add sufficient alcohol (90 per cent.) to yield 500 c.c. of the mixture. It contains 5 times as much oil of cinnamon as the 1885 British Pharmacopœia spirit did. The United States Pharmacopœia spirit contains the same as the above—*i.e.*, 10 per cent. of oil of cinnamon, and 90 per cent. alcohol (91 per cent.).

Dose.—*Man* - - - - 5 to 20 minims.

SPIRITUS GAULTHERIÆ (A.).

Spirit of Gaultheria.

Mode of Preparation.—To 50 c.c. of oil of gaultheria add 950 c.c. of alcohol, and mix the two.

SPIRITUS JUNIPERI (A. and B.).

Spirit of Juniper.

Mode of Preparation.—To 50 c.c. oil of juniper add sufficient alcohol (90 per cent.) to form 1,000 c.c. of the mixture.

This 5 per cent. spirit is of the same strength in both Pharma-

[1] The United States Pharmacopœia Spiritus Chloroformi consists of 60 c.c. chloroform mixed with 940 c.c. alcohol (91 per cent.), so that it is a little stronger than the British Pharmacopœia spirit.

copœias, but the spirit of the 1885 British Pharmacopœia contained only 2 per cent.

Dose.—*Man* - - - - 20 to 60 minims.
Dog - - - - ½ to 1 fluid drachm.

SPIRITUS METHYLATUS.

Methylated Spirit.

Composition.—Methylated spirit consists of 90 per cent. of spirit of wine, and 10 per cent. of methylic alcohol, CH_3HO.

Uses.—Methylated spirit is used as a substitute for rectified spirit for external purposes.

SPIRITUS MYRCIÆ (A.).

Spirit of Myrcia.

Mode of Preparation.—Spirit of myrcia, or bay rum, is made by mixing together 16 c.c. oil of myrcia, 1 c.c. oil of orange peel, 1 c.c. oil of pimenta, with 1,220 c.c. alcohol, and adding enough water to make 2,000 c.c. in all. Place the mixture aside in a carefully-closed bottle for eight days, then filter through paper in a well-covered funnel.

SPIRITUS RECTIFICATUS (B.).[1]

Rectified Spirit.

Description.—Alcohol (90 per cent.), or rectified spirit, contains 90 parts by volume of ethyl hydroxide, C_2H_5OH, and 10 of water and it is prepared by the distillation of fermented saccharine liquids.

Characters and Tests.—It is a colourless, transparent, highly mobile and inflammable liquid, burning with a blue, smokeless flame. It has a pleasant odour and strong taste. Specific gravity is 0·8340. It contains 85·65 per cent. by weight of ethyl hydroxide, C_2H_5OH, and 14·35 per cent. by weight of water.

Absence of solid impurity is proved by there being no residue after burning; absence of oily or resinous material by there

[1] In the United States Pharmacopœia there are:

1. Alcohol, containing 91 per cent. by weight, or 94 by volume, of ethyl alcohol.
2. Absolute alcohol, containing 99 per cent. by weight of ethyl alcohol.
3. Alcohol deodoratum, containing 92·5 per cent. by weight of ethyl alcohol
4. Alcohol dilutum, containing 41 per cent. by weight of ethyl alcohol.

being no cloudiness when it is mixed with water; absence of fusel oil, etc., by no unpleasant smell remaining after the alcohol or clean paper has evaporated; absence of more than traces of aldehyde by the fact that, when mixed with half its volume on solution of hydroxide of potassium, the solution does not become dark; absence of tannic acid, excess of aldehyde, and other organic impurities, by the fact that ammonia does not cause it to become dark.

If it be mixed with water, lessening of volume and rise of temperature occur, and this mixture should be allowed to cool before use.

Diluted alcohol may contain 70, 60, 45, or 20 per cent. by volume of ethyl hydroxide.

1. Alcohol (70 per cent.): With 1,000 c.c. alcohol (90 per cent.) mix 310·5 c.c. distilled water; specific gravity, 0·89.

2. Alcohol (60 per cent.): With 1,000 c.c. alcohol (90 per cent.) mix 536·5 c.c. distilled water; specific gravity, 0·9135.

3. Alcohol (45 per cent.): With 1,000 c.c. alcohol (90 per cent.) mix 1053·4 c.c. distilled water; specific gravity, 0·9436.

4. Alcohol (20 per cent.): With 1,000 c.c. alcohol (90 per cent.) mix 3,558 c.c. distilled water; specific gravity, 0·976.

Therapeutics.—Externally, alcohol is antiseptic and disinfectant. It is also refrigerant, rubefacient, and stimulant. It is extensively used in the preparation of tinctures, ethers, and extracts. As a refrigerant, it is a common ingredient of so-called evaporating or cooling lotions; but for this purpose methylated spirit serves the purpose equally as well. A good cooling lotion may be made of 1 ounce of rectified or methylated spirit, ½ ounce of chloride of ammonium, and 1 pint of water.

Internally, alcohol is a diffusible stimulant, and a promoter of gastric digestion, diuretic and diaphoretic. Inasmuch as it is a source of energy and heat, it is to be regarded as a food. It diminishes oxidation of the tissue-elements. The circulatory and nervous activity are increased markedly; but depression follows the stage of increased vital activity. The voluntary faculties first become dull, and then, if the dose taken be large, they are arrested, the muscles become paralyzed, and when the amount injected is greater still, the depression of the respiratory and circulatory centres leads to stertorous breathing, circulatory failure, and death. The effect of alcohol on the nervous structures is partly due to dilatation of the bloodvessels, and partly

to a direct action upon the nerve-cells. The temperature of the body is lowered by this agent.

Alcohol is most frequently administered to the larger animals in the form of whisky, gin, rum, or brandy, to the smaller ones in the form of wine. As a stimulant, it is of great service in connection with its action on the heart. For cases of acute pulmonary congestion in horses, whether blood be abstracted or not, the administration of whisky or brandy is of the greatest importance. For horses struck down suddenly by severe forms of influenza, such as the kind popularly called pink-eye, alcohol is of great value. For many other epizoötic maladies of horses, both in the early and later stages, it is commonly given. As a tonic and stimulant, it is used for many chronic forms of disease; and for the later stages of acute illnesses, in debility, loss of appetite, and anæmia, it is often administered. In colic of the spasmodic or flatulent variety, alcohol acts by controlling the spasm and dispelling the accumulation of gas.

In poisoning by hellebore it is very useful, and is prescribed with spirit, or solution, of ammonia. (See Mr. J. B. Gresswell on hellebore poisoning in the *Veterinary Journal* and *Veterinarian*, May, 1885.) For opium- and aconite-poisoning, and likewise in cases of ingestion of other powerfully sedative agents, it is a remedy of the first importance. In cases of chill it is prescribed with solution of acetate of ammonium and spirit of nitrous ether, and it has been given also in cases of tetanus.

For puerperal apoplexy in cows, alcohol, in the form of gin or whisky, is prescribed with solution of ammonia, the mixture being given at frequent intervals. In combination with the hypodermic injection of ergotin and the hot pack, this method of treatment is very satisfactory.

Dose.—Alcohol (90 per cent.):

Horse	1 to 3	fluid ounces.	
Ox	2 to 5	,,	,,
Sheep	¼ to 1	,,	ounce.
Pig	1 to 3	,,	drachms.
Dog	½ to 1½	,,	,,

Whisky, gin, or brandy:

Horse	2 to 6	fluid ounces.	
Ox	5 to 10	,,	,,
Sheep	1 to 1½	,,	,,
Pig	½ to 1	,,	ounce.

SPIRITUS VINI GALLICI (A.[1] and B.).

Brandy.

Brandy is an alcoholic liquid distilled from wine, or fermented juice of fresh grapes, matured by age (about 4 years), and having not less than 36·5 per cent. by weight, or 43·5 by volume, of ethyl hydroxide.

STAPHISAGRIÆ SEMINA (A.[2] and B.).

Stavesacre Seeds.

Natural Order.—Ranunculaceæ.

Characters.—The dried ripe seeds of *Delphinium Staphisagria*, Linn. (B. and T., *Med. Pl.*, vol. i., plate 4), which grows in the South of Europe, are irregularly triangular or obscurely quadrangular, arched, blackish-brown when fresh, but dull grayish-brown after being kept. The testa is wrinkled and deeply pitted. The nucleus is soft, whitish, and oily. There is no marked odour, but the taste is nauseously bitter and acrid. The seeds contain several alkaloids, of which delphinine and staphisagrine are the most important, and also resin, fatty matter, wax, lignin, etc.

Preparation.—Unguentum Staphisagriæ.

Therapeutics.—Stavesacre seeds are not given internally, but are used externally in the form of infusion, tincture, or ointment, being frequently applied to destroy pediculi and acari. An infusion made by boiling ½ ounce of seeds in a pint of water is often used for killing lice, or an ointment for this purpose may be made of 2 drachms of powdered stavesacre seeds well mixed with 1 ounce of lard. Digest for an hour and strain.

Another formula for stavesacre ointment, from Mr. J. B. Gresswell's 'Veterinary Pharmacology,' is the following: Oil of stavesacre, 1 drachm; white precipitate of mercury, 15 grains; lard, ½ ounce; vaseline, ½ ounce. For scabies or mange, it is best to combine equal parts of ointment of sulphur and ointment of stavesacre. Sulphur is poisonous to acari, and the skin should be thoroughly washed with soap and hot water, since the female parasites burrow deeply.

[1] The United States Pharmacopœia brandy has an average 43 per cent. by weight and 50·5 by volume.

[2] The United States Pharmacopœia appellation is simply Staphisagria.

STRAMONII FOLIA (A. and B.).

Stramonium Leaves.

Description.—The dried leaves of *Datura stramonium*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. iii., plate 192)—Nat. Ord., Solanaceæ—are ovate, petiolate, about 5 inches long, unequal at the base, whilst the margin is sinuate-dentate and the apex acuminate. The superior surface is of a dark-green colour and closely wrinkled, and the under surface is paler. The mesophyll has cluster-crystals of oxalate of calcium. Odour peculiar, taste bitter.

STRAMONII SEMINA (A. and B.).

Stramonium Seeds.

Description. — The dried ripe seeds of *Datura stramonium*, Linn. (Nat. Ord., Solanaceæ), are nearly black, about $\frac{1}{6}$ in. (4 millimetres) long, kidney-like in outline, flat. Their surface has reticulate depressions, and is minutely pitted. The embryo is curved and in a white oily albumin. No odour, but bitter taste.

Composition. — Both leaves and seeds possess a crystalline alkaloid, daturine, in combination with malic acid. The formula of daturine is $C_{17}H_{23}NO_3$, and it is either identical with hyoscyamine (which is isomeric with, but not the same as, atropine), or it is a mixture of atropine and hyoscyamine in varying proportions.

Actions and Uses.—Daturine closely resembles atropine in action, but it more strongly depresses the nerves of the bronchi. Stramonium is used for bronchitis and asthma. About $\frac{1}{4}$ grain of the extract may be given to prevent or lessen attacks in human beings or in dogs, and the smoke of the burning leaves may be inhaled from cigarettes or from the burning powder during a seizure.

Dose of Stramonium Leaves or Seeds :

Dog	1 to 3 grains.
Pig	2 to 6 ,,
Horse	$\frac{1}{4}$ to 1 drachm.

STRONTII BROMIDUM (A.).

Bromide of Strontium.

Formula.—$SrBr_2+6H_2O=354{\cdot}58$.

Description.—This salt should be kept in glass-stoppered bottles. It has the form of colourless, odourless, transparent, hexagonal, highly deliquescent crystals, and has a bitter saline taste.

It is soluble in 1·05 parts of water at 15° C., and in 0·5 of boiling water, easily soluble in alcohol, and if an equal volume of ether, in which it is insoluble, be added to the alcoholic solution, it is precipitated.

If heated it melts, and then loses its water (30·4 per cent.), and the anhydrous residue fuses at 630° C.

Strontium and all its compounds impart an intensely crimson colour to a colourless flame.

Therapeutics.—It is claimed that bromide of strontium has a better effect than the more commonly used bromides. Lée held that it is useful for gastric indigestion with pain and acidity, and Hare confirms this idea, and also says that salicylate of strontium is useful for rheumatism, and should be given in capsules in the same doses as salicylate of sodium, and followed by a draught of milk or water. If barium be present with the strontium, serious effects are caused, and hence it is necessary that the salt should be pure.

Dose.—*Man* - - - - - - - 20 to 30 grains.

STROPHANTHI SEMINA (A.[1] and B.).

Strophanthus Seeds.

Description.—The dried ripe seeds of *Strophanthus Kombé*, Oliver (*Icon. Plant.*, plate 1,098)—Nat. Ord., Apocynaceæ—separated from the awns, are oval, acuminate, about 15 millimetres long and 4 millimetres broad, greenish-fawn, and covered with silky hairs, flat, narrow near the base, which is obtuse, and having on one surface a ridge from the centre to the apex. The nucleus is white and oily, and the cotyledons are straight and encased in a thin endosperm. This latter endosperm is made dark-green by sulphuric acid, as are occasionally the cotyledons, owing to the presence of strophanthin. The odour is peculiar and the taste bitter.

Action.—Very similar to that of digitalis, being a cardiac stimulant and diuretic.

Dose of Tincture of Strophanthus :

Man - - - - - -	5 to 15 minims.
Dog - - - - - -	2 to 10 ,,
Horse - - - - - -	1 to 3 fluid drachms.
Ox - - - - - -	1 to 4 ,, ,,

STRYCHNINA (A. and B.).

Strychnine.

Formula.—$C_{21}H_{22}N_2O_2$.

Characters.—This very active poison, of which the dose for a man is $\frac{1}{60}$ to $\frac{1}{15}$ grain, is an alkaloid obtained from the dried ripe seeds of *Strychnos Nux Vomica*, Linn., and other species of *Strychnos*. It exists in octahedra or trimetric prisms. The alkaloid is colourless and inodorous. It is sparingly soluble in

[1] The United States Pharmacopœia designation is Strophanthus, the seed of *S. hispidus*, De Candolle, deprived of its long awn.

water, but sufficiently so to impart to it an intensely bitter taste. It is soluble in 150 parts of cold and less of boiling alcohol (90 per cent.), and in 6 parts of chloroform, slightly soluble in cold, but easily in 40 parts of boiling, absolute alcohol, nearly insoluble in ether.

Tests.—Pure sulphuric acid forms with strychnine a colourless solution, which on the addition of bichromate of potassium acquires an intensely violet hue, speedily becoming first red, then yellow. If a minute portion of strychnine be subjected to the action of sulphuric acid which contains $\frac{1}{1000}$ part of permanganate of potassium, a violet colour is produced. Strychnine is not coloured by nitric acid (showing that brucine is not present). It leaves no ash when burned with free access of air.

Preparation.—Liquor Strychninæ Hydrochloridi, which contains 1 grain in 110 minims, or 1 gramme in 100 c.c.

Therapeutics, Action, and Uses.—See Nux Vomica.

Dose of Strychnine:[1]

Cat	$\frac{1}{240}$ to $\frac{1}{200}$	grain.
Dog	$\frac{1}{120}$ to $\frac{1}{60}$	,,
Man	$\frac{1}{60}$ to $\frac{1}{15}$	,,
Pig	$\frac{1}{15}$ to $\frac{1}{5}$	,,
Sheep	$\frac{1}{10}$ to $\frac{1}{2}$	,,
Horse	$\frac{1}{2}$ to 2	grains.
Ox	1 to 3	,,

Solution of Hydrochloride of Strychnine (110 minims contain 1 grain, 100 c.c. contain 1 gramme):

Cat	$\frac{1}{4}$ to $\frac{1}{2}$	minim.
Dog	$\frac{1}{2}$ to 2	minims.
Man	2 to 8	,,
Pig	2 to 12	,,
Horse	$\frac{1}{2}$ to 1	fluid drachm.
Ox	$\frac{1}{2}$ to $1\frac{1}{2}$	,, drachms.

STRYCHNINÆ HYDROCHLORIDUM (B.).

Hydrochloride of Strychnine.

Description and Formula.—The hydrochloride of an alkaloid which is prepared from Nux Vomica and other species of Strychnos, having the formula, $C_{21}H_{22}N_2O_2HCl,2H_2O$.

[1] The greatest care is necessary in the use of strychnine. It is often best to discard so dangerous an alkaloid, especially in the case of cats and dogs.

Characters and Tests.—It occurs in small colourless trimetric prisms, which effloresce in the air, and is soluble in 35 parts of water, and in 60 parts of alcohol (90 per cent.). The solution is neutral, and very bitter in taste. The tests for hydrochlorides and those for strychnina should be yielded, but not those for sulphates. If dried at 212° F., it should lose about 8·05 per cent. of water.

Dose.—*Man* - - - - $\frac{1}{60}$ to $\frac{1}{15}$ grain.

SUCCUS BELLADONNÆ (B.).

Juice of Belladonna.

Mode of Preparation.—Bruise a quantity of the fresh leaves and young branches of the plant *Atropa Belladonna* in a stone mortar, press out the juice, and to every 3 fluid parts of juice add 1 of alcohol (90 per cent.). Leave the mixture for a week, and then filter, afterwards preserving it in a cool place.

Dose.—*Man and Dog* - - - 5 to 15 minims.
Pig - - - - 7 to 30 ,,
Man - - - - 1 to 2 fluid drachms.
Horse - - - - $\frac{1}{2}$ to 1 ,, ounce.
Ox - - - - $\frac{1}{2}$ to $1\frac{1}{2}$,, ounces.

SUCCUS CONII (B.).

Juice of Hemlock.

Mode of Preparation.—Bruise a sufficient amount of the fresh leaves and young branches of the plant *Conium maculatum* in a stone mortar, press out the juice, and to every 3 fluid parts of the juice add 1 of alcohol (90 per cent.). Set the mixture aside for seven days, and filter. Preserve it in a cool place.

Dose.—*Dog* - - - - $\frac{1}{2}$ to $1\frac{1}{4}$ fluid drachms.
Man - - - - 1 to 2 ,, ,,
Pig - - - - 2 to 5 ,, ,,
Sheep - - - - 4 to 8 ,, ,,
Horse - - - - 1 to 4 ,, ounces.
Ox - - - - 2 to 6 ,, ,,

SUCCUS HYOSCYAMI (B.).

Juice of Henbane.

Mode of Preparation.—Bruise a sufficient amount of the fresh leaves, flowering tops, and young branches of the plant *Hyoscyamus niger* in a stone mortar and press out the juice. To every 3 fluid parts of the juice add 1 fluid part of alcohol (90 per cent.). Set the mixture aside for seven days and filter. Preserve the preparation in a cool place.

Dose.—

Man and Dog	½ to 1	fluid drachm.
Pig	1 to 3	,, drachms.
Sheep	2 to 4	,, ,,
Horse	1 to 1¾	,, ounces.
Ox	1½ to 2	,, ,,

SUCCUS LIMONIS (B.).

Lemon Juice.

Description.—The above is the freshly-expressed juice of the ripe fruit of *Citrus Medica*. It is a turbid yellow liquid with a sharp sour taste.

SUCCUS SCOPARII (B.).

Broom Juice.

Mode of Preparation.—Fresh broom tops are pressed so as to squeeze out the juice, and to every 3 volumes of juice add 1 volume of alcohol (90 per cent.), set aside for a week and filter.

Dose.—

Man and Dog	1 to 2	fluid drachms.
Pig	1 to 4	,, ,,
Horse	1 to 3	,, ounces.

SUCCUS TARAXACI (B.).

Taraxacum Juice.

Mode of Preparation and Dose are same as above, except that taraxacum root is used.

SULPHONAL (B.).

Sulphonal.

Composition and Formula.—Sulphonal, or dimethyl-methane-diethyl-sulphone, $(CH_3)_2C(SO_2C_2H_5)_2$, is obtained by the oxidation of mercaptol, $(CH_3)_2C(SC_2H_5)_2$, which is produced from acetone and mercaptan.

Characters.—It has the form of prismatic crystals, devoid of colour and odour, and nearly of taste. It is neutral, and melts at 258° F. It is soluble in 15 parts of boiling water, in 450 parts of cold water, in 50 parts of cold alcohol (90 per cent.), and very highly soluble in boiling alcohol, also soluble in ether.

Tests.—If it be heated with access of air, it burns, giving off sulphurous anhydride, and no residue of mineral impurity should remain.

If it be mixed with an equal weight of cyanide of potassium and heated, an odour of mercaptan is given off, and if the product be dissolved in water and excess of hydrochloric acid added, together with a few drops of diluted aqueous solution of perchloride of iron, a red colour is produced. Again, if it be gradually warmed with dried acetate of sodium, sulphuretted hydrogen gas is given off. There should be no chloride or sulphate present.

Action.—Sulphonal is a hypnotic, tasteless, and not impairing digestion. It does not depress the circulation or respiration, and can therefore be employed in cases of heart and lung disease where morphine and chloral are to be avoided.

It is, however, not only slow, but also uncertain, and prolonged drowsiness, giddiness, and eruptions may follow its use. It is best to give very finely powdered in hot broth some hours before bedtime.

It also has the disadvantage of being unreliable, especially after having been given several times, and experience of its use in mankind is so unsatisfactory that one can only seldom recommend it either for animals or human beings.

Dose.—*Man* - - - - - - - 5 to 20 grains.

SULPHUR PRÆCIPITATUM (A. and B.).

Precipitated Sulphur.

Mode of Preparation.—Mix well 5 ounces of sublimed sulphur and 3 ounces of lime, place the mixture in a pint of distilled water, and heat, stirring diligently with a wooden spatula. Boil for fifteen minutes, and filter. Boil the residue again in ½ pint distilled water, and filter. Add together the two filtrates, let the mixture of them cool, dilute with 2 pints of distilled water, and in an open place or under a chimney add in successive quantities 8 fluid ounces of hydrochloric acid previously mixed with 1 pint of distilled water, until effervescence ceases, and the mixture acquires a slightly acid reaction. Allow the precipitate to settle, decant the supernatant liquid, pour in fresh distilled water, and continue the purification by affusion of distilled water and subsidence, until the fluid has not an acid reaction, and is not precipitated with oxalate of ammonium. Collect the sulphur which is precipitated on a calico filter, wash it once with distilled water, and dry it at a temperature not exceeding 48·9° C.

Characters.—Precipitated sulphur is a grayish-yellow soft powder free from grittiness and from the smell of sulphuretted hydrogen.

Tests.—When it is heated in an open vessel, precipitated sulphur burns with a blue flame and the evolution of sulphurous oxide gas. It is entirely volatilized by heat. By the aid of a microscope it is seen to consist of opaque globules without any admixture of crystalline matter. In other points it resembles sublimed sulphur.

Therapeutics.—Precipitated sulphur is more finely divided than sublimed sulphur, and thus is more active as an aperient. The therapeutic action and doses are the same as those of sublimed sulphur.

Dose.—*Man* - - - - 20 to 60 grains.

SULPHUR SUBLIMATUM (A. and B.).

Sublimed Sulphur.

Mode of Preparation.—Sublimed sulphur is prepared from crude or rough sulphur by sublimation.

Characters.—Sublimed sulphur is a slightly gritty powder of a fine greenish-yellow colour. Examined with a microscope, it shows no crystals. It is tasteless and odourless except when heated. In open vessels it burns with a blue flame and gives off sulphurous acid gas, and it is entirely volatilized by heat. Sublimed sulphur does not redden moistened blue litmus. Solution of ammonia, agitated with it and filtered, does not on evaporation leave any residue (thus showing that sulphide of arsenium is absent).

Therapeutics.—Externally, sulphur is a vascular stimulant and alterative. It is also destructive to acari and lice, especially the former. In mange and phtheiriasis, it is best to have the animal's skin thoroughly washed with soft soap and warm water, and, after drying, to apply sulphur or white precipitate ointment to kill the parasites. For mange, a mixture of equal parts of ointment of sulphur and ointment of stavesacre is a useful application, or an ointment may be made of 2 parts of sulphur, 1 part of carbonate of potassium, and 10 parts of lard. The ointment of iodide of sulphur is also a very valuable application (see Sulphuris Iodidum). Sulphur ointment is used in cases of eczema and psoriasis as a vascular stimulant and alterative. Internally,

sulphur is laxative, alterative, and expectorant, and possesses mild stimulant and diaphoretic properties. It is given in cases of piles and in pregnancy, as an aperient, for sheep, pigs, and dogs, and it is well to mix it with treacle.

Dose of Precipitated or Sublimed Sulphur:

As an alterative:

Man	10 to 20 grains twice daily.
Dog	½ to 2 drachms.
Pig	¾ to 3 ,,
Sheep	3 to 8 ,,
Horse	1 to 2 ounces.
Ox	1 to 3 ,,

As a laxative:

Man.—1 to 2 drachms at night with a little molasses or treacle, or 10 grains to 2 drachms of the Confectio Sulphuris may be given.

Dog	1 to 4 drachms.
Pig	1 to 1½ ounces.
Sheep	1½ to 2 ,,
Horse	2 to 4 ,,
Ox	2 to 5 ,,

SULPHURIS IODIDUM (A. and B.).

Iodide of Sulphur.

Mode of Preparation.—Rub together in a glass or earthenware mortar 4 ounces of iodine and 1 ounce of sublimed sulphur, until they are thoroughly mixed. Place the mixture in a flask, close the orifice loosely, and heat gently. When the colour of the mass is uniformly dark throughout, increase the heat so as to produce liquefaction. Incline the flask in different directions, in order to return into the liquid any portion of the iodine which may have been condensed on the inner surface of the vessel. Take the flask away from the source of heat, and when the liquid has congealed, remove the mass by breaking the flask. Break up the mass, and keep the pieces in a well-stoppered bottle.

Characters and Tests.—Iodide of sulphur is a grayish-black solid substance, with a radiated crystalline appearance. It resembles iodine in smell, and in the power of staining the skin when applied to it. It is soluble in about 60 parts of glycerin and insoluble in cold water. If 100 grains be thoroughly boiled

with water, the iodine will pass off in vapour, and about 20 grains of sulphur will remain.

Preparation.—Unguentum Sulphuris Iodidi.

Therapeutics.—Iodide of sulphur, externally applied, is a vascular stimulant and nervous sedative, having alterative properties in addition. It is destructive to parasites of animal and vegetable nature which may infest the skin. It is used in the form of ointment (1 part to 10 of lard) for mange and ringworm, and also for eczema and other irritating skin-diseases.

Dose of Iodide of Sulphur:

Dog - - - - -	½ to 2 grains.
Pig - - - - -	1 to 3 ,,
Horse - - - - -	4 to 20 ,,

SUMBUL (A. and B.).[1]

Sumbul.

Description.—The above consists of the dried transverse slices of the root of *Ferula Sumbul*, Hook. f. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 129). The slices vary in size, and are covered on the external surface with a dusky-brown, papery, and transversely wrinkled cork, and sometimes have short bristly fibres. The inner surface is spongy, coarsely fibrous, dry, and brownish, with white patches and resinous spots. Musk-like smell and taste bitter.

Action.—Sumbul is a stimulant like the aromatic oils, especially resembling valerian and musk.

SUPPOSITORIA BELLADONNÆ (B.).

Belladonna Suppositories.

Mode of Preparation.—Melt about 180 grains of oil of theobroma. Rub 18 grains of alcoholic extract of belladonna with a little of the oil, add the rest and stir well. As the mixture is thickening, pour it into twelve moulds, which are constructed so as to hold about 16 grains of oil of theobroma.

Each suppository contains about $\frac{1}{60}$ grain of the alkaloids of belladonna root.

SUPPOSITORIA GLYCERINI (A. and B.).

Glycerin Suppositories.

Mode of Preparation.—1. British Pharmacopœia: Place 14·2 grammes gelatin in an evaporating-dish, the weight of which

[1] The British Pharmacopœia name is Sumbul Radix. The United States Pharmacopœia designation is Sumbul, the root of *Ferula Sumbul* (Kauffmann), Hooker, filius; Nat. Ord., Umbelliferæ.

has been ascertained, with enough distilled water to cover it; let it stand for two minutes; pour off the excess of distilled water, and set aside until the gelatin is quite soft. Now add 71 grammes of glycerin, dissolve on a water-bath, and evaporate until the mixture weighs 102 grammes. Pour the product into moulds of 2, 4, or 8 grammes, or of other required size. The suppositories contain 70 per cent. of glycerin.

2. The United States Pharmacopœia glycerin suppositories should be made shortly before use by dissolving 3 grammes of sodium carbonate in 60 grammes of glycerin in a capsule on a water-bath, adding 5 grammes of stearic acid, heating with care until solution and cessation of escape of CO_2. The melted mixture is poured into ten suitable moulds, taken out when cold, and wrapped in tinfoil.

SUPPOSITORIA IODOFORMI (B.).

Iodoform Suppositories.

Mode of Preparation.—Melt 12 grammes oil of theobroma; rub with it 2·4 grammes iodoform, using at first only a little of the former, and keep stirring well while the rest is added. As it begins to thicken pour it into twelve moulds of capacity equal to about 1 gramme. Each suppository contains 0·2 gramme iodoform.

SUPPOSITORIA MORPHINÆ (B.).

Morphine Suppositories.

Mode of Preparation.—These are made as in the preceding case, with 0·2 gramme morphine hydrochloride, and each suppository contains $\frac{1}{4}$ grain, or 0·017 gramme of morphine hydrochloride.

SUPPOSITORIA PHENOL (B.).[1]

Phenol Suppositories.

Mode of Preparation.—Melt a sufficient quantity (about 180 grains) of oil of theobroma and 24 grains of white beeswax together, and add 12 grains of carbolic acid, and mix. Pour the mixture into twelve moulds, each of which will hold about 16 grains of oil of theobroma. Each suppository will contain 1 grain of carbolic acid.

[1] Called Suppositoria Acidi Carbolici in the British Pharmacopœia.

SYRUPUS (A. and B.).

Syrup.

Mode of Preparation.—Dissolve 1,000 grammes of refined sugar in 500 c.c. of boiling distilled water with the aid of heat; and add, after cooling, as much boiling distilled water as may be necessary to make the weight of the product 1,500 grammes. The specific gravity should be 1·33.

Preparation.—Syrupus Chloralis Hydratis.

SYRUPUS AROMATICUS (B.).

Aromatic Syrup.

Mode of Preparation.—Mix 250 c.c. tincture of orange with the same amount of cinnamon water. Shake the mixture with a little powdered talc, filter, and add 500 c.c. syrup.

Dose.—*Man* - - - - ½ to 1 fluid drachm.

SYRUPUS CALCII LACTOPHOSPHATIS (A.[1] and B.).

Syrup of Lactophosphate of Lime.

Mode of Preparation.—Add 2½ ounces of precipitated carbonate of calcium to 6 fluid ounces of lactic acid diluted with 24 fluid ounces of distilled water. When it is completely dissolved, add 4 fluid ounces and 262 minims of concentrated phosphoric acid, and triturate until the precipitate at first formed is dissolved. Add a little distilled water, and then 2½ fluid ounces of undiluted orange-flower water, filter, dissolve 70 ounces of refined sugar in the mixture without heat, strain, and add sufficient distilled water to make 5 pints.

Dose.—*Man* - - - - - - ½ to 1 fluid drachm.

SYRUPUS CASCARÆ AROMATICUS (B.).

Aromatic Syrup of Cascara.

Mode of Preparation.—Mix well together 8 fluid ounces of liquid extract of cascara sagrada, 2 fluid ounces of tincture of orange, 1 fluid ounce of alcohol (90 per cent.), 3 fluid ounces of cinnamon water, and 6 fluid ounces of syrup.

Dose.—*Man* - - - - ½ to 2 fluid drachms.

[1] The United States Pharmacopœia directs the use of 36 c.c. of Phosphoric Acid instead of 46 c.c. of the British Pharmacopœia, so that in this respect it is not quite so strong.

SYRUPUS CHLORALIS HYDRATIS (B.).[1]

Syrup of Hydrate of Chloral.

Mode of Preparation.—Dissolve 91·43 grammes of hydrate of chloral in 93·75 c.c. of distilled water, and add simple syrup, until the mixed product measures 500 c.c. The specific gravity should be about 1·32.

Composition.—One fluid drachm of syrup of chloral contains 10 grains of hydrate of chloral.

Dose.—*Man and Dog* - - - ½ to 2 fluid drachms.

SYRUPUS CODEINÆ (B.).

Syrup of Codeine.

Mode of Preparation. — Dissolve 4·57 grammes codeine phosphate in 12·5 c.c. distilled water, add 987·5 c.c. syrup, and mix the two well together. One fluid drachm of the syrup contains ¼ grain codeine phosphate.

Dose.—*Man* - - - - ½ to 2 fluid drachms.

SYRUPUS FERRI IODIDI (A.[2] and B.).

Syrup of Iodide of Iron.

Mode of Preparation. — Dissolve with the aid of heat 825 grammes of refined sugar in 300 c.c. boiling distilled water. Digest 83 grammes of iodine and 25 grammes of iron wire with 125 c.c. of water in a flask, heating gently, and occasionally shaking until, after slight boiling, the froth becomes white. Add 2 fluid ounces of the syrup as above prepared, and boil gently for ten minutes. Filter the liquid while it is still hot into the remainder of the warm syrup and mix. Pass enough distilled water through the filter to produce 1,000 c.c.; when cold its specific gravity should be about 1·3835.

Composition.—Syrup of iodide of iron contains about 1 grain of iodide of iron in 11 minims.

Therapeutics.—The syrup of iodide of iron is a convenient form for administering iodide of iron to dogs.

Dose.—*Man and Dog* - - - ½ to 1 fluid drachm.

[1] Styled Syrupus Chloral in the British Pharmacopœia.

[2] The United States Pharmacopœia syrup has a specific gravity of 1·353, and contains about 10 per cent. of ferrous iodide, which is about the same as the 1 grain in 11 minims of the British Pharmacopœia syrup. Preserve in small, well-stoppered and filled bottles.

SYRUPUS FERRI PHOSPHATIS (B.).

Syrup of Phosphate of Iron.

Composition.—Syrup of phosphate of iron contains 1 grain of anhydrous phosphate of iron, $Fe_3(PO_4)_2$, in 1 fluid drachm. Put 8·6 grammes iron wire and 62·5 c.c. concentrated phosphoric acid diluted with the same amount of distilled water in a flask, plug the neck with cotton-wool, and heat gently. When the solution is cold, filter it into 700 c.c. syrup, and add distilled water to make 1,000 c.c.

Therapeutics.—Syrup of phosphate of iron is given to dogs in rickets, and when recovering from distemper and other debilitating diseases.

Dose.—*Man and Dog* - - - - ½ to 1 fluid drachm.

SYRUPUS FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA (B.)[1]

Syrup of Phosphate of Iron with Quinine and Strychnine.

Mode of Preparation.—Add 1¼ fluid ounces of distilled water to an equal volume of concentrated phosphoric acid in a small flask, and place in it also 75 grains of iron wire, put a plug of cotton-wool in the neck, and heat gently until the iron be dissolved. Then to the solution add 5 grains of powdered strychnine and 130 grains of sulphate of quinine. Shake and filter, allowing the filtrate to run into a bottle containing 14 fluid ounces of syrup, and finally pass enough distilled water through the filter so that the resulting liquid measures 1 pint.

Composition.—One fluid drachm contains 1 grain of anhydrous ferrous phosphate, ⅛ grain of sulphate of quinine, and $\frac{1}{32}$ grain of strychnine.

Dose.—*Man* - - - - - - ½ to 1 fluid drachm.

SYRUPUS GLUCOSI (B.).

Syrup of Glucose.

Mode of Preparation.—Mix together by the aid of the application of a very gentle heat 25 grammes liquid glucose and 50 grammes syrup.

SYRUPUS KRAMERIÆ (A.).

Syrup of Krameria.

Mode of Preparation.—Mix 450 c.c. fluid extract of krameria and 550 c.c. syrup.

[1] The corresponding United States Pharmacopœia preparation has the title Syrupus Ferri, Quininæ, et Strychninæ Phosphatum. It contains 0·2 gramme Strychnine in 1,000 c.c., the British Pharmacopœia having 0·57 gramme.

SYRUPUS LIMONIS (B.).

Syrup of Lemon.

Mode of Preparation.—Macerate 20 grammes fresh lemon-peel thinly sliced or grated in 30 c.c. alcohol (90 per cent.) for seven days, press, filter, add enough alcohol to produce 40 c.c. Now, in 500 c.c. lemon-juice, cleared by subsidence, dissolve 760 grammes refined sugar with low heat. When cold mix with it the 40 c.c. of alcoholic liquid.

Dose.—*Man and Dog* - - ½ to 1 fluid drachm.

SYRUPUS PRUNI VIRGINIANÆ (A. and B.).[1]

Syrup of Virginian Prune.

Mode of Preparation.—Add a very little distilled water to 3 ounces of Virginian prune bark in No. 20 powder, and leave it for one day in a closed vessel. Then pack in a percolator, gradually adding distilled water until 9 fluid ounces of percolate have been obtained. In this liquid dissolve 15 ounces of refined sugar in coarse powder by shaking without heat, then add 1¼ fluid ounces of glycerin, strain, and pour over the strainer enough distilled water to make 1 pint of syrup.

Dose.—*Man* - - - - ½ to 1 fluid drachm.

SYRUPUS RHŒADOS (B.).

Syrup of Red Poppy.

Mode of Preparation.—Add 260 grammes red poppy petals by degrees to 400 c.c. distilled water kept hot on a water-bath, stir often, and then remove, and let the vessel stand for twelve hours. Press out the liquid, strain, add 720 grammes refined sugar, and dissolve with heat. When cold, add 50 c.c. alcohol (90 per cent.), and enough distilled water to produce 1,160 grammes of syrup.

Therapeutics. — It is a very valuable adjunct to cough-mixtures.

Dose.—*Man* - - - - ½ to 1 fluid drachm.

[1] The amount of Wild Cherry is the same in both Pharmacopœias, but the mode of preparation is different.

SYRUPUS ROSÆ (A.[1] and B.).

Syrup of Rose.

Mode of Preparation.—Infuse 50 grammes dried red rose petals in 500 c.c. distilled water for two hours, strain, press, heat to boiling-point, filter, and add 750 grammes refined sugar, and continue heating so as to melt.

Dose.—*Man and Dog* - - - ½ to 1 fluid drachm.

SYRUPUS SENNÆ (A.[2] and B.).

Syrup of Senna.

Mode of Preparation.—To 1,200 grammes of senna add 1,200 c.c. alcohol (20 per cent.), pack tightly in a vessel and close it, leave for three days, press strongly, reserve the fluid obtained, break up the marc, and add to it 450 c.c. alcohol (20 per cent.), leave it for twenty-four hours, press strongly, and add the resulting liquid to that previously preserved. Again break up the marc, mix it with 450 c.c. alcohol (20 per cent.), leave for three hours, press again, and evaporate the liquid obtained until when added to the reserved liquid the whole measures 1,200 c.c. After mixing, heat the mixture in a covered vessel to 82·2° C. for a few minutes, leave for twenty-four hours, filter, and pass distilled water through the filter until the filtrate measures 1,200 c.c., add 1,500 grammes refined sugar in powder, and dissolve in a covered vessel with help of a low heat, cool, add 0·6 c.c. oil of coriander mixed with 2·4 c.c. alcohol (90 per cent.), and shake well. The product weighs 2,760 grammes.

Dose.—*Man and Dog* - - ½ to 2 fluid drachms.

TABACI FOLIA.[3]

Tobacco Leaves.

Natural Order.—Solanaceæ.

Characters.—The dried leaves of *Nicotiana Tabacum*,[4] Linné, are large, being sometimes more than 20 inches long, ovate, ovate-lanceolate, or oval-oblong, acute, entire, brown, brittle, glandular-hairy. They have a characteristic odour and a nauseously bitter acrid taste; and yield, when distilled with

[1] The United States Pharmacopœia syrup is made differently.

[2] The United States Pharmacopœia gives a different plan of making.

[3] In the United States Pharmacopœia the name is Tabacum.

[4] Virginia Tobacco, cultivated in America. As a rule, ordinary 'shag' is used. The reference is Linn. (B. and T., *Med. Pl.*, vol. iii., plate 191).

solution of hydrate of potassium, an alkaline fluid, which has the peculiar odour of nicotine, and precipitates with perchloride of platinum and tincture of galls.

Therapeutics.—The action of tobacco is the same as that of nicotine, but not so powerful. It stimulates, and then paralyzes, the motor nerves of the involuntary muscles and the secreting nerves of glands. It especially acts upon the nervous system, which it first stimulates, but afterwards depresses, causing extreme debility and enervation. The spinal cord is at first stimulated, convulsions being caused, and afterwards paralyzed. Respiration is first excited, then perturbed, and finally arrested, death from poisoning by tobacco being due to cessation of the activity of the respiratory centre. Tobacco causes a great diminution of pulse-rate and a fall of blood-pressure, followed by a rise of blood-pressure, the pulse still remaining slow; but if a large dose be given, the pulse-rate rises very quickly (Brunton). It also, in small or moderate doses, often produces at first an acceleration of the heart's beats, and this is probably due to its depressing the normal restraining power of the vagus nerve. After a time other factors come into play and the heart slows down. But the action of tobacco varies considerably, not only in different persons, but also in different states of the same person, and also, of course, in accordance with habit. A regular smoker will scarcely feel the effect of a small dose, although a tobacco-pulse can be readily detected, and there is also, as a rule, a peculiar somnolent feeling and aspect, as can easily be seen come over smokers, especially after dinner. This appearance is partly due to a characteristic haziness which obscures the lustre of the eye; but this is not so readily seen if the smoker has also put himself under the influence of tea, coffee, or alcohol, for the stimulation thereby produced obviates the dulness of the cornea and mental faculties otherwise evoked. On the alimentary canal tobacco acts as a gastro-intestinal irritant, and markedly increases peristalsis.

Externally, tobacco is destructive to acari in horses, sheep, and dogs, and weak solutions in water are used for this purpose. Care should be taken not to have them too strong, as the toxic properties of the drug may be brought out by absorption through the skin. Internally, tobacco has been given to horses with tetanus, more especially in cases of the acute traumatic variety, and the results are often satisfactory, if this drug be given with bromide of potassium, and the carbonate, salicylate, or citrate of potassium, sodium, or lithium. It is usually given in 1½-drachm doses three times daily in the form of powder, or the alkaloid nicotine may be given hypodermically. Tobacco has also anthelmintic properties, and it may be given internally, or in the form of the enema, to dislodge ascarides from the rectum. In protracted constipation from lead-poisoning it is also very useful, as also in impaction of the colon and rectum, for tobacco undoubtedly causes increased peristaltic movements.

Dose of Tobacco Leaves:

Dog	3 to 10 grains.
Pig	5 to 16 ,,
Sheep	5 to 20 ,,
Horse	1 to 2½ drachms.
Ox	1 to 3½ ,,

Dose of Nicotine:

Dog	$\frac{1}{10}$ to $\frac{1}{2}$ grain.
Pig	$\frac{1}{4}$ to $\frac{3}{4}$,,
Horse	1 to 5 grains.
Ox	$1\frac{1}{2}$ to 6 ,,

TABELLÆ TRINITRINI (B.).

Trinitrin Tablets.

Mode of Preparation.—Tablets of nitroglycerin, as they are also called, consist of about 5 grains of chocolate each, and contain $\frac{1}{100}$ grain of trinitroglycerin.

Dose.—*Man* - - - - 1 or 2 tablets.

TAMARINDUS (A. and B.).

Tamarind.

Description.—Tamarinds are the fruits of *Tamarindus indica*, Linn. (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 92); Nat. Ord., Leguminosæ. The brittle outer part of the pericarp has been removed and the fruits are preserved with sugar. Each is a brownish moist sugary mass, containing strong-branched fibres and brown shining seeds, each enclosed in a tough membranous coat. Taste slightly acid and pleasant. The pulp should not give any reaction for copper.

Action.—Pleasant refrigerant and laxative.

One part of the pulp may be mixed with 30 parts of warm milk to form tamarind whey.

TEREBENUM (A. and B.).

Terebene.

Description.—Terebene is really a mixture of dipentene and other hydrocarbons, and is formed by shaking oil of turpentine with successive quantities of sulphuric acid until it ceases to rotate the plane of a ray of polarized light, and then distilling in a current of steam.

Characteristics.—It is a colourless liquid with agreeable smell and an aromatic turpentine-like taste. The specific gravity is 0·864. It does not rotate the plane of a ray of polarized light. It should distil at a temperature of about 334·4° F., and leave

only a slight amount of resin, and no more than 15 per cent. should distil below 329° F.

Use.—It may either be inhaled, or given internally in some cases of disease of the lungs and bronchial tubes.

Dose.—*Man and Dog* - - - 5 to 15 minims.
Horse - - - - 2 to 4 fluid drachms.
Ox - - - - - 2 to 6 ,, ,,

TEREBINTHINA CANADENSIS (A. and B.).

Canada Turpentine.

Synonym and Natural Order. — Canada turpentine, or Canada balsam, as it is more usually called, is obtained by puncturing or incising the bark of the trunk and branches of *Abies balsamea*, Linné, Miller (B. and T., *Med. Pl.*, vol. iv., plate 263), belonging to the Coniferæ.

Characters.—Canada turpentine is a pale yellow and faintly green transparent oleo-resin, of the consistence of thin honey, possessing a peculiar agreeable odour, and a slightly bitter and feebly acrid taste. On exposure to the air it dries very slowly, forming a transparent adhesive varnish. When mixed with about a sixth of its weight of oxide of magnesium with a little water, Canada turpentine solidifies.

Preparation.—Collodium Flexile.

THERIACA.

Treacle.

Characters.—Treacle, the uncrystallized residue left after the refining of sugar, is a thick fermentable syrup of a golden colour and very sweet taste. It does not crystallize by spontaneous evaporation. The specific gravity is about 1·4. Treacle should be free from empyreumatic odour or flavour.

Therapeutics.—Treacle is given as a laxative and used as an adjunct to purgatives. For cattle and sheep it is employed after the administration of active cathartics to promote their action. It is largely used in making masses and gargles.

Dose.—*Dog* - - - - - - ½ to 1½ ounces.
Pig - - - - - - 1 to 3 ,,
Sheep - - - - - - 2 to 4 ,,
Horse and Ox - - - - 8 to 20 ounces, or 24 for ox.

THUS AMERICANUM (B.).

Frankincense.

Description.—A concrete oleo-resin scraped off the trunks of *Pinus palustris*, Mill., and *Pinus Tæda*, Linn. (B. and T., *Med. Pl.*, vol. iv., plates 258, 259); Nat. Ord., Coniferæ. It occurs in yellow, opaque, tough solid masses, with peculiar odour and taste. After being kept it becomes dry, brittle, translucent, darker, and less odorous.

Action.—Same as resin and turpentine.

THYMOL (A. and B.).

Description.—A crystalline substance, $C_6H_3 \cdot OH \cdot CH_3 \cdot C_3H_7$, prepared from the volatile oils of *Thymus vulgaris*, Linn., *Monarda punctata*, Linn., and *Carum copticum*, Benth. and Hook. f. (Bentl. and Trim., *Med. Pl.*, vol. iii., plates 205 and 208; and vol. ii., plate 120); Nat. Ord., Umbelliferæ. Purified by recrystallization from alcohol. It has the form of large oblique prismatic crystals, with the smell of thyme and an aromatic taste. These sink in cold water, but on heating to 47·5° C. they melt and rise to the surface. Nearly insoluble in cold water, freely soluble in alcohol (90 per cent.), ether, and solutions of alkalies. Volatilizes at temperature of a water-bath. A solution of the substance in half its bulk of glacial acetic acid, warmed with an equal volume of sulphuric acid, assumes a reddish-violet hue.

Action:

Externally.—Thymol is antiseptic, and 1 part in 109 kills bacteria, being more active than phenol. The solution may be used as lotion, injection, or spray. An alcoholic and ethereal solution is of use as a lotion for ringworm, and as an ointment it is useful for some skin diseases.

Internally.—It acts like turpentine and is antiseptic, and in 30-grain doses is valuable as an anthelmintic in ankylostomiasis in human beings.

Dose.—*Man* - - - - - - - ½ to 2 grains (in pill).

THYROIDEUM SICCUM (B.).

Dry Thyroid.

Description.—A powder obtained from the fresh and healthy thyroid gland of a healthy sheep.

Mode of Preparation.—Just after killing the sheep, remove the thyroid glands. Strip off the external fat and connective tissue, cut the glands transversely, and throw away any which on examination are seen to be hypertrophied or to contain cysts or be in any way abnormal. Having selected the healthy glands, mince them into small portions and dry at 95° F., powder the product, remove all fat with petroleum spirit, and again dry.

Characters.—It is a light-brownish powder, with a faint meat-like odour and taste, and devoid of any sign of putridity. If exposed to the air, it may become damp and get spoilt.

Action.—It is given in certain diseases of the thyroid gland.

Dose.—*Man* - - - - - - - 3 to 10 grains.

TINCTURA ACONITI (A. and B.).

Tincture of Aconite.

Mode of Preparation.—1.[1] British Pharmacopœia: Moisten 50 grammes in No. 40 powder of the root of the plant *Aconitum Napellus*, cultivated in Britain, collected in the autumn, with 25 c.c. alcohol (70 per cent.). Transfer to a percolator, and, when the fluid ceases to pass, add 250 c.c. of alcohol. Subject the contents of the percolator to pressure, and filter the product. Mix the filtrates, and add sufficient rectified spirit to make 1,000 c.c.

N.B.—Fleming's tincture of aconite is four times as strong as the above British Pharmacopœia tincture.

2. United States Pharmacopœia: Mix 700 c.c. of alcohol and 300 c.c. of water. Moisten 350 grammes of aconite with 200 c.c. of the mixture, and macerate for twenty-four hours. Pack it firmly in a cylindrical percolator, and gradually pour more of the above mixture on it, until 1,000 c.c. of tincture are obtained.

Dose of Tincture of Aconite (British Pharmacopœia):

Man - - -	5 to 15 minims, but if for frequent use, only 2 to 3 minims.
Dog - - -	2 to 5 minims.
Pig - - -	4 to 10 ,,
Sheep - - -	5 to 10 ,,
Horse - - -	15 to 50 ,,
Ox - - -	30 to 60 ,,

Dose of Tincture of Aconite (Fleming's). In order to avoid mistakes, it is best to use the British Pharmacopœia tincture, and to discontinue the use of Fleming's tincture altogether:

Dog - - - - -	½ to 1 minim.
Pig and Sheep - - -	1 to 2 minims.
Horse - - - - -	5 to 10 ,,
Ox - - - - -	10 to 17 ,,

The doses above stated may be given for three times at intervals of three hours, and then, if it be still further needed, for about twice or thrice more at intervals of four hours. Half the above doses are sufficient for hypodermic use.

[1] This tincture contains ⅔ of the Aconite Root ordered for the tincture of the 1885 British Pharmacopœia.

TINCTURA ARNICÆ (B.).[1]

Tincture of Arnica.

Mode of Preparation. — Macerate, in a closed vessel with occasional agitation, 50 grammes of the rhizome of *Arnica montana*, in No. 40 powder, for forty-eight hours in 50 c.c. alcohol (70 per cent.). Transfer to a percolator, and when the fluid ceases to pass, add 250 c.c. more alcohol. Then subject the contents of the percolator to pressure, and filter the product. Mix the filtrates, and add sufficient alcohol to make 1,000 c.c. in all.

Therapeutics.—See Arnicæ Rhizoma.

Dose of Tincture of Arnica (British Pharmacopœia):

Dog	10 to 20 minims.
Pig	½ to 1½ fluid drachms.
Sheep	½ to 2 „ „
Horse	½ to 1 „ ounce.
Ox	½ to 1½ ounces.

Dose of Tincture of Arnica Root (United States Pharmacopœia):

Dog	5 to 20 minims.
Horse	2 to 3 fluid drachms.
Ox	2 to 4 „ „

Dose of Tincture of Arnica Flowers (United States Pharmacopœia):

Dog	15 to 30 minims.
Horse	½ to 1 fluid ounce.

[1] The United States Pharmacopœia has Tincture of Arnica Flowers, and Tincture of Arnica Root; and in the preparation of the latter double as much arnica root as in the British Pharmacopœia tincture is used; but the alcohol employed being stronger in the British Pharmacopœia, namely, 70 per cent., as opposed to 59 per cent., there is a greater solution of ingredients effected in proportion to the amount of root employed.

The doses of the root, of the flowers, and of the United States Pharmacopœia extract and fluid extract of the root are about the same, those of the United States Pharmacopœia tincture of the root are about half those of the tincture of the flowers, and those of the British Pharmacopœia Tincture of Arnica Root are said to be, as above, much greater than those of the United States Pharmacopœia tincture of the root; but this is doubtful, because the greater strength of alcohol used must effect a more intimate solution. Arnica is by no means a harmless substance, and should be used with care. It is seldom given internally, and it is probably never of any value.

TINCTURA BELLADONNÆ (B.).[1]

Tincture of Belladonna.

Mode of Preparation.—To 60 c.c. liquid extract of Belladonna add alcohol (60 per cent.) to form 900 c.c.; leave twenty-four hours, filter. In 100 c.c. is about ·05 gramme of alkaloid.

Dose.—

Man	5 to 15	minims.
Dog	5 to 20	,,
Pig	15 to 30	,,
Horse	½ to 1	fluid ounce.
Ox	½ to 1½	,, ounces.

TINCTURA BENZOINI COMPOSITA (A.[2] and B.).

Compound Tincture of Benzoin.

Mode of Preparation.—The above tincture, which is also called Friar's Balsam, is made by placing: Benzoin (coarsely powdered), 100 grammes; prepared storax, 75 grammes; balsam of Tolu, 25 grammes; and Socotrine aloes, 18·3 grammes; with 800 c.c. alcohol (90 per cent.) in a closed vessel, setting aside for two days, often shaking the mixture. Filter, pass enough alcohol through the filter to make 1,000 c.c. in all.

Dose of British Pharmacopœia Tincture (less for United States Pharmacopœia Tincture):

Dog	¼ to ¾	fluid drachm.
Man	½ to 1	,, ,,
Pig	1 to 2	,, drachms.
Horse	1 to 1½	,, ounces.
Ox	1 to 2	,, ,,

[1] In the United States Pharmacopœia there is a Tincture of Belladonna Leaves, of which the dose for dogs is 5 to 30 minims. There is also an Alcoholic Extract of Leaves, the doses being:

Dog	⅛ to ½	grain.
Sheep and Pig	2 to 4	grains.
Horse and Ox	10 to 20	,,

[2] The United States Pharmacopœia tincture is stronger, containing 120 grammes of benzoin, 20 of aloes, 80 of storax, and 40 of balsam of Tolu. The mixture is digested with 800 c.c. of alcohol for two hours at 65° C. in a closed vessel, filtered, and more alcohol added on the filter to make 1,000 c.c.

TINCTURA BUCHU (B.).

Tincture of Buchu.

Mode of Preparation. — Moisten 200 grammes of buchu leaves in No. 20 powder with 200 c.c. alcohol, and complete the percolation process. The resulting tincture should measure 1,000 c.c.

Dose.—*Man and Dog* - - ½ to 1 fluid drachm.
Horse - - - - ½ to 1½ „ ounces.

TINCTURA CALUMBÆ (A. and B.).

Tincture of Calumba.

Mode of Preparation.—Macerate 100 grammes calumba root in No. 20 powder with 1,000 c.c. of alcohol (60 per cent.), or (United States Pharmacopœia—54·6 per cent.). Dose for man or dog, ½ to 1 fluid drachm; horse and ox, 1 to 2 fluid ounces.

TINCTURA CAMPHORÆ COMPOSITA (B.).

Compound Tincture of Camphor.

Mode of Preparation.—Dissolve 4·6 grammes benzoic acid, 3·4 grammes camphor, 3·1 c.c. oil of anise, in 900 c.c. of alcohol (60 per cent.); add 60·9 c.c. tincture of opium, and enough alcohol to produce 1,000 c.c., and filter.

In 1 fluid drachm is the equivalent of $\frac{1}{30}$ grain of morphine hydrochloride, or ¼ grain of opium. In 1 c.c. the equivalent of 0·5 milligramme of anhydrous morphine.

Dose.—*Dog* - - - - 5 to 40 minims.
Pig - - - - 15 to 60 „
Man - - - - ½ to 1 fluid drachm.
Horse - - - - ¼ to 1 „ ounce.

TINCTURA CANNABIS INDICÆ (B.).[1]

Tincture of Cannabis Indica.

Mode of Preparation.—Dissolve 50 grammes extract of Indian hemp in 900 c.c. alcohol (90 per cent.), filter, and add enough alcohol to produce 1,000 c.c.

[1] The United States Pharmacopœia Tincture of Indian Cannabis is got from 150 grammes of Indian cannabis in No. 40 powder, with 150 c.c. of alcohol (91 per cent.), and by percolating with more alcohol to make 1,000 c.c. in all.

Dose of British Pharmacopœia Tincture:

Man	5 to 15 minims.
Dog	10 to 25 ,,
Pig	15 to 30 ,,
Horse	½ to 1½ fluid ounces.
Ox	1 to 2 ,, ,,

TINCTURA CANTHARIDUM (B.).[1]

Tincture of Cantharides.

Mode of Preparation.—Macerate for seven days in a closed vessel, occasionally shaking, 12·5 grammes of cantharides in No. 40 powder and 1,000 c.c. alcohol (90 per cent.). Strain, press, filter, and add sufficient proof spirit to make up the filtrate to 1,000 c.c.

Dose.—

Horse	½ to 1 fluid ounce.
Cattle	1 fluid ounce.
Sheep and Pig	1 to 2 fluid drachms.
Dog	20 to 30 minims.
Man	5 to 15 minims, or for several doses only 2 to 5 minims.

TINCTURA CAPSICI (B.).[2]

Tincture of Capsicum.

Mode of Preparation.—Tincture of capsicum is made from 50 grammes of the fruit of *Capsicum fastigiatum*, in No. 20 powder, and 1,000 c.c. of alcohol (70 per cent.), by the maceration process.

Dose.—

Man	5 to 15 minims.
Horse	2 to 4 fluid drachms.
Cattle	1 fluid ounce.
Sheep	1 to 4 fluid drachms.
Pig	1 to 2 ,, ,,
Dog	10 to 40 minims.

[1] The United States Pharmacopœia tincture is made of 50 grammes of cantharides in No. 60 powder, moistened with 30 c.c. of alcohol (91 per cent.), percolating with more alcohol to make 1,000 c.c. in all.

[2] The United States Pharmacopœia tincture is made of 50 grammes of capsicum in No. 30 powder, moistened with 40 c.c. alcohol (86·45 per cent.), and percolated with more alcohol to make 1,000 c.c. in all.

TINCTURA CARDAMOMI COMPOSITA (B.).[1]

Compound Tincture of Cardamoms.

Mode of Preparation.—Take of

Bruised Cardamom Seeds, 12·5 grammes;
Bruised Caraway Fruit, 12·5 grammes;
Raisins, freed from seeds, 100 grammes;
Bruised Cinnamon Bark, 25 grammes;
Powdered Cochineal, 6·3 grammes;
Alcohol (60 per cent.), 1,000 c.c.

Macerate in a closed vessel the solid constituents for forty-eight hours in 750 c.c. alcohol, with occasional agitation. Transfer to a percolator, and when the fluid ceases to pass, add 250 c.c. of alcohol. Subject the contents of the percolator to pressure, and filter the liquid product. Mix the two filtrates, and add sufficient proof spirit to make 1,000 c.c. of the compound tincture.

Dose.—*Horse* - - - - 2 to 4 fluid ounces.
Sheep - - - - 1 fluid ounce.
Pig - - - - ½ ,, ,,
Dog - - - - 1 to 3 fluid drachms.
Man - - - - ½ to 1 fluid drachm.

TINCTURA CHIRATÆ (A. and B.).

Tincture of Chiretta.

Mode of Preparation.—Moisten 100 grammes of chiretta in No. 40 powder with 100 c.c. alcohol (60 per cent.), and complete percolation with enough alcohol to make 1,000 c.c. The only difference in the United States Pharmacopœia is that slightly weaker alcohol is used—viz., about 59 per cent.

Dose.—*Man and Dog* - - ½ to 1 fluid drachm.

TINCTURA CINCHONÆ (A.[2] and B.).

Tincture of Cinchona.

Mode of Preparation.—Tincture of cinchona is made as described in the cases of the tinctures of aconite, arnica, bella-

[1] In the United States Pharmacopœia appear Tinctura Cardamomi and Tinctura Cardamomi Composita. The latter is similar to the British Pharmacopœia, but contains less alcohol; and 50 c.c. glycerin, but not raisins.

[2] In the United States Pharmacopœia occur Tincture of Cinchona and Compound Tincture of the same, just as in the British Pharmacopœia; but

donna, capsicum, and compound tincture of camphor, the ingredients used being 200 grammes red cinchona bark in No. 40 powder, and about 1,000 c.c. alcohol (70 per cent.), so that 100 c.c. contain 1 gramme of alkaloids.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - 1 to 2 ,, drachms.
Pig - - - - 2 to 4 ,, ,,
Sheep - - - - ½ to 1 ,, ounce.
Horse - - - - 1 to 2 ,, ounces.
Ox - - - - 2 to 4 ,, ,,

TINCTURA COCCI (B.).

Tincture of Cochineal.

Mode of Preparation.—Treat 100 grammes cochineal in powder by maceration with 1,000 c.c. alcohol (45 per cent.).

Dose.—*Man* - - - - 5 to 15 minims.

TINCTURA COLCHICI SEMINUM (A.[1] and B.).

Tincture of Colchicum Seeds.

Mode of Preparation.—Treat 200 grammes colchicum seeds in No. 30 powder with a sufficiency of alcohol (45 per cent.), as described in the preparation of compound tincture of camphor, completing the percolation process with successive amounts of alcohol so as to make 1,000 c.c. of the tincture.

Dose.—*Man* - - - - 5 to 15 minims.
Dog - - - - 10 to 20 ,,
Pig - - - - ½ to 1½ fluid drachms.
Horse - - - - ½ to 1 ,, ounce.
Ox - - - - ½ to 1½ ,, ounces.

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the alcohol used is 66 and 80 per cent. respectively in the United States Pharmacopœia tinctures, and both contain glycerin, and the compound tincture of the United States Pharmacopœia has no saffron or cochineal, as the British Pharmacopœia has for its compound tincture, but has bitter orange-peel.

[1] The United States Pharmacopœia directs the use of alcohol (54·6 per cent.) and only 150 grammes of colchicum seeds, so that its Tinctura Colchici Seminis is a weaker preparation.

TINCTURA CONII (B.).

Tincture of Hemlock.

Mode of Preparation.—Treat 200 grammes of the fruit of *Conium maculatum*, recently reduced to No. 40 powder, with a sufficient quantity of alcohol (70 per cent.), added at first to the extent of 200 c.c., and then completing the percolation so as to make 1,000 c.c. of the tincture.

Dose.—

Dog	5 to 30	minims.	
Man	¼ to 1	fluid	drachm.
Pig	½ to 1½	„	„
Sheep	1 to 2	„	drachms.
Horse	1 to 1½	„	ounces.
Ox	1 to 2	„	„

TINCTURA CUBEBÆ (A.[1] and B.).

Tincture of Cubebs.

Mode of Preparation. — Treat 200 grammes of powdered cubebs with a sufficient quantity of alcohol (90 per cent.), added at first to the extent of 200 c.c., and then completing percolation with successive quantities, in the manner above referred to, to make 1,000 c.c. of the tincture.

Dose.—

Man amd Dog	½ to 1	fluid	drachm.
Pig	1 to 1½	„	drachms.
Sheep	2 to 3	„	„
Horse	1 to 2	„	ounces.
Ox	1 to 3	„	„

TINCTURA DIGITALIS (A.[2] and B.).

Tincture of Digitalis.

Mode of Preparation.—Moisten 125 grammes digitalis leaves in No. 20 powder with 100 c.c. of alcohol (60 per cent.), completing percolation with successive additions of alcohol, so as to make 1,000 c.c.

[1] The United States Pharmacopœia uses the same amount of cubebs in No. 30 powder, and alcohol of 91 per cent.

[2] The United States Pharmacopœia directs 150 grammes of Digitalis in No. 60 powder, and the ordinary percolation process, first with 150 c.c. of diluted alcohol (41 per cent.) for a day, and then to be packed in a cylindrical percolator and percolation completed so as to make 1,000 c.c. in all.

Dose.—*Man and Dog* - - 5 to 15 minims.
Pig - - - - 10 to 20 ,,
Horse - - - - 1 to 3 fluid drachms.
Ox - - - - 1 to 4 ,, ,,

TINCTURÆ HERBARUM RECENTIUM (A.).

Tinctures of Fresh Herbs.

Mode of Preparation.—Generally to be made by macerating 500 grammes of the fresh herb, bruised or crushed, with 1,000 c.c. of alcohol, for fourteen days, and then expressing the liquid and filtering it.

TINCTURA ERGOTÆ.

Tincture of Ergot.

Mode of Preparation.—As above, treat 250 grammes of finely comminuted ergot with proof spirit to make 1,000 c.c. of the tincture.

Dose.—*Bitch* - - - - 20 to 60 minims.
Sow - - - - 1 to 2 fluid drachms.
Ewe - - - - 1 to 2 ,, ,,
Mare - - - - ½ to 1 ,, ounce.
Cow - - - - 1 to 2 ,, ounces.

TINCTURA ERGOTÆ AMMONIATA (B.).

Ammoniated Tincture of Ergot.

Mode of Preparation.—Mix 2 fluid ounces (100 c.c.) of solution of ammonia with 18 fluid ounces of alcohol (900 c.c.—60 per cent.). Now take 5 ounces (250 grammes) of ergot in No. 20 powder, and add 2 fluid ounces (100 c.c.) of the above mixture, and percolate with the rest. Press the marc, add the expressed liquid to the percolate, now add more alcohol so as to form 1 pint (1,000 c.c.) of tincture, leave for one day, and filter.

Dose.—*Man* - - - - ½ to 1 fluid drachm.

TINCTURA FERRI PERCHLORIDI (B.).[1]

Tincture of Perchloride of Iron.

Mode of Preparation.—Mix 250 c.c. of strong solution of perchloride of iron, 250 c.c. alcohol (90 per cent.), shake well, and

[1] The United States Pharmacopœia has a Tincture of Ferric Chloride which is of about the same strength.

add distilled water to make 1,000 c.c. Preserve the tincture in a stoppered bottle.

Dose.—*Man* - - - - 5 to 15 minims.
Dog - - - - 5 to 35 ,,
Pig - - - - ½ to 1½ fluid drachms.
Sheep - - - - ½ to 2 ,, ,,
Horse - - - - ½ to 1 ,, ounce.
Ox - - - - ¾ to 2 ,, ounces.

TINCTURA GELSEMII (B.).[1]

Tincture of Gelsemium.

Mode of Preparation.—Moisten 100 grammes of gelsemium root in No. 40 powder with 50 c.c. of alcohol (60 per cent.), and complete percolation, so that the product measures 1,000 c.c.

Dose.—*Man* - - - - 5 to 15 minims.
Dog - - - - 10 to 60 ,,
Horse - - - - ½ to 1½ fluid ounces.

TINCTURA GENTIANÆ COMPOSITA (A.[2] and B.).

Compound Tincture of Gentian.

Mode of Preparation.—Macerate with alcohol (45 per cent.) in the manner mentioned in the case of compound tincture of cardamoms, so as to make 1,000 c.c. of the compound tincture of gentian, the following solid ingredients:

Gentian Root, cut small and bruised, 100 grammes;
Bitter Orange-peel, dried, cut small, and bruised, 37·5 grammes;
Cardamom Seeds, bruised, 12·5 grammes.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 2½ ,, drachms.
Pig - - - - ½ to 1½ ,, ounces.
Horse - - - - 1 to 3 ,, ,,
Ox - - - - 1 to 4 ,, ,,

[1] The United States Pharmacopœia Tincture is made with 150 grammes of Gelsemium and a slightly weaker alcohol (59 per cent.).

[2] The United States Pharmacopœia Compound Tincture of Gentian is very similar, but the alcohol is stronger—viz., 54·6 per cent.

TINCTURA GUAIACI AMMONIATA (B.).[1]

Ammoniated Tincture of Guaiacum.

Mode of Preparation. — Mix 75 c.c. strong solution of ammonia with 800 c.c. alcohol (90 per cent.), add 200 grammes powdered guaiacum resin, leave in a closed vessel for two days, shaking repeatedly, filter, in the filtrate dissolve 2·1 c.c. oil of lemon and 3·1 c.c. oil of nutmeg, and pass enough alcohol through the filtrate to make 1,000 c.c.

Dose.—*Man and Dog* - - ½ to 1 fluid drachm.
Pig - - - - 1 to 2 ,, drachms.
Horse - - - - 1 to 2 ,, ounces.

TINCTURA HAMAMELIDIS (B.).

Tincture of Hamamelis.

Mode of Preparation.—Moisten 100 grammes of hamamelis bark in No. 20 powder with 50 c.c. alcohol (45 per cent.), and complete percolation so that the product measures 1,000 c.c.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - 5 to 20 minims.
Horse - - - - 1½ to 2½ fluid drachms.

TINCTURA HYOSCYAMI (A.[2] and B.).

Tincture of Hyoscyamus.

Mode of Preparation.—Take 100 grammes of leaves and flowering tops of *Hyoscyamus niger* in No. 20 powder, add 100 c.c. alcohol (45 per cent.), percolate and complete the process by adding successively in portions a sufficient amount of alcohol to make 1,000 c.c.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 1½ ,, drachms.
Pig - - - - 1 to 2 ,, ,,
Sheep - - - - 1 to 2½ ,, ,,
Horse - - - - 1 to 2 ,, ounces.
Ox - - - - 1½ to 3½ ,, ,,

[1] The United States Pharmacopœia ammoniated tincture is made of 200 grammes of Guaiac and enough Aromatic Spirit of Ammonia to make 1,000 c.c.

[2] The United States Pharmacopœia tincture is made by percolation, using 150 grammes of Hyoscyamus in No. 60 powder, with enough diluted alcohol to make 1,000 c.c. in all.

TINCTURA IODI (B.).[1]

Tincture of Iodine.

Mode of Preparation.—In a bottle place 25 c.c. distilled water and add 25 grammes iodine and 25 grammes potassium iodide, shake so as to dissolve, and then add enough alcohol (90 per cent.) to make 1,000 c.c.

Dose.—

Man	2 to 5	minims.	
Dog	5 to 15	,,	
Pig	12 to 24	,,	
Sheep	½ to 1½	fluid	drachms.
Horse	1½ to 4	,,	,,
Ox	2 to 6	,,	,,

TINCTURA JABORANDI (B.).

Tincture of Jaborandi.

Mode of Preparation.—Moisten 200 grammes of jaborandi leaves in No. 40 powder with 125 c.c. of alcohol (45 per cent.), and complete percolation so as to make up the tincture to the bulk of 1,000 c.c. with successive additions of alcohol.

Dose.—

Man	½ to 1	fluid	drachm.
Dog	½ to 1½	,,	drachms.
Pig	1 to 2	,,	,,
Sheep	1 to 2½	,,	,,
Horse	1 to 2	,,	ounces.

TINCTURA KRAMERIÆ (A.[2] and B.).

Tincture of Krameria.

Mode of Preparation.—A quantity of krameria root in No. 40 powder weighing 200 grammes is moistened with 100 c.c. alcohol (60 per cent.), and the percolation is completed with more alcohol so as to make 1,000 c.c. in all.

Dose.—

Man	½ to 1	fluid	drachm.
Dog	½ to 1¾	,,	drachms.
Pig	1 to 2	,,	,,
Foal, Calf, and Sheep	½ to 1	,,	ounce.
Horse	1 to 1½	,,	ounces.
Ox	1 to 2	,,	,,

[1] The United States Pharmacopœia tincture is made with 70 grammes of Iodine and enough alcohol to make 1,000 c.c.

[2] The United States Pharmacopœia tincture is made with diluted alcohol (41 per cent.), but with the same amount of krameria.

TINCTURA LAVANDULÆ COMPOSITA (B.).[1]

Compound Tincture of Lavender.

Mode of Preparation.—Macerate 17 grammes red sanders wood, 8·5 grammes cinnamon bark bruised, and 8·5 grammes nutmeg bruised, with 1,000 c.c. alcohol (90 per cent.), adding then 4·7 c.c. oil of lavender, and 0·5 c.c. oil of rosemary.

Dose.—

Man	½ to 1	fluid drachm.
Dog	⅓ to 1	,, ,,
Pig	1 to 2	,, drachms.
Horse	1 to 2	,, ,,

TINCTURA LOBELIÆ ÆTHEREA (B.)[2]

Ethereal Tincture of Lobelia.

Mode of Preparation.—Moisten 200 grammes lobelia in No. 40 powder, with 100 c.c. spirit of ether, and complete percolation with additional spirit of ether to make 1,000 c.c.

Dose.—

Man and Dog	5 to 15	minims.
Pig	½ to 1	fluid drachm.
Horse	½ to 1	,, ounce.

TINCTURA MYRRHÆ (A. and B.).[3]

Tincture of Myrrh.

Mode of Preparation.—Treat 200 grammes of coarsely powdered myrrh with 800 c.c. alcohol (90 per cent.), put into a closed vessel and leave for a week, shaking repeatedly, filter, and then pass more alcohol through the filter to make 1,000 c.c.

Therapeutics.—Used externally (see Myrrh).

Dose.—

Man and Dog	½ to 1	fluid drachm.
Pig	1 to 2	,, drachms.
Horse	1 to 2	,, ,,

[1] The Unites States Pharmacopœia contains different proportions of ingredients, and 5 grammes of cloves in addition.

[2] The United States Pharmacopœia has tincture of lobelia made by percolation of 200 grammes of lobelia in No. 40 powder, with enough diluted alcohol to make 1,000 c.c.

[3] The British Pharmacopœia and United States Pharmacopœia tinctures are practically the same, except that the United States Pharmacopœia directs a 91 per cent. alcohol to be used.

TINCTURA NUCIS VOMICÆ (A. and B.).

Tincture of Nux Vomica.

Mode of Preparation.—British Pharmacopœia: Mix 100 c.c. liquid extract of nux vomica and 150 c.c. distilled water, add enough alcohol (90 per cent.) to yield 600 c.c., and filter.

In 100 c.c. is 0·25 gramme strychnine; in 1 fluid drachm $\frac{1}{8}$ grain, and that is about twice as much as in the British Pharmacopœia of 1885.

United States Pharmacopœia: Dissolve 20 grammes of extract of nux vomica (containing 15 per cent. of alkaloids) in enough of a mixture of 3 volumes of alcohol (91 per cent.), and 1 of water, to make 1,000 c.c. In 100 c.c. of the tincture there should be 0·3 gramme of alkaloids.

Dose.—

Dog	3 to 7 minims.
Man	4 to 10 ,,
Pig	15 to 30 ,,
Sheep	20 to 40 ,,
Horse	1 to 2 fluid drachms.
Ox	1 to 3 ,, ,,

TINCTURA OPII (B.).[1]

Tincture of Opium.

Mode of Preparation.—Make 150 grammes opium into a paste with 500 c.c. distilled water, which is heated to 93·3° C., leave for six hours, add 500 c.c. alcohol (90 per cent.), mix well, leave in a covered vessel for one day, strain, press, mix the liquids, leave for one day and filter.

In 100 c.c. should be 0·75 gramme morphine, or in 15 minims 1 grain opium containing 10 per cent. morphine (anhydrous)—*i.e.*, $\frac{1}{10}$ grain morphine, or in 1 fluid ounce 3·2 grains.

[1] One thousand c.c. of the tincture of opium of the United States Pharmacopœia are made from 100 grammes of opium rubbed with warm water, and 50 grammes of precipitated phosphate of calcium; but it is said that 100 c.c. of it should contain about 1·4 gramme of crystalline morphine. Of morphine reckoned as anhydrous—that is, devoid of the molecule of water of crystallization—there is 0·75 gramme in 100 c.c. of the British Pharmacopœia tincture.

In the Unites States Pharmacopœia there occur also camphorated tincture of opium and tincture of deodorized opium; whilst the British Pharmacopœia has also an ammoniated tincture.

Dose.—*Man* - - - 5 to 15 minims, or for one dose 20 to 30 minims.
Dog - - - 3 to 20 minims.
Pig - - - 1 to 3 fluid drachms.
Sheep - - - 2 to 4 ,, ,,
Horse - - - 1 to 2 ,, ounces.
Ox - - - 1 to 3 ,, ,,

TINCTURA PRUNI VIRGINIANÆ (B.).
Tincture of Virginian Prune.

Mode of Preparation.—Mix 4 ounces (200 grammes) Virginian prune bark in No. 20 powder, with $7\frac{1}{2}$ fluid ounces (375 c.c.) of distilled water, leave in a closed vessel for one day, then add $12\frac{1}{2}$ (625 c.c.) fluid ounces of alcohol (90 per cent.) and complete maceration.

Dose.—*Man* - - - - $\frac{1}{2}$ to 1 fluid drachm.

TINCTURA QUASSIÆ (A.[1] and B.).
Tincture of Quassia.

Mode of Preparation.—Macerate 100 grammes quassia wood rasped, with 1,000 c.c. alcohol (45 per cent.).

Dose.—*Man* - - - - $\frac{1}{2}$ to 1 fluid drachm.

TINCTURA QUILLAIÆ (A.[2] and B.).
Tincture of Quillaia.

Mode of Preparation.—Add to 50 grammes of quillaia bark, in No. 20 powder, 25 c.c. of alcohol (60 per cent.), and pack in percolator, then adding sufficient alcohol by degrees so as to make 1,000 c.c. of tincture.

Dose.—*Man* - - - - $\frac{1}{2}$ to 1 fluid drachm.

TINCTURA QUININÆ (B.).
Tincture of Quinine.

Mode of Preparation.—Dissolve 20 grammes of hydrochloride of quinine in 1,000 c.c. of tincture of orange, with the aid

[1] The difference is that the United States Pharmacopœia directs the use of weaker alcohol—viz., 31·85 per cent.—and is probably, therefore, a little weaker preparation.

[2] The United States Pharmacopœia directs 200 grammes of quillaia to be mixed with 800 c.c. water for fifteen minutes. Strain, and wash the residue on the strainer with 100 c.c. water. Boil the liquid down to 600 c.c., let it cool, add 350 c.c. alcohol (91 per cent.), shake, and when the insoluble matter has subsided, filter the liquid portion through paper, and add water to make 1,000 c.c. The alcohol in the tincture is 31·85 per cent.

of gentle heat. Allow the solution to remain for three days in a closed vessel, shake it occasionally, and finally filter.

Dose.—*Man and Dog* - - - - ½ to 1 fluid drachm.

TINCTURA QUININÆ AMMONIATA (B.).

Ammoniated Tincture of Quinine.

Mode of Preparation.—Mix 100 c.c. solution of ammonia with 900 c.c. alcohol (60 per cent.), add 20 grammes sulphate of quinine, shake so as to make a clear solution, set aside for three days, and filter.

Dose.—*Man and Dog* - - - ½ to 1 fluid drachm.

TINCTURA RHEI COMPOSITA (B.).[1]

Compound Tincture of Rhubarb.

Mode of Preparation.—Moisten 100 grammes of rhubarb root in No. 20 powder, 12·5 grammes cardamom seeds, and same amount of coriander fruit, both bruised, with 100 c.c. of alcohol (60 per cent.), percolate until 900 c.c. are obtained, shake, set aside for two days, filter, and add 100 c.c. of glycerin.

Dose.—*Man* - - - ½ to 1 fluid drachm, or for 1 dose 2 to 4 fluid drachms.

TINCTURA SCILLÆ (A.[2] and B.).

Tincture of Squill.

Mode of Preparation.—Take of bruised squill 200 grammes, and of alcohol (60 per cent.) 1,000 c.c., and prepare by maceration.

Dose.—*Man* - - - - 5 to 15 minims.
Dog - - - - 5 to 25 „
Pig - - - - ¼ to ¾ fluid drachm.
Horse - - - - ¼ to 1 „ ounce.

[1] The United States Pharmacopœia has Tinctura Rhei, similar to above, and also Tinctura Rhei Aromatica (from 200 grammes rhubarb), and Tinctura Rhei Dulcis. In the first and last 100 grammes are used.

[2] This British Pharmacopœia tincture is stronger than the United States Pharmacopœia tincture, which is made of 150 grammes of squill in No. 30 powder, and alcohol (68 per cent.). As squill is by no means an innocuous drug, this fact should be noted.

TINCTURA SENEGÆ (B.).

Tincture of Senega.

Mode of Preparation.—Moisten 200 grammes of senega root in No. 40 powder with 200 c.c. alcohol (60 per cent.), and complete percolation with sufficient alcohol so that product measures 1,000 c.c.

Dose.—*Dog* - - - - ¼ to ½ fluid drachm.
Man and Pig - - ½ to 1 ,, ,,
Horse - - - - ½ to 1 ,, ounce.

TINCTURA STROPHANTHI (A.[1] and B.).

Tincture of Strophanthus.

Mode of Preparation.—Pack 25 grammes strophanthus seeds, in No. 30 powder, in a percolator, moisten with 6 c.c. alcohol (70 per cent.), set aside for two days. Pour on alcohol in successive portions, letting the percolation go on slowly, until 500 c.c. of percolate is produced, filter, add enough alcohol to produce 1,000 c.c. in all.

Dose.—*Dog* - - - - 2 to 10 minims.
Man - - - - 5 to 15 ,,
Horse - - - - 1 to 3 fluid drachms.
Ox - - - - 1 to 4 ,, ,,

TINCTURA VALERIANÆ AMMONIATA (B.).[2]

Ammoniated Tincture of Valerian.

Mode of Preparation.—Mix 3·1 c.c. oil of nutmeg, 2·1 c.c. oil of lemon, 100 c.c. solution of ammonia, 900 c.c. alcohol (60 per cent.), and macerate with it 200 grammes valerian rhizome in No. 40 powder.

Dose.—*Man* - - - - ½ to 1 fluid drachm.
Dog - - - - ½ to 2 ,, drachms.

[1] The United States Pharmacopœia directs the use of double the quantity of strophanthus, but a weaker alcohol—viz., 59 per cent.

[2] The United States Pharmacopœia has a Tincture of Valerian, using alcohol (68 per cent.), as well as an Ammoniated Tincture, and the doses of the two are the same; but both contain the same proportion of valerian—viz., 200 grammes—as the British Pharmacopœia preparation. The Ammoniated Tincture is made with 200 grammes valerian in No. 60 powder and 1,000 c.c. Aromatic Spirit of Ammonia.

TINCTURA ZINGIBERIS (B.).[1]

Tincture of Ginger.

Mode of Preparation.—Pack 100 grammes ginger in No. 40 powder in a percolator, and pour over it 100 c.c. alcohol (90 per cent.). At the expiration of two hours, add successive quantities of alcohol, and let it percolate slowly until 1,000 c.c. of tincture have been collected.

Dose.—*Dog* - - - - 20 minims to 1 fluid drachm.
Man - - - - ½ to 1 fluid drachm.
Pig - - - - 1 to 2 fluid drachms.
Sheep - - - - 2 to 4 ,, ,,
Horse - - - - 1 to 2 ,, ounces.
Ox - - - - 2 to 4 ,, ,,

TRAGACANTHA (A. and B.).

Tragacanth.

Description.—Syrian tragacanth is an exudation of a gummy nature obtained by incision from *Astragalus gummifer*, Labillardière (Bentl. and Trim., *Med. Pl.*, vol. ii., plate 73), and some other species of astragalus, Linn., Nat. Ord., Leguminosæ. Yellowish flat flakes of varying size, thin, more or less curved. They have concentric ridges on the surface, are horny, snap off short, are odourless and have demulcent taste. Sparingly soluble in water, forming with it a gelatinous mixture, sometimes used as a gum, and tinged blue by solution of iodine.

Dose.—*Dog* - - - - - - ½ to 1 drachm.
Pig - - - - - - 1 to 2 drachms.
Horse - - - - - - ½ to 1½ ounces.

UNGUENTUM ACIDI BORICI (B.).

Ointment of Boric Acid.

Mode of Preparation.—Mix 30 grammes of boric acid in very fine powder sifted, with 270 grammes white paraffin ointment gently heated. Then stir the mixture constantly until it is cold. A mixture of equal parts of this ointment and of vaseline is also useful. A readily made mixture can be made of vaseline and boric acid in the same proportions of 9 to 1, or, if desirable, it can be made stronger.

[1] The United States Pharmacopœia directs 200 grammes of ginger to be percolated with enough alcohol (91 per cent.) to make 1,000 c.c. It is therefore much stronger than the British Pharmacopœia tincture.

UNGUENTUM ACIDI SALICYLICI (B.).

Ointment of Salicylic Acid.

Mode of Preparation.—Mix well 0·5 gramme salicylic acid and 24·5 grammes white paraffin ointment. An ointment can also be made with vaseline and salicylic acid in similar proportions.

UNGUENTUM ACONITINÆ (B.).

Ointment of Aconitine.

Mode of Preparation.—Rub 0·5 gramme of aconitine with 4 grammes of oleic acid, and gently warm so as to dissolve, and then mix well with 20·5 grammes of lard.

UNGUENTUM AQUÆ ROSÆ (A.[1] and B.).

Ointment of Rose-Water.

Mode of Preparation.—Mix together, and at a moderate heat melt, 1½ ounces of white beeswax, 1½ ounces of spermaceti, and 9 ounces of almond oil. Pour the mixture into a warmed mortar, and gradually add 7 fluid ounces of undiluted rose-water, constantly shaking, then add 8 minims of oil of rose, and keep shaking until the ointment be cold.

UNGUENTUM ATROPINÆ (B.).

Ointment of Atropine.

Mode of Preparation.—Rub 0·5 gramme of atropine with 2 grammes of oleic acid, and gently warm so as to dissolve, and mix with 22·5 grammes of lard.

UNGUENTUM BELLADONNÆ (A.[2] and B.).

Ointment of Belladonna.

Mode of Preparation.—Expose 40 c.c. liquid extract of belladonna to the heat of a water-bath so as to make it weigh only 5 grammes, and then mix with 45 grammes benzoated lard. In 100 parts there should be 0·6 part of the alkaloids of belladonna root.

[1] In the United States Pharmacopœia preparation, cold cream, as it is popularly called, contains also borate of sodium, which is a useful adjunct.

[2] Not identical.

UNGUENTUM CANTHARIDUM (B.).[1]

Ointment of Cantharides.

Mode of Preparation. — 1. British Pharmacopœia: Melt 300 grammes benzoated lard, add 30 grammes cantharides bruised, and digest at 48·9° C. for twelve hours. Strain through calico, using gentle pressure, and stir until the ointment is cold.

2. Veterinary Pharmacopœia: Unguentum Lyttæ; Blistering Ointment: Melt together thoroughly over a fire in a saucepan the following:

Four pounds of Lard;
Four pounds of Resin;
Four fluid ounces of Turpentine;
Four fluid ounces of Oleum Succini.

Mix together with great care, so as to avoid a violent action, 2 fluid drachms of sulphuric acid and 2 fluid ounces of distilled water, and add this mixture to the above. Finally, add 1 pound of finely powdered cantharides, and stir thoroughly while the ointment is allowed to cool.

UNGUENTUM CAPSICI (B.).

Ointment of Capsicum.

Mode of Preparation.—Mix together 120 grains (12 grammes) of bruised capsicum fruit, 60 grains (6 grammes) of spermaceti, and 1 ounce (44 grammes) of olive oil. Place the mixture on a water-bath for one hour, stirring now and again, strain, and leave the ointment to cool without stirring.

UNGUENTUM CHRYSAROBINI (A.[2] and B.).

Ointment of Chrysarobin.

Mode of Preparation.—Melt 24 parts by weight of benzoated lard, add 1 part of chrysarobin, and stir them together. Continue to heat the mixture for some time so as to dissolve the chrysarobin, and then stir until the ointment is cold.

[1] Called in the British Pharmacopœia Unguentum Cantharidis.

[2] The United States Pharmacopœia directs 5 grammes of Chrysarobin to be well mixed with 95 grammes of Benzoinated Lard gradually added. The proportionate amounts are, therefore, 1 to 19, as opposed to 1 to 24 of the British Pharmacopœia.

UNGUENTUM COCAINÆ (B.).

Ointment of Cocaine.

Mode of Preparation.—Rub together 20 grains (1 gramme) of cocaine and 80 grains (4 grammes) of oleic acid, gently warm until solution occurs, then add 400 grains (20 grammes) of lard, and mix.

UNGUENTUM CONII (B.).

Ointment of Conium.

Mode of Preparation.—Evaporate 88 c.c. juice of conium on a water-bath to $\frac{1}{8}$ of its volume at 60° C., add 33 grammes hydrous wool fat, and rub the mixture well together.

UNGUENTUM CREOSOTI (B.).

Creosote Ointment.

Mode of Preparation.—Mix together 120 grammes of hard paraffin and 150 grammes of soft paraffin, white, and melt the two, add 30 grammes creosote, and stir until the ointment is cold.

UNGUENTUM EUCALYPTI (B.).

Ointment of Eucalyptus.

Mode of Preparation.—Mix together 120 grammes of hard paraffin and 150 grammes of soft paraffin, and melt the mixture, add 30 grammes of oil of eucalyptus, and stir until the ointment is cold.

UNGUENTUM HAMAMELIDIS (B.).

Ointment of Hamamelis.

Mode of Preparation.—Mix together 10 c.c. liquid extract of hamamelis and 90 grammes hydrous wool fat.

UNGUENTUM HYDRARGYRI (B.).[1]

Ointment of Mercury.

Mode of Preparation.—Rub together 16 parts by weight of mercury, 16 parts of lard, and 1 part of prepared suet, until metallic globules are no longer visible.

Preparation.—Linimentum Hydrargyri.

[1] The United States Pharmacopœia Unguentum Hydrargyri is made differently.

UNGUENTUM HYDRARGYRI AMMONIATI (A.[1] and B.).

Ointment of Ammoniated Mercury.

Synonym.—Ointment of White Precipitate.

Mode of Preparation. — Mix thoroughly 1 part by weight of ammoniated mercury and 9 parts of white paraffin ointment.

Composition.—The strength is 10 per cent.

UNGUENTUM HYDRARGYRI IODIDI RUBRI.

Ointment of Red Iodide of Mercury.

Modes of Preparation :

(*a*) Mix thoroughly 1 part of finely-powdered red iodide of mercury and 9 parts of simple ointment.

(*b*) Melt with heat 8 pounds of lard. Rub with a wooden knife by degrees 1 pound of red iodide of mercury with successive portions of olive oil, using in all 1 pint of olive oil. Then add the mixture of oil and red iodide of mercury to the melted lard, and continue stirring until the ointment is cool.

(*c*) British Pharmacopœia : Mix 2 grammes of finely-powdered mercuric iodide with 48 grammes of benzoated lard.

UNGUENTUM HYDRARGYRI NITRATIS (A.[2] and B.).

Ointment of Nitrate of Mercury.

Synonym.—Unguentum Citrinum.

Take of

Mercury by weight, 100 grammes ;
Nitric Acid, 300 c.c. ;
Lard, 400 grammes ;
Olive oil, 700 grammes.

Mode of Preparation.—Dissolve the mercury in the nitric acid with the aid of gentle agitation. Melt the lard in the oil by a steam- or water-bath in a porcelain vessel capable of holding 10 times the quantity, and while the mixture is at about 143·3° C. add the cold solution of mercury very gradually, stirring constantly, and mixing them thoroughly. After the mixture ceases

[1] The United States Pharmacopœia directs it to be made up with Benzoinated Lard, but the proportions are the same.

[2] The United States Pharmacopœia preparation is made differently.

to froth, keep the temperature up to 93·3° C. Continue to stir until the mixture is cold.

The ointment should be firm and of a pale-yellow hue.

UNGUENTUM HYDRARGYRI NITRATIS DILUTUM (B.).

Diluted Ointment of Nitrate of Mercury.

Mode of Preparation.—Mix together :

Nitrate of Mercury Ointment, 1 part by weight ;
Soft Paraffin, 4 parts.

UNGUENTUM HYDRARGYRI OLEATIS (B.).

Ointment of Oleate of Mercury.

Mode of Preparation.—Mix well 1 ounce of oleate of mercury with 3 ounces of benzoated lard.

UNGUENTUM HYDRARGYRI OXIDI FLAVI (A. and B.).

Ointment of Yellow Oxide of Mercury.

Mode of Preparation.—British Pharmacopœia : Mix well together 0·5 gramme of yellow mercuric oxide very finely powdered and 24·5 grammes of yellow soft paraffin.

The United States Pharmacopœia directs that 10 grammes of yellow mercuric oxide in very fine powder be mixed with 90 grammes of ointment ; hence it is five and a half times stronger.

UNGUENTUM HYDRARGYRI OXIDI RUBRI (A. and B.).

Ointment of Red Oxide of Mercury.

Mode of Preparation.—British Pharmacopœia : Mix 10 grammes red mercuric oxide very finely powdered with 90 grammes paraffin ointment, yellow.

United States Pharmacopœia : Mix 10 grammes red mercuric oxide with 5 grammes castor oil, and then gradually mix it with 85 grammes of ointment. It is of the same strength as the above.

UNGUENTUM IODI (A. and B.).

Ointment of Iodine.

1. British Pharmacopœia: Take of

Iodine, 1 gramme;
Iodide of Potassium, 1 gramme;
Glycerin, 3 grammes;
Lard, 20 grammes.

Mode of Preparation.—Rub the iodine and the iodide of potassium together with the glycerin in a porcelain or glass mortar; add the lard gradually, and mix.

2. United States Pharmacopœia: Rub 4 grammes of iodine, 1 gramme of iodide of potassium, with 2 c.c. of water, and then with 93 c.c. of benzoinated lard, and mix well with a non-metallic spatula. It should be made shortly before use.

UNGUENTUM IODOFORMI (A. and B.).

Iodoform Ointment.

Mode of Preparation.—British Pharmacopœia: Mix together 10 grammes of iodoform in very fine powder with 90 grammes of yellow paraffin ointment.

United States Pharmacopœia: Rub 10 grammes of iodoform with 90 grammes of benzoinated lard. It should be made shortly before use.

UNGUENTUM PARAFFINI (B.).

Ointment of Paraffin.

Mode of Preparation. — Mix together 3 ounces of hard paraffin and 7 ounces of soft paraffin, and melt the mixture in a shallow evaporating dish by the aid of gentle heat. As the liquid cools shake or stir constantly, until when cold a well-mixed ointment is formed.

When used as basis for white ointments the white soft paraffin should be used, and *vice versâ*, for coloured ointments the yellow soft paraffin should be employed. The proportions of the hard and soft paraffins to be used should vary with the climate and the prevailing temperature at different seasons of the year.

UNGUENTUM PHENOL.[1]

Ointment of Phenol.

Mode of Preparation.—Dissolve 15 grammes of phenol in 45 grammes of glycerin, add 315 grammes of white paraffin ointment, and mix.

UNGUENTUM PHENOL COMPOSITUM.

Compound Ointment of Phenol.

Mode of Preparation.—Take of

Benzoated Lard, 8 ounces;
Beeswax, 1½ ounces;
Olive Oil, 1½ ounces;
Phenol, 3 fluid drachms;
Oil of Eucalyptus, 6 fluid drachms;
Iodoform, 3 drachms.

Melt the lard and wax and add the other ingredients, stirring while the ointment cools.

UNGUENTUM PICIS LIQUIDÆ (A. and B.).

Tar Ointment.

Mode of Preparation.—1. United States Pharmacopœia: Mix 125 grammes of yellow wax and 375 grammes of lard, and melt together at a moderate heat, then add 500 grammes of tar, mix, strain through muslin, and stir until the mixture be cold.

2. British Pharmacopœia: Melt 40 grammes of beeswax at a low heat, add 100 grammes of tar, and stir until the mixture be cold.

UNGUENTUM PLUMBI ACETATIS (B.).

Lead Acetate Ointment.

Mode of Preparation.—Mix well 2 grammes of finely-powdered lead acetate and 48 grammes of white paraffin ointment.

[1] In both Pharmacopœias it is called Unguentum Acidi Carbolici. The United States Pharmacopœia directs that 5 grammes Carbolic Acid should be well mixed with 95 grammes Ointment.

UNGUENTUM PLUMBI ACETATIS COMPOSITUM.

Compound Ointment of Acetate of Lead.

Synonym.—Milk Absorbent Ointment.

Mode of Preparation.—Take of

Carbonate of Lead, 2½ pounds;
Acetate of Lead in fine powder, 10 ounces;
Alum, 10 ounces;
Lard, 7½ pounds;
Rose Pink, 3 ounces.

Mix thoroughly.

UNGUENTUM POTASSII SULPHIDI ET POTASSII SULPHATIS.

Ointment of Sulphate and Sulphide of Potassium.

Mode of Preparation.—Take of

Sulphurated Potash, 5 parts;
Hard Paraffin, 18 parts;
Soft Paraffin, 55 parts.

Triturate the sulphurated potash in a glass or porcelain mortar, and gradually add the previously melted mixture of the hard and soft paraffins. Rub together until the ointment is free from grittiness. This ointment should be recently prepared.

UNGUENTUM SIMPLEX.

Simple Ointment.

Mode of Preparation.—Melt 1 part of white wax and 1½ parts of benzoated lard in 1½ fluid parts of almond oil in a water-bath. Remove and stir the mixture constantly while it cools.

UNGUENTUM STAPHISAGRIÆ (B.).

Ointment of Stavesacre.

Mode of Preparation.—Crush 40 grammes of stavesacre seeds, and macerate them in 170 grammes of benzoated lard, kept melted over a water-bath for two hours. Strain through calico, and cool.

Composition.—Ointment of stavesacre contains nearly 5 per cent. of oil of stavesacre.

UNGUENTUM SULPHURIS (A.[1] and B.).

Ointment of Sulphur.

Mode of Preparation.—Mix thoroughly 1 part by weight of finely-sifted sublimed sulphur with 9 parts of benzoated lard.

UNGUENTUM SULPHURIS IODIDI (B.).

Ointment of Iodide of Sulphur.

Mode of Preparation.—Triturate 2 grammes of iodide of sulphur and 2 grammes of glycerin in a slightly warmed porcelain mortar, and add gradually 46 grammes of benzoated lard. Rub together until the ointment is cold and free from grittiness.

UNGUENTUM TEREBINTHINÆ.

Ointment of Turpentine.

Synonym.—Digestive Ointment.

Mode of Preparation.—Take of

Oil of Turpentine, 1 fluid part;
Resin, in powder, 1 part;
Yellow Wax, $\frac{1}{20}$ part;
Prepared Lard, 3 parts.

Melt the ingredients by the heat of a steam- or water-bath. Remove the vessel, and stir the mixture constantly while it cools.

UNGUENTUM VERATRINÆ (A. and B.).

Ointment of Veratrine.

Mode of Preparation.—1. British Pharmacopœia: Rub together 0·5 gramme veratrine and 2 grammes oleic acid, warm gently so as to dissolve, add 22·5 grammes lard, and mix well.

2. United States Pharmacopœia: Rub 4 grammes of veratrine with 6 grammes of olive oil in a mortar, and gradually mix it with 90 grammes of benzoinated lard.

[1] The United States Pharmacopœia proportion is 3 of washed sulphur to 7 of benzoinated lard. A useful proportion is 1 to 4 of lard.

UNGUENTUM ZINCI OXIDI (A. and B.).[1]

Ointment of Oxide of Zinc.

Mode of Preparation. — 1. British Pharmacopœia: Add 3 parts by weight of zinc oxide gradually to 17 of benzoated lard melted at a low heat, and stir constantly until it be cold.

2. United States Pharmacopœia: Sift 2 parts by weight of zinc oxide, through a No. 20 sieve, on the surface of 8 parts by weight of melted benzoinated lard, and stir until cool.

UROTROPIN.

Chemical Constitution.—Formin, or urotropin, is a compound of formaldehyde and ammonia. It increases excretion of uric acid, and is a urinary antiseptic. It is hexamethylene-tetramine $(CH_2)_6N_4$.

Actions and Uses.—P. J. Cammidge measured the daily output of urine of a healthy adult male, estimating amount of urea, uric acid, chlorides, phosphates and sulphates, also taking the specific gravity, reaction, and number of acts of micturition.

The results for the first and third weeks were standards to compare with those of the second week, in which 10 grains of urotropin in an ounce of water were taken thrice daily. It had no diuretic action, nor was there any appreciable change in the chemical composition of the urine. It was found in the urine ten minutes after the first dose, and it was still present in small quantity twenty-six hours after cessation.

On the fourth day formication occurred, especially at night, and in parts pressed by clothes. It became more intense each day, and on the sixth a diffuse red rash, like that of measles, appeared. Both rash and itching ceased after the urotropin was stopped. Nicolaier said that 90 grains a day caused the presence of blood and epithelial cells in the urine, and a burning in the bladder.

The urine of the first and third weeks quickly decomposed on standing, but that of the second week, which contained urotropin, was clear, and devoid of smell for more than four times as long.

Much of the urotropin is passed unchanged, but it is probably not free formaldehyde which exerts bactericidal powers.

Urotropin, or an alkaline solution of it, by prolonged heating, yields formaldehyde, but this does not occur at the normal

[1] Known as Unguentum Zinci in the British Pharmacopœia.

temperature of the body. Diluted acids boiled with urotropin quickly decompose it with evolution of free formaldehyde, and this occurs to a less extent at 37° C. Similarly, the acid salts —*e.g.*, of the urine—set free formaldehyde from urotropin on boiling, but not at 37° C.

The acid urine of a person taking 30 grains of urotropin daily does not contain free formaldehyde.

Probably acid urines produce in the kidney a partial decomposition of the urotropin, either setting free a new body or forming a fresh compound, whereby the growth of bacteria is checked. The urine should be acid as it leaves the kidney, as it is in cases of typhoid cystitis, in which urotropin causes quick disappearance of bacilli. It is also useful in cystitis from enlarged prostate and stricture of the urethra, in which the urine is acid whilst leaving the kidney, and becomes alkaline from ammoniacal decomposition in the bladder, as also in suppurative pyelitis and in cystitis.

F. Suter says that 5 or 10 milligrammes of formaldehyde have the same effect on 3 ounces of urine as ½ gramme urotropin. *Bacilli coli communis* and *streptococci* are very resistant. Different portions of urine passed first in the morning were examined after administration the preceding night of one of the following medicines: benzoic acid 10 grains, or boric acid 15 grains, salol 15 or 45 grains, or urotropin 15 grains. Only the salol in the stronger dose, and the urotropin, retarded the decomposition.

It is useful in cases where an operation such as even catheterism is requisite, in bacteriuria, especially after enteric fever, and in cystitis, as an aid to local measures.

It is of little value in pyonephritis, gonorrhœal cystitis, or tuberculosis of the kidney. It acts best in those cases of cystitis where there is ammonia decomposition, and is useful in disease of the prostate with residuary urine, and in stricture with partial retention. About 15 to 25 grains can safely be given daily for weeks.

A case, however, is recorded by W. F. Glenn in which 7½ grains in twenty-four hours could not be borne because of the extreme vesical irritation. He has never seen nervous chill when urotropin had been given a week before the time for operating. Large quantities of water should also be given.

J. Dreschfeld recorded good results from this drug in the pyuria of cystitis, due to hypertrophy of the prostate, gonorrhœa, gout, after typhoid fever, or in arsenical poisoning.

It was useful in four out of six cases of pyelitis, the two not benefited being tuberculous, and one of the four being calculous in origin.

As a solvent for uric acid, it is of doubtful utility. In one case of gouty sciatica it gave relief. Doses of 10 to 15 grains in powder were placed on the tongue, and water then was swallowed. Large doses sometimes caused tenesmus and pain in the bladder, and, if nausea were produced, it was prevented by the addition of bismuth in powder.

Reginald Harrison says it removes all traces of pus in simple suppurative affections of the upper urinary passages.

It is most beneficial in cases of phosphaturia. When the urine is full of pus and triple phosphates, and is ammoniacal, bladder lavage should be carried out in addition to the internal treatment.

VALERIANÆ RHIZOMA (A.[1] and B.).

Valerian Rhizome.

Synonym.—Valerianæ Radix.

Natural Order.—Valerianaceæ.

Characters.—The rhizome and rootlets of *Valeriana officinalis*, Linn. (B. and T., *Med. Pl.*, vol. ii., plate 146. Nat. Ord., Valerianaceæ), should be collected in autumn from plants growing wild or cultivated in Britain, and dried. The rhizome is short and erect, entire or sliced, and dark yellowish-brown externally. It gives off numerous slender, brittle, and shrivelled rootlets, 3 or 4 inches in length. The rootlets are whitish internally, and in this, as in their external colour, are like the rhizome. The odour, which is developed in drying, is strong and peculiar. The taste is unpleasant, camphoraceous, and slightly bitter. When valerian rhizome is distilled with water, volatile oil and valerianic acid are produced.

Therapeutics.—Valerian is a powerful carminative, circulatory stimulant, excitant of the cerebro-spinal system, and antispasmodic. It has also anthelmintic properties. It is but little used in veterinary medicine, but is sometimes prescribed for chorea and epilepsy in dogs. On horses and cattle its effect is very slight. It may be administered in powder or as infusion, or may be dissolved in spirit of ammonia.

[1] Known as Valeriana, Valerian, in the United States Pharmacopœia.

Dose.—*Cat* - - - - $\frac{1}{4}$ to $\frac{1}{2}$ drachm.
Dog - - - - $\frac{1}{4}$ to 1 ,,
Pig - - - - $\frac{1}{2}$ to 2 drachms.
Horse - - - - $\frac{1}{2}$ to $1\frac{1}{2}$ ounces.
Ox - - - - 1 to 2 ,,

VAPOR CREASOTI.

Inhalation of Creasote.

Mode of Preparation.—Mix $\frac{1}{2}$ fluid drachm of creasote with 10 fluid ounces of boiling water for inhalation.

VERATRI VIRIDIS RHIZOME (A.[1] and B.).

Green Hellebore Rhizome.

Synonym.—Veratri Viridis Radix.

Natural Order.—Melanthaceæ.

Characters.—The dried rhizome of *Veratrum viride*, Solander—Nat. Ord., Liliaceæ—is entire, or transversely or longitudinally divided, and may or may not have attached rootlets. When entire, the rhizome is from 1 inch to 2 inches or more in length, and $\frac{3}{4}$ inch or more in diameter, erect, obconical, obtuse or truncated at the apex, dark brown externally, whitish within. The rhizome frequently bears at its upper end the concentrically arranged remains of leaves, and gives off on all sides numerous shrivelled yellowish-white rootlets several inches in length. The rootlets may have been broken off, and the rhizome marked with corresponding scars. The rhizome and rootlets are odourless, but when powdered excite sneezing. The taste is bitterish and very acrid.

Therapeutics.—Externally, green hellebore and its alkaloid veratrine act firstly as powerful irritants, and then as depressants, on the nerves and vessels, owing to the fact that when used for local purposes, they are liable to be absorbed and produce constitutional effects. For the destruction of pediculi, more safe preparations are to be recommended.

Internally, green hellebore and veratrine are powerful vaso-motor depressants. The heart's action, after primary acceleration, becomes reduced in frequency. If large doses be taken, the action becomes irregular, feeble, and accelerated, and finally paralysis of the cardiac muscle ensues. The blood-pressure rises at first under the influence of these agents. It then falls, and becomes much lowered. The effects on the heart are to be attributed to the action of the drug on the centres in the medulla. The respiration is first accelerated, and finally arrested, when large doses are taken. There is a fall of temperature in animals affected with fever, when these agents are administered, and this is to be assigned to cardiac and circulatory depression. On the digestive tract these agents act as irritants. The chief action, however, of veratrine is on the muscles, the periods of the contractions of which are greatly lengthened, and the strength thereof increased. If large doses are

[1] Known in the United States Pharmacopœia as Veratrum Viride.

taken, the muscles are much weakened, and finally paralyzed. Toxic doses of hellebore cause spasm of the muscles, followed by paralysis of them, and also paralysis of the heart, great prostration, muscular weakness, difficulty of movement, slavering at the mouth, purging, retching, and vomiting. Finally, death results from asphyxia.

Hellebore is seldom given internally, though in former times it was administered in a great many diseases of horses and cattle. In acute rheumatism it is still sometimes prescribed as an antipyretic and depressant in horses, but is not so safe nor so useful as salicylate of sodium.

Dose.—*Dog* - - - - - - - $\frac{1}{10}$ to 2 grains.
Pig - - - - - - - 4 to 12 ,,
Sheep - - - - - - - 10 to 25 ,,
Horse - - - - - - - $\frac{1}{4}$ to $\frac{1}{2}$ drachm.
Ox - - - - - - - $\frac{1}{2}$ to 1 ,,

VERATRINA (A.[1] and B.).

Veratrine.

Synonym.—Veratria.

Characters.—The active poison, veratrine, an alkaloid or mixture of alkaloids obtained from cevadilla, the dried ripe seeds of *Schœnocaulon officinale*, A. Gray (B. and T., *Med. Pl.*, vol. iv., plate 287)—Nat. Ord., Liliaceæ—is pale gray in colour and amorphous. Though inodorous, it strongly irritates the nostrils, even in the most minute quantity. It is strongly and persistently bitter, and highly acrid; insoluble in water, but soluble in 3 parts of alcohol (90 per cent.), or of chloroform, in 6 parts of ether, and in diluted acids, leaving traces of an insoluble brown resinoid matter. A solution of veratrine in nitric acid is yellow, and a solution in sulphuric acid is deep red, and exhibits a green fluorescence by reflected light. If warmed with hydrochloric acid veratrine dissolves likewise, forming a blood-red solution. If heated with access of air, it melts, forming a yellow liquid, and at length burns away, leaving no residue.

Therapeutics.—Veratrine is used for making ointment for the relief of neuralgia. The British Pharmacopœial ointment of veratrine is made of 0·5 gramme veratrine, 2 grammes oleic acid, and 22·5 grammes lard.

Doses of Veratrine:

Dog - - - - - - $\frac{1}{16}$ to $\frac{1}{12}$ grain.
Pig - - - - - - $\frac{1}{8}$ to $\frac{1}{2}$,,
Sheep - - - - - - $\frac{1}{6}$ to $\frac{1}{2}$,,
Horse - - - - - - $\frac{1}{2}$ to $2\frac{1}{2}$ grains.
Ox - - - - - - 1 to 4 ,,

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[1] In the United States Pharmacopœia veratrine is said to be a mixture of alkaloids obtained from the seed of *Asagræa officinalis* (Schlechtendal et Chamisso), Lindley, Liliaceæ.

VINUM ANTIMONIALE (A.[1] and B.).

Antimonial Wine.

Mode of Preparation.—Dissolve 4 grammes of tartrate of antimony and potassium in 44 c.c. of distilled water, and add enough sherry to make 875 c.c.

Dose.—*Man* - - - - 10 to 30 minims; as an emetic, 2 to 4 fluid drachms.

VINUM IPECACUANHÆ (B.).[2]

Wine of Ipecacuanha.

Mode of Preparation.—Add 950 c.c. sherry to 50 c.c. liquid extract of ipecacuanha, shake, leave for two days and filter.

Dose.—*Man* - - as expectorant, 10 to 30 minims; as an emetic, 4 to 6 fluid drachms.

Dog - - - as expectorant, 20 to 60 minims; as an emetic, 2 to 6 fluid drachms.

XANTHOXYLUM (A.).

Xanthoxylum.

Description.—The bark of *X. Americanum*, Miller, and of *X. Clava-Herculis*, Linné; Nat. Ord., Rutaceæ.

Preparation.—Extractum Xanthoxyli Fluidum.

Composition.—It contains a volatile oil, resins, and perhaps *berberine*.

Action and Use in Human Beings.—Aromatic and slightly irritant, bitter, similar to mezereum and guaiacum, and, like them, useful for certain forms of rheumatism, possibly of a malarial nature. The bark is chewed for tooth-ache and palsy of the tongue.

Dose of the Fluid Extract.—*Man* - - ½ to 1 fluid drachm.

YOHIMBIN.

Chemical Composition.—Yohimbin, or Johimbin, is an alkaloid or mixture of alkaloids from the Johimbehe bark. Its formula is given as $C_{23}H_{32}N_2O_4$, or $C_{22}H_{30}N_2O_4$.

Action and Uses.—Oberwarth says the lethal dose for guinea-

[1] The Vinum Antimonii of the United States Pharmacopœia is made differently.

[2] The United States Pharmacopœia Vinum Ipecacuanhæ is made of 100 c.c. fluid extract of ipecacuanha, 100 c.c. alcohol, and 800 c.c. white wine. Mix, and after a time filter. It is nearly double as strong as the British Pharmacopœia tincture.

pigs is $\frac{1}{6}$ grain to the kilogramme of animal. In cold-blooded animals, in doses gradually increased, it causes a weakening of the functions of the spinal cord, the heart's action is slowed and depressed, the blood-pressure lessened, and respiration is also depressed. It causes death in frogs by paralysis of the heart.

Doses of hydrochloride of yohimbin, $\frac{1}{10}$ to $\frac{1}{8}$ grain in water, 1 in 500, cause congestion of ovaries and testicles, with swelling and sexual desire.

Professor E. Mendel, of Berlin, gave 5 to 10 drops solution of yohimbin thrice daily, with no effect when impotence was due to tabes or other organic diseases; but when owing to irritable weakness or paralytic inability, it was beneficial.

Berger gave a fluid form of the drug of the strength of 1 decigramme to 20 c.c., and 20 drops of this solution represents 5 milligrammes, which should first be tried, and after a week, if necessary, 10 or 15 milligrammes can be given.

S. Eulenberg has used it in a 1 per cent. solution in doses of 10 drops, and in 5 milligramme tablets.

ZINCI ACETAS (A. and B.).

Acetate of Zinc.

Formula.—$Zn(C_2H_3O_2)_2,3H_2O$.

Add 2 ounces of carbonate of zinc in successive portions to a mixture of 3 fluid ounces of acetic acid and 6 fluid ounces of distilled water in a flask. Heat gently, and add by degrees 2 fluid ounces or a sufficiency of acetic acid until the carbonate of zinc is dissolved. Boil for a few minutes, filter while the solution is hot, and set the filtrate aside for two days in order that the acetate may crystallize. Decant the mother-liquor, evaporate it to half its bulk, and likewise set it aside for two days to crystallize. Place the crystals in a funnel to drain, then spread them on filter-paper on a porous tile, and dry them by exposure to the air at the ordinary temperature.

Characters.—Acetate of zinc exists in thin, translucent and colourless crystalline plates having a pearly lustre. The salt possesses a sharp, unpleasant taste.

Tests.—When decomposed by sulphuric acid, sulphate of zinc is produced, while acetic acid is evolved. The salt is soluble in 2·5 parts of water, and the aqueous solution gives a white precipitate with sulphuretted hydrogen. A diluted aqueous solution does not give precipitates with chloride of barium nor with nitrate of silver. When slightly acidulated with hydrochloric acid it is not precipitated by sulphuretted hydrogen. After it has been boiled for a few minutes with a little nitric acid, the aqueous solution yields with ammonia a white precipitate, which is entirely soluble without colour in an excess of the ammonia.

Therapeutics.—Acetate of zinc in its action is very similar to the sulphate, having emetic and nervine tonic properties; but it is rarely or never prescribed for internal purposes. Externally, it is used for the same purposes as the sulphate, though not nearly so frequently employed. As an injection for gonorrhœa it may be used in the strength of 4 to 5 grains to the ounce of water.

Dose of Acetate of Zinc:

Man	1 to 2 grains.
Dog	1 to 3 grains, but as emetic 10 to 20 grains.
Pig	4 to 10 grains.
Sheep	5 to 20 ,,
Horse	½ to 1 drachm.
Ox	1 to 1½ drachms.

ZINCI CARBONAS (A.[1] and B.).

Carbonate of Zinc.

Formula.—$ZnCO_3(Zn2HO)_2,H_2O$.

Composition.—A mixture of zinc carbonate and zinc hydrate.

Mode of Preparation—Dissolve 10½ ounces of carbonate of sodium in a pint of boiling distilled water in a large porcelain vessel, and pass into it a solution of 10 ounces of sulphate of zinc in a pint of boiling distilled water, stirring diligently. Boil for fifteen minutes after effervescence has ceased, and allow the precipitate to subside. Decant the supernatant liquid, pour on the precipitate 3 pints of boiling distilled water, agitating briskly. Let the precipitate again subside, and repeat the processes of affusion of hot distilled water and subsidence, until the washings are no longer precipitated by chloride of barium. Collect the precipitate on calico, let it drain, and dry it at a moderate temperature.

Characters.—Carbonate or hydroxycarbonate of zinc is white, tasteless, and inodorous. It is insoluble in water, but soluble with effervescence and without residue in diluted nitric acid.

Tests.—A solution in nitric acid is really one of nitrate of zinc, and contains no sulphate or chloride. With carbonate of ammonium it yields a white precipitate soluble in excess and forming a solution which gives a white precipitate with sulphydrate of ammonium.

Therapeutics.—In veterinary medicine calamine (native carbonate of zinc) is generally used after partial purifying by levigation, instead of the carbonate as above prepared. It is equally serviceable, and is used externally for the same purposes as the oxide.

Dose of Carbonate of Zinc:

Dog	2 to 10 grains.
Pig	5 to 20 ,,
Horse	1 to 2 drachms.

[1] The United States Pharmacopœia is Zinci Carbonas Præcipitatus.

ZINCI CHLORIDUM (A. and B.).

Chloride of Zinc.

Formula.—$ZnCl_2$.

Synonym.—Butter of Zinc.

Mode of Preparation.—Place 16 ounces of granulated zinc in a porcelain basin, add by degrees 44 fluid ounces of hydrochloric acid mixed with 1 pint of distilled water, and aid the action by gently warming on a sand-bath until the gas hydrogen is no longer evolved. Boil for half an hour, supplying the water lost by evaporation, and allow it to stand on a cool part of a sand-bath for twenty-four hours, stirring frequently. It is then necessary to test a few drops of the resulting liquid for iron or lead by adding excess of ammonia and then sulphydrate of ammonium, when a black precipitate will be produced if iron or lead be present. Should this be the case, filter the remainder of the product into a gallon bottle and pour in solution of chlorine by degrees with frequent agitation until the fluid obtains a permanent odour of chlorine. Add $\frac{1}{2}$ ounce or a sufficient quantity of carbonate of zinc in small quantities at a time and with agitation until a brown sediment appears, and the iron or lead is thus precipitated. Filter through paper into a porcelain basin, and evaporate until a portion of the liquid, cooled on the end of a glass rod, forms an opaque white solid. Pour it out now into suitable moulds, and when the salt has solidified, but before it has cooled, place it in closely-stoppered bottles. The reaction of zinc on hydrochloric acid is thus expressed:

$$Zn + 2HCl = ZnCl_2 + H_2.$$

If no iron or lead be present, filter and evaporate at once.

Characters and Tests.—Chloride of zinc exists in the form of colourless opaque rods or tablets. It is a very deliquescent and caustic salt, almost entirely soluble in water, alcohol, or ether. The aqueous solution gives a white precipitate with ammonium sulphide and with nitrate of silver. If first acidulated with hydrochloric acid, it is not affected by sulphuretted hydrogen. The solution is not affected by chloride of barium, nor by oxalate of ammonium, and is not tinged blue by ferrocyanide, nor by ferricyanide, of potassium. With ammonia the solution yields a white precipitate soluble in excess.

Preparation.—Liquor Zinci Chloridi.

Therapeutics.—Chloride of zinc is a powerful escharotic, and its application causes destruction of the tissue, with severe pain, and separation of a slough, followed by healing. In the form of a paste made with one or two parts of flour or plaster of Paris, or in the form of concentrated solution, it is employed to destroy morbid growths, chronic ulcers, gangrenous tissues, and the walls of fistulæ and sinuses, such as those of quittor and poll-evil. It is used also as a caustic for canker of the foot, protuberant granulations, foul spreading ulcers, and foot-rot in sheep. The solution of chloride of zinc (liquor zinci chloridi) is applied as an astringent and antiseptic to wounds, and also for killing animal parasites which may be invading the skin, and as a wash for ticks in sheep. Chloride of zinc is very destructive to bacteria, and is used as a disinfectant. Burnett's disinfecting and deodorizing solution, which contains 25 grains to the fluid drachm, is used in the strength of 1 pint to 5 gallons of water.

Dose of Chloride of Zinc:

Dog - - - -	½ to 2 grains.
Pig - - - -	1½ to 4 „
Horse - - - -	¼ to ½ drachm.

ZINCI OXIDUM (A. and B.).

Oxide of Zinc.

Formula.—ZnO.

Mode of Preparation.—Place 6 ounces of carbonate of zinc in a loosely-covered Hessian crucible, and expose it to a dull red heat, until a portion of it, taken from the centre and cooled, does not effervesce when moistened with water and dropped into diluted sulphuric acid. Then let the crucible cool, and transfer the contents to stoppered bottles. Oxide of zinc may also be obtained from metallic zinc by combustion.

Characters.—Oxide of zinc is a soft, white, or nearly white, tasteless, and inodorous powder.

Tests.—When heated, oxide of zinc becomes pale-yellow in colour. It is soluble without effervescence in diluted nitric acid, and the solution thu formed is not precipitated by chloride of barium, nitrate of silver, nor by diluted sulphuric acid. With carbonate of ammonium, however, this solution yields a white precipitate which dissolves entirely and without colour in an excess of the reagent, forming a solution which gives a white precipitate with sulphydrate of ammonium. It should be totally soluble when warmed with strong solution of ammonia (absence of zinc).

Preparation.—Unguentum Zinci Oxidi (3 parts of the oxide to 17 of benzoated lard).

Therapeutics.—The oxide of zinc is seldom administered internally. It is

useful as an astringent for dusting irritable sores, or as the ointment in cases of eczema and erythema.

Dose.—*Man and Dog* - - - - 2 to 10 grains.
Pig - - - - - - 5 to 20 ,,
Horse and Ox - - - - 1 to 2 drachms.

ZINCI SULPHAS (A. and B.).

Sulphate of Zinc.

Formula.—$ZnSO_4,7H_2O$.

Mode of Preparation.—Mix 12 fluid ounces of sulphuric acid carefully with 4 pints of distilled water, and then pour the mixture on 16 ounces of granulated zinc contained in a porcelain vessel. When the evolution of hydrogen[1] has nearly ceased, aid the action by gentle heat. Test a few drops of the liquid for iron by adding excess of ammonia, and then sulphydrate of ammonium. If iron be present, a black precipitate will be produced. If so, filter into a gallon bottle, and add gradually to the filtrate, while constantly shaking, solution of chlorine, until the fluid acquires a permanent odour of chlorine. Next add, still shaking constantly, $\frac{1}{2}$ ounce of carbonate of zinc, or a sufficient quantity to produce a brown precipitate of the whole of the iron present. Let this precipitate subside, and filter the solution. Evaporate the filtrate until a pellicle forms on the surface, and set aside that crystals may be produced. Dry the crystals by exposure to the air on filter-paper placed on porous tiles. More crystals may be obtained in the usual way from the mother-liquor, by evaporating and allowing it to cool.

If the test prove the absence of iron, then filtration, evaporation, and crystallization may at once be proceeded with.

Characters.—Sulphate of zinc exists in colourless, transparent, prismatic crystals. It possesses a strong, metallic, styptic taste, and is thus easily distinguished from sulphate of magnesium, a salt which it otherwise closely resembles in general characters.

Tests.—It is soluble in less than an equal weight of cold water. An aqueous solution of sulphate of zinc gives white precipitates with chloride of barium and with sulphydrate of ammonium. It is not tinged purple by tincture of galls; and when acidulated with sulphuric or hydrochloric acid, it gives no precipitate with sulphuretted hydrogen. After it has been boiled for a few

[1] The reaction may be thus expressed: $Zn + H_2SO_4 = ZnSO_4 + H_2$.

minutes with a little nitric acid, it yields with ammonia a white precipitate which is entirely soluble, without producing any colour, in an excess of the reagent.

Therapeutics.—Sulphate of zinc has sedative, irritant, astringent, and antiseptic properties. It is also a nervine tonic. In dogs and pigs it produces emesis when taken in proportionately large doses, and is a useful agent to employ when it is desired to empty the stomach rapidly. In cases of engorgement of the stomach, and in some cases of poisoning, it should be given in 2 ounces of water. On horses it has no emetic action, though it causes nausea and depression if taken in large doses. As an astringent in cases of diarrhœa, it is not so much employed as the corresponding salt of lead. In cases of chorea in dogs, it is often prescribed with benefit in the acute stages.

Externally, sulphate of zinc is very frequently used for healing ulcers and wounds, limiting the discharge, checking excessive growth, and restricting and altering the intensity of the inflammatory process with which healing is associated. The 'white lotion' is made of 6 drachms of the sulphate of zinc, 1 ounce of acetate of lead, and 2 pints of water. An astringent lotion containing 5 to 15 grains to the fluid ounce of water is suitable for wounds, sores, and ulcers. For simple ophthalmia, a lotion of 1 to 2 grains to the ounce of water is very serviceable. In cases of gonorrhœa 4 grains to the ounce of water are used.

Dose of Sulphate of Zinc:

As astringent:

Man and Dog	1 to 3 grains.
Pig	4 to 10 ,,
Sheep	5 to 15 ,,
Horse	½ to 1½ drachms.
Ox	1 to 2 ,,

As emetic:

Dog	6 to 15 grains.
Pig	8 to 20 ,,
Man	10 to 30 ,,

ZINCI SULPHOCARBOLAS (B.).

Sulphocarbolate of Zinc.

Formula.—$Zn(OH{\cdot}C_6H_4{\cdot}SO_3)_2,H_2O$.

Mode of Preparation.—Sulphocarbolate of zinc or zinc phenol-para-sulphonate, may be obtained by heating a mixture of

phenol and sulphuric acid, saturating the product with oxide of zinc, evaporating and crystallizing.

Characters.—Sulphocarbolate of zinc is composed of colourless, transparent, tabular, efflorescent crystals. It is soluble in 2 parts of water, or in 2·5 parts of alcohol (90 per cent.).

Tests.—An aqueous solution is rendered violet-coloured by perchloride of iron, and affords a white precipitate with hydrosulphide of ammonia. It is not at once rendered turbid, or is only rendered faintly turbid, by chloride of barium, and is not precipitated by oxalate of ammonium.

Therapeutics.—An astringent lotion containing 2 or 3 grains of sulphocarbolate of zinc to each fluid ounce of water is very useful in cases of leucorrhœa and foul discharges from the vagina or uterus in mares and cows. In cases of gonorrhœa in bulls, a lotion of 4 to 5 grains to each fluid ounce of water has been used with beneficial results.

ZINCI VALERIANAS (A. and B.).

Valerianate of Zinc.

Formula.—$Zn(C_5H_9O_2)_2$.[1]

Mode of Preparation.—Dissolve 5½ ounces of sulphate of zinc and 5 ounces of iso-valerianate of sodium, each in 2 pints of distilled water. Heat both solutions to near the boiling-point, and mix them. Cool, and skim off the crystals which are produced. Evaporate the mother-liquor at a temperature not exceeding 93·3° C., until it is reduced to 4 ounces. Cool, remove the crystals which have formed, and add them to those which have already been obtained. Drain the crystals on filter-paper, and wash them with a small quantity of cold distilled water, until the washings give only a very feeble precipitate with chloride of barium. Again drain, and dry on filter-paper at the ordinary temperature. The salt may also be obtained by saturating iso-valerianic acid with carbonate of zinc.

Characters.—Valerianate of zinc, or iso-valerianate of zinc, exists in brilliant, white, pearly, tabular crystals. The salt has an odour of valerianic acid, and gives rise to a metallic taste in the mouth. It is scarcely soluble in cold water or in ether, soluble in hot water and alcohol (90 per cent.).

Tests.—When heated to redness in an open crucible, valerianate of zinc leaves a residue which, when dissolved in diluted sulphuric acid, yields with ammonia a white precipitate wholly soluble in excess of ammonia. The solution which results yields a white precipitate with sulphydrate of ammonium. If moistened with nitric acid, and then heated to redness, it gives about 28 per cent. of oxide of zinc. A solution of valerianate of zinc in hot water is only faintly precipitated by chloride of barium. When

[1] The United States Pharmacopœia formula is the same with 2 molecules of water.

heated with diluted sulphuric acid, the salt yields a distillate, which, when mixed with solution of acetate of copper, does not at once affect the transparency of the fluid, but forms after a little time oily drops, which gradually pass into a bluish-white crystalline deposit (proving absence of butyrates).

Therapeutics.—Valerianate of zinc acts chiefly, if not entirely, in virtue of its zinc constituent, the valerianic acid appearing to have no action.

For acute chorea in dogs, it may be prescribed in doses of 3 grains.

Dose.—*Man and Dog* - - - - - - 1 to 3 grains.
Pig - - - - - - - 3 to 10 ,,
Horse - - - - - - - ½ to 1 drachm.

ZINCUM (A.).

Zinc.

Externally applied, the salts of zinc are caustic in stronger solutions, astringent or antiphlogistic in weaker. The chloride is a powerful escharotic, whereas the sulphate and acetate, having less affinity for water, are much less powerful. The oxide, oleate, and carbonate act as mild astringents, and, being insoluble, are applied in the form of powder or ointment. The preparations of zinc have powerfully disinfectant properties, and to these they owe a great share of their value as external applications.

Internally, the acetate of zinc is a direct emetic in pigs and dogs, and, as it causes much less immediate depression and less subsequent nausea than antimony or ipecacuanha, it is generally preferred. The other salts of zinc also have emetic properties, but the sulphate is the one generally employed.

The salts of zinc are also astringent, but are not much used internally for this purpose. They are direct depressants to the nervous centres, especially the sensory parts of the spinal cord, and thus they indirectly weaken and disturb the muscular system. Being eliminated by the kidneys, mammary glands, and probably by the skin and mucous surfaces, the salts of zinc exert a remote astringent effect on these organs whilst leaving the system.

ZINCUM GRANULATUM.

Granulated Zinc.

Mode of Preparation.—Heat 1 pound of zinc of commerce in an earthen crucible; and, as soon as the metal is fused, remove the crucible from the fire, and, taking necessary care, pour the fluid zinc in a thin stream into a vessel containing about 2 gallons of cold water. Drain off the water, and dry the granulated zinc.

ZINGIBER (A. and B.).

Ginger.

Natural Order.—Zingiberaceæ.

Characters. — The scraped and dried rhizome of *Zingiber officinale*, Roscoe (B. and T., *Med. Pl.*, vol. iv., plate 270), exists in flattish irregularly branched pieces, ordinarily from about 3 to 4 inches in length. Each branch is marked at its summit by a depressed scar.

Externally, the colour is pale buff. The substance is somewhat striated and fibrous, and breaks with a mealy, short, but rather fibrous, or at times resinous, fracture. The odour is agreeably aromatic, the taste strong and pungent.

Preparation :

Tinctura Zingiberis—2 ounces ginger to 1 pint of alcohol (90 per cent.)-

Therapeutics. — Ginger is aromatic, carminative, tonic, stomachic, and somewhat irritant. It is often employed with other remedies as a mild tonic and appetizer after debilitating diseases, and is sometimes given with purgatives to diminish their tendency to cause griping. In indigestion, ginger acts as a useful carminative, and is often prescribed with other remedies given for this disorder.

Dose.—

Dog	5 to 20 grains.
Pig	¼ to 1 drachm.
Sheep	½ to 1½ drachms.
Horse	¼ to 1 ounce.
Ox	1 to 1½ ounces.

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