are so common a factor in the development of gouty dyspepsia; a 2½ grain tablet before each meal.—*Pr.* '07, i. 168.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme, in capsules in the middle of or immediately after a meal.

Diastase from Malt is official in Fr., Jap., Mex. and Span.

CADINUM OLEUM.

OIL OF CADE.

B.P.Syn.—JUNIPER TAR OIL.

FR., HUILE DE CADE; GER., KADEÖL; ITAL., OLIO CADINO; SPAN., BREA DE OXICEDRO.

A brownish or dark brown, viscid fluid, of an oily nature, with a tarry odour and an empyreumatic and somewhat bitter taste; a product of the dry distillation of the Branches and Wood of *Juniperus Oxycedrus*, L., and other species. It contains a high percentage of the sesquiterpene, Cadinene.

Solubility.—Mixes in all proportions with Chloroform and Ether; partially soluble in Alcohol (90 p.c.); slightly soluble in Water.

Medicinal Properties.—An agreeable form of Tar. Used as a stimulant in cases of psoriasis and of chronic eczema.

Prescribing Notes.—*It is used in the form of Ointment; the Oil mixed with equal parts of Yellow Wax, and further diluted with Lard or Vaseline if required.*

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Hung., Ital., Norw., Port., Span. (Brea de Oxicedro), Russ., Swed. (Pyroleum Oxycedri), Swiss and U.S. Not in the others.

In **Balzer's Cade Baths** the oil is emulsified before being added to the bath.

An emulsion of Oil of Cade and a fluid extract from the decoction of the tops of the Taunus Pines. The baths are given daily, and can be used in all varieties of psoriasis.

Cade Bath Fluid is put up in bottles, one of which, being mixed with a little warm Water, is added to an ordinary bath, which should last from half an hour to an hour, and should be accompanied by slight friction on the affected patches.

These baths may be used as an adjuvant to the ordinary treatment, and are suitable both for hospital and private cases.

Tests.—Oil of Cade has a specific gravity of about 0·990. When shaken with Water and filtered it should yield an almost colourless filtrate possessing an acid reaction. In a sample (sp. gr. 0·996), examined by the author, the acidity amounted to 0·7 p.c. of pure Acetic Acid.

The filtered aqueous solution should yield a red coloration with diluted Ferric Chloride Test-solution.

The *B.P.* states that the filtered aqueous solution is almost colourless and possesses an acid reaction; and the *U.S.P.* that it imparts to Water an acid reaction.

VASOLIMENTUM EMPYREUMATICUM. — Juniper Tar Oil, 25; Vasoliment, 75.—*Hager.*

Parogenum Empyreumaticum.—Oil of Cade, 25; Parogen, 75.—*B.P.C.*

CAFFEINA.

CAFFEINE.

B.P.Syn.—THEINE.

N.O.Syn.—COFFEINA.

FR., CAFEINE; GER., KOFFEIN; ITAL., CAFFEINA; SPAN., CAFEINA.

$C_8H_{10}N_4O_2, H_2O$, eq. 210·68.

Fine white silky acicular crystals, odourless, and possessing a bitter taste.

A feebly basic alkaloid, contained in the prepared and dried Leaves of *Camellia Thea*, Link., the dried seed of *Coffea Arabica*, L., and also in other plants. It is chemically allied to Theobromine, being **Methyl-theobromine** (Trimethyl-xanthine).

The quantities yielded are about as follows: Tea Leaves, 3 to 4 p.c., Coffee Seeds, 1 p.c.; Guarana, 5 p.c.; Maté or Paraguay Tea, 1 p.c.; Kola Nut, 2 to 3 p.c.

Solubility.—1 in 68 of Water; 1 in 40 of Alcohol (90 p.c.); 1 in 7 of Chloroform; 1 in 400 of Ether; 1 in 1 of boiling Water.

Medicinal Properties.—A valuable heart tonic and diuretic, especially in cases of loss of compensation with cardiac dropsy. To be given with caution in the presence of renal disease.

Given in 1 grain doses every hour for migraine and hemicrania; also in the form of **Effervescent Caffeine Citrate** (1 grain in each drm.).

It is eliminated but slowly by the kidneys, and its action on the heart is cumulative.—*B.M.J.E.* '00, i. 35.

Used by malingering soldiers to produce symptoms of cardiac disease.—*L.* '00, i. 1406.

Diuretic action of *Caffeine* and *Theobromine*.—*B.M.J.* '01, ii. 7.

Specially valuable in spasmodic asthma and allied affections. In 5-grain doses every four hours.—*Pr.* liv. 318.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

Prescribing Notes.—*Given in* **cachets**, *in* **mixtures,** *or in pills made with 'Diluted Glucose'; also in the form of* **effervescent preparations.** *For hypodermic use 20 grains can be dissolved in 60 minims of Water by the aid of 20 grains of Sodium Salicylate, or 20 grains of Sodium Benzoate. See also Caffeinæ Sodio-Salicylas, and Caffeinæ Sodio-Benzoas.*

Official Preparations.—Caffeinæ Citras, Caffeinæ Citras Effervescens.

Not Official.—Elixir Caffeinæ, Caffeinæ Hydrobromidum, Caffeinæ Di-iodi-Hydriodidum, Caffeinæ Sodio-Benzoas, Caffeinæ Sodio-Salicylas, Caffeinæ Valerianas, Æthoxycaffeinum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger. (Koffein), Hung., Ital. (Caffeina), Jap., Mex., Port., Russ., Span. (Cafeina), Swed., Swiss and U.S. Not in Norw.

Tests.—The distinguishing test for Caffeine is the Murexide test which consists in dissolving the alkaloid in a small quantity (about ½ to 1 c.c.) of concentrated Hydrochloric Acid, adding a crystal of Potassium Chlorate and evaporating the mixture to dryness on a water-bath. When the residue is subjected to the action of Ammonia gas or is moistened with a little Ammonia Solution, a fine purple coloration is produced. The colour is not affected by an excess of Ammonia, but is immediately discharged by a fixed alkali. A similar coloration is produced when the test is performed with Chlorine or Bromine Water in place of Potassium Chlorate and Hydrochloric Acid; Chlorine Water is used in the *P.G.* test. The usual alkaloidal reagents precipitate Caffeine only imperfectly. Neither Mercuric-potassium Iodide (Mayer's) Solution nor Iodo-potassium Iodide (Wagner's) Solution precipitate Caffeine from neutral solutions; this non-precipitation serving to distinguish Caffeine from other official alkaloids. If the Iodo-potassium Iodide Solution is preceded or followed by the addition of some dilute mineral acid, a dark-reddish precipitate is at once thrown down. Upon this reaction is based (*C.N.* '97, 99) a method for the determination of Caffeine. Tannic Acid produces a white precipitate in moderately dilute solutions, but the extent of the reaction is largely dependent on the temperature.

Caffeine is completely extracted by Chloroform from a slightly acid or slightly ammoniacal aqueous solution, and is the solvent generally employed in its gravimetric determination. It dissolves without colour in Sulphuric and in Nitric Acids. It melts, when anhydrous at 231·5° C. (448·7° F.). No melting point is given in the *B.P.* The *P.G.* gives 230·5° C. (446·9° F.), and the *U.S.P.* 236·8° C. (458·3° F.) after drying till constant in weight at 100° C. (212° F.). Theoretically, it should contain 8·49 p.c. of Water, and the *B.P.* states that the crystals lose this amount at 100° C. (212° F.); but commercial Caffeine generally loses about 7 p.c. on drying. It has been pointed out (*P.J.* '00, ii. 148) that the Pharmacopœia errs in its method of expression, as commercial Caffeine probably never contains 8·49 p.c. of Water, owing to the facility with which the crystals effloresce. The *P.G.* states that in the air Caffeine loses 1 part of its Water of crystallisation and at 100° C. (212° F.) it becomes anhydrous. The sublimation point is given in the *P.G.* as 180° C. (356° F.), in the *U.S.P.* as 178° C. (352·4° F.). The *B.P.* says that 'at a higher temperature than 100° C. (212° F.) it melts and volatilises without decomposition.' It has been shown (*P.J.* (3) xxiii. 213) that Caffeine which has been dried at the ordinary temperature over Sulphuric Acid till constant in weight undergoes no further material loss on prolonged exposure in an open dish in the water-oven at 100° C. (212° F.), and that it does not volatilise with steam during the evaporation of its solutions.

The more generally occurring impurities are alkaloids other than Caffeine, organic impurities and mineral matter. The presence of alkaloids other than Caffeine is shown by the formation of a precipitate with Mercuric-potassium Iodide (Mayer's) Solution or Iodo-potassium Iodide Solution; organic impurities by the production of coloured solutions in Sulphuric Acid, and mineral matter by a residue remaining after sublimation.

Potassium Chlorate and Hydrochloric Acid.—A small quantity of Caffeine is dissolved in 1 c.c. of Hydrochloric Acid in a porcelain dish, a little Potassium Chlorate is added and the whole evaporated to dryness on a water-bath; the dish is then inverted over a vessel containing a few drops of Ammonia Water, the residue acquires a rich purple colour which is destroyed by fixed alkalis, *U.S.P.* A similar test is given in the *P.G.*, but Chlorine Water is used instead of Potassium Chlorate and Hydrochloric Acid. One part of Caffeine with 10 parts of Chlorine Water are evaporated on a water-bath and yield a yellowish-red residue, which on moistening with a little Ammonia Solution becomes coloured a rich purple. The *B.P.* simply evaporates an indefinite quantity of Caffeine with Potassium Chlorate and a few drops of Hydrochloric Acid.

Potassium Dichromate and Sulphuric Acid.—If a fragment of Caffeine be dissolved in Sulphuric Acid, and a minute fragment of Potassium Dichromate be added to the liquid, a yellowish-green colour which gradually becomes green will be produced, *U.S.P.*

Chlorine Water.—A cold saturated aqueous solution of Caffeine should not become turbid with Chlorine Water, *P.G.*

Iodine Solution.—A cold saturated aqueous solution should not become turbid with Iodine Solution, *P.G.*

Ammonia Solution.—A cold saturated aqueous solution should not become coloured on the addition of Ammonia Solution, *P.G.*

Sulphuric Acid or Nitric Acid.—*P.G.* and *U.S.P.* require that Caffeine should dissolve without coloration in Sulphuric Acid or in Nitric Acid. The *P.G.* uses 0·1 gramme of Caffeine and 1 c.c. of either Acid.

Preparations.

CAFFEINÆ CITRAS. CAFFEINE CITRATE.

An unstable combination of Caffeine and Citric Acid, which readily undergoes dissociation in the presence of Water.

A fine white, odourless powder possessing an acid and somewhat bitter taste; prepared by stirring one part of Caffeine into a heated solution of 1 part of Citric Acid and 2 parts of Distilled Water, the mixture being subsequently evaporated to dryness on a water-bath and kept constantly stirred towards the end of the evaporation. It is then reduced to powder.

Solubility.—1 in 32 of Water; 1 in 22 of Alcohol (90 p.c.); 1 in 10 of a mixture of 2 parts Chloroform with 1 part Alcohol (90 p.c.).

When combined with Sodium Benzoate, it acted rapidly and efficaciously in a case of tricuspid incompetency.—*M.P.* '04, ii. 515.

Dose.—2 to 10 grains = 0·13 to 0·65 gramme.

Foreign Pharmacopœias.—Official in Hung., Mex., Span. (Citrato Cafeico), Swiss and U.S. Not in the others.

Tests.—Caffeine Citrate should afford the reactions distinctive of Caffeine appearing in the large type under that substance. The aqueous solution, after neutralisation and separation of the Caffeine by shaking with Chloroform, yields with Calcium Chloride Solution a white precipitate insoluble in Potassium Hydroxide Solution; with Silver Nitrate Solution a white precipitate soluble in Ammonia Solution, which is distinguished from Tartrate by yielding no mirror on boiling. The salt is official in *B.P.* and *U.S.P.*, but not in *P.G.* Neither *B.P.* nor *U.S.P.* gives any process for ensuring the presence of the requisite proportion of Caffeine. It should contain not less than 50 p.c. by weight of Caffeine as gravimetrically determined by rendering an aqueous solution of the salt faintly alkaline with Potassium or Sodium Hydroxide Solution and shaking out the Caffeine with successive quantities of Chloroform. The mixed chloroformic solutions are evaporated to dryness and the residue dried till constant in weight at 100° C. (212° F.) and weighed. The Swiss Pharmacopœia states that it shall contain not less than 50 p.c. nor more than 75 p.c. of Caffeine.

The Citric Acid may be determined by direct titration with Normal Volumetric Potassium or Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. Caffeine is so feebly basic that it exercises no influence on the indicator. Theoretically it should contain about 50 p.c. of Citric Acid.

The *U.S.P.* states that 1 part of Caffeine forms a clear syrupy solution with about 4 parts of hot Water, which is correct, and agrees with the Swiss Pharmacopœia statement, 'soluble' in 4 parts of hot Water. On dilution with 5 parts of Water a white crystalline precipitate separates which redissolves when about 25 parts of Water have been added. The *B.P.* states that 'with 3 parts of Water it forms a clear syrupy solution,' which is incorrect; but more Water dissociates the salt and affords a white precipitate of Caffeine, which redissolves when excess of Water is added. It has been pointed out (*P.J.* '00, ii. 148) that in reality with 3 parts of Water it forms a stiff paste and only forms a solution when the mixture is gently warmed; but, on cooling, it again forms an almost solid mass of acicular crystals. On adding a little Water to the warm solution the Caffeine separates out as a mass of acicular crystals and not in the form which might be described as a 'white precipitate.'

The more generally occurring impurities are Calcium, Lead, Chlorides, Sulphates, Tartrates, and mineral matter. The presence of Calcium may be detected by Ammonium Oxalate Solution, Lead by Hydrogen Sulphide Solution in a solution made faintly acid with Hydrochloric Acid, Chlorides by Silver Nitrate Solution, Sulphates by Barium Chloride or Nitrate Solution. The *U.S.P.* tests for Tartaric Acid by heating 0·25 gramme of the salt for fifteen minutes on a water-bath with 5 c.c. of concentrated Sulphuric Acid, care being taken to protect the mixture from dust, no brown or black coloration should be developed, but only a lemon-yellow colour. The *B.P.* allows 'a mere trace of ash when heated in air.'

The Belgian Pharmacopœia states that when Caffeine Citrate is prescribed for internal use, the indicated dose should be dispensed as a mixture of equal parts of Caffeine and of Citric Acid.

CAFFEINÆ CITRAS EFFERVESCENS. EFFERVESCENT CAFFEINE CITRATE.

Contains about 2 p.c. of Caffeine (4 p.c. of Caffeine Citrate), or nearly 9 grains of Caffeine in the oz.

Dose.—60 to 120 grains = 4 to 8 grammes.

Foreign Pharmacopœias.—Official in U.S., containing 2 p.c. of Caffeine, and in Span. Not in the others.

For other Caffeine Citrate Effervescing Compounds, *see* PHENACETIN and PHENAZONE.

Not Official.

ELIXIR CAFFEINÆ (*U.S.N.F.*).—Caffeine 17·5, Dilute Hydrobromic Acid (*U.S.P.*) 4, Syrup of Coffee (*N.F.*) 250, Aromatic Elixir (*U.S.P.*) *q.s.* to make 1000. Each fl. drm. contains 1 grain Caffeine.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c.

CAFFEINÆ HYDROBROMIDUM.—A crystallisable salt, which has been recommended (*P.J.* (3) xxiii. 220) as superior to the *B.P.* Citrate, but as it is instantly decomposed into free Caffeine and Hydrobromic Acid on contact with Water, it has obviously no advantage over the Citrate in this respect.

Solubility.—1 in 52 of Water.

Dose.—1 to 4 grains = 0·06 to 0·26 gramme.

Prescribing Notes.—*It is also prescribed as* **Effervescent Caffeine Hydrobromide,** *containing* 1 *or* 2 *grains of the Hydrobromide in each drm.*

Tests.—When dissolved in Water, neutralised with Potassium or Sodium Hydroxide Solution, and shaken with Chloroform, the chloroformic solution when separated and evaporated to dryness leaves a residue which yields the tests distinctive of Caffeine given under that heading. The neutralised aqueous solution from which the Caffeine has been separated, when slightly acidified with Nitric Acid yields with Silver Nitrate Solution a yellowish curdy precipitate soluble with difficulty in Ammonia Solution, readily soluble in Potassium Cyanide Solution, but insoluble in Nitric Acid. Rendered slightly acid with a few drops of diluted Sulphuric Acid it yields on the addition of Chlorine Water a yellowish-brown coloration, which dissolves to form a reddish-brown solution in Chloroform or Carbon Bisulphide.

Caffeinæ Hydrobromidum Effervescens (*B.P.C.*).—Contains 2 grains of the Hydrobromide in 50 grains of granules.

CAFFEINÆ DI-IODO-HYDRIODIDUM. *Syn.* CAFFEINE TRI-IODIDE.—Prismatic crystals, steel blue by reflected and red by transmitted light, which slowly decompose on the addition of Water. The salt was prepared and introduced by the author at the suggestion of the late Dr. Mortimer Granville, who obtained much success with it in the treatment of gout, the relief afforded being immediate and effective.

Dose.—1 to 3 grains in **pill,** with Glucose and Pulv. Acaciæ.

Tests.—It should contain 42·72 p.c. by weight of loosely-combined Iodine as volumetrically determined by dissolving a suitable quantity (0·5 gramme) in Alcohol (90 p.c.), adding Water to the point of precipitation, and titrating with Deci-normal Volumetric Sodium Thiosulphate Solution. The liquid remaining after titration, after acidification with Nitric Acid, gives with Silver Nitrate Solution a yellow curdy precipitate almost insoluble in Ammonia Solution, insoluble in Nitric Acid, soluble in Potassium Cyanide Solution. With a little Chlorine Water it yields a brown coloration, which dissolves in Carbon Bisulphide with the production of violet-coloured solution; if a little Starch Mucilage be added before the Chlorine Water a blue coloration is produced. The Caffeine obtained on shaking out another portion of this liquid with Chloroform should conform to the distinguishing tests given under that heading.

CAFFEINÆ SODIO-BENZOAS.—A white, amorphous powder, possessing an aromatic odour and bitter and aromatic taste.

Solubility.—1 in 2 of Water, 1 in 30 of Alcohol (90 p.c.).

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

Prescribing Notes.—*It is employed as a soluble salt of Caffeine, but principally by* **hypodermic injection.**

Foreign Pharmacopœias.—Official in Austr. (Coffeinum Natriobenzoicum), 40 p.c. Caffeine; Dan. (Benzoas Natrio-coffeicus), and Jap. (Caffeino-Natrium Benzoicum), 44 p.c. of dry Caffeine; Dutch (Benzoas Natricus cum Coffeino), 45 p.c. of dry Caffeine; Hung. (Coffeinum Natrio-benzoicum), about 75 p.c. Caffeine; Ital. (Benzoato di Sodio e Caffeina), 43 to 46 p.c. of dry Caffeine; Swiss (Coffeino-Natrium Benzoicum), 44 to 46 p.c. of dry Caffeine.

Tests.—Caffeine Sodium Benzoate should contain about 50 p.c. by weight of Caffeine as gravimetrically determined by dissolving a suitable quantity in Water, rendering the solution slightly alkaline with Sodium Hydroxide Solution and shaking out with successive quantities of Chloroform. The residue should yield the tests distinctive of Caffeine described under that substance.

It is official in several Foreign Pharmacopœias, and the proportion of Caffeine varies (*see* Foreign Pharmacopœias). The *U.S.N.F.* requires the salt to contain 50 p.c. of Caffeine.

The aqueous solution from the Chloroform extraction when neutralised with diluted Sulphuric Acid yields with Ferric Chloride Test-solution a buff-coloured precipitate. The Benzoic Acid obtained from the acidified solution should possess the melting point, answer the tests distinctive of Benzoic Acid, and be free from the impurities given under that substance.

CAFFEINÆ SODIO-SALICYLAS.—An amorphous white powder.

Solubility.—1 in 1 of Water; 1 in 28 of Alcohol (90 p.c.).

Ph. Ger. maximum single dose, 1 gramme; maximum daily dose, 3 grammes.

Medicinal Properties.—The same as Caffeine, but being much more soluble is more easily absorbed; it is also suitable for **hypodermic injection.** Has been used in sea-sickness.—*B.M.J.* '87, ii. 768.

Dose.—2 to 15 grains = 0·13 to 1 gramme.

Ph. Ger. maximum single dose, 1 gramme; maximum daily dose, 3 grammes.

Foreign Pharmacopœias.—Official in Belg. (Coffeino-Natricum Salicylicum), Dan. (Salicylas Natrico-coffeicus), Ger. and Jap. (Coffeino-Natrium Salicylicum), 40 p.c. of dry Caffeine; Dutch (Salicylas Natricus cum Coffeino), 45 p.c. of dry Caffeine; Hung. (Coffeinum Natrio-Salicylicum), about 55 p.c. Caffeine; Norw. (Salicylas Natrico-Coffeicus), and Russ. (Coffeinum Natrio-Salicylicum), 40 p.c. Caffeine; Swiss (Coffeino-Natrium Salicylicum), 44 to 46 p.c. of dry Caffeine.

It should be preserved in well-stoppered dark amber-tinted glass bottles.

Tests.—Caffeine Sodium Salicylate should contain about 50 p.c. by weight of pure Caffeine as gravimetrically determined by dissolving a suitable quantity in Water, rendering the solution alkaline by the addition of Potassium or Sodium Hydroxide Solution and extracting the Caffeine by successive shakings with Chloroform. The residue obtained on evaporating the mixed chloroformic solutions, when dried till constant at 100° C. (212° F.) should respond to the tests distinctive of Caffeine given under that substance. The salt is official in several of the Foreign Pharmacopœias, and the percentage of Caffeine required by each individual Pharmacopœia is given above.

The Salicylic Acid obtained on acidifying the aqueous portion remaining after the Chloroform extractions, when washed and dried should possess the melting point, respond to the distinctive tests, and be free from the impurities mentioned under Salicylic Acid.

CAFFEINÆ VALERIANAS.—A variable mixture of Valerianic Acid and Caffeine.

It should be preserved in well-stoppered glass bottles.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme.

Tests.—Caffeine Valerianate should contain theoretically 32·8 p.c. by weight of Valerianic Acid. The Valerianic Acid may be volumetrically determined by titration with Deci-normal Volumetric Potassium or Sodium Hydroxide Solution using Phenolphthalein Solution as an indicator of neutrality. Sufficient neutral Chloroform may be added to form two layers, the Caffeine passes into the chloroformic solution, and the Valerianic Acid, as Potassium or Sodium Valerianate, into the aqueous layer. 1 c.c. of Deci-normal Volumetric Alkali Solution is equivalent to 0·010131 gramme of anhydrous Valerianic Acid.

Commercially the Valerianic Acid varies from 1 p.c. (or less) to 13 p.c., the latter being very exceptional. The majority of commercial specimens are little more than Caffeine scented with Valerianic Acid. The difficulty in forming a true salt is so great that it only exists as a chemical curiosity; but for all purposes of practical dispensing, a product, obtained by absorbing 1 of anhydrous Valerianic Acid by 4 of anhydrous Caffeine, is superior to anything commercially obtainable, and when assayed by the above method shows when freshly prepared about 17 p.c., and even after keeping a considerable time, about 9·7 p.c. of anhydrous Valerianic Acid. The residue obtained on washing and evaporating the chloroformic solution (after titration) to dryness should answer the tests distinctive of Caffeine given under that substance.

ÆTHOXYCAFFEINUM.—A compound of Caffeine, containing an additional Æthoxyl group. Colourless, crystalline needles, less soluble in Water than Caffeine, readily soluble in Alcohol. Heart tonic and diuretic; also narcotic. Given with Sodium Salicylate in migraine and trigeminal neuralgia. Subcutaneously it acts as an anæsthetic. It readily forms soluble double salts with Sodium Benzoate and Salicylate.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme.

The following have also received notice in Medical Literature:—Caffeine-chloral, Caffeine Tri-bromide, Caffeine Sodium Iodide, Caffeine Sulphate, Caffeine Vanadate, Symphoral L. (Lithium Caffeine Sulphonate), Symphoral N. (Sodium Caffeine Sulphonate), and Symphoral Sr (Strontium Caffeine Sulphonate).

CAJUPUTI OLEUM.

OIL OF CAJUPUT.

FR., HUILE VOLATILE DE CAJEPUT; GER., CAJEPUTÖL; ITAL., ESSENZA DE CAJEPUT; SPAN., ESENCIA DE CAYEPUT.

A transparent green or bluish-green, thin, oily liquid, possessing an agreeable odour resembling Eucalyptus and a pungent, camphoraceous taste.

A volatile Oil distilled from the leaves of *Melaleuca Leucadendron*.

Solubility.—In all proportions of Alcohol (90 p.c.).

Medicinal Properties.—Antispasmodic, carminative and stomachic. Counter-irritant. Given in flatulent colic, hysteria, and other spasmodic and nervous affections. Externally, diluted with Olive Oil (1 to 2), or with Linimentum Terebinthinæ, it is used for chilblains and to allay rheumatic and gouty pains. Applied on lint for toothache.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Prescribing Notes.—*Given on Sugar, or in Pill or in the form of Spirit of Cajuput. Occasionally as much as* 10 *minims are given in a mixture.* See *below.*

Official Preparations.—Spiritus Cajuputi; contained in Linimentum Crotonis.

Not Official.—Mistura Cajuputi.

Foreign Pharmacopœias.—Official in Austr., Dutch, Ital., Jap., Norw., Port., Russ., Span., Swed., Swiss and U.S. Not in Belg., Dan., Fr., Ger., Hung. or Mex.

Tests.—Cajuput Oil has a specific gravity of 0·919 to 0·930. The *U.S.P.* gives 0·915 to 0·925 at 25° C. (77° F.). The optical rotation is not given in the *B.P.*; according to the *U.S.P.* it should not exceed $-2°$ in a 100 mm. tube at a temperature of 25° C. (77° F.). Oils are occasionally met with having as high a rotation as $-3° 40'$.

It should contain about 55 to 65 p.c. of Cineol (Eucalyptol) as determined by the Phosphoric Acid process described under Eucalyptus Oil. The *B.P.* makes no attempt to determine the actual amount of Cineol, only requiring that the Oil shall become semi-solid when stirred with one-third or one-half its volume of Phosphoric Acid, specific gravity 1·750, the mixture being kept cool. The *U.S.P.* measures the actual amount of Cineol produced on decomposing the Cineol Phosphate. A measured quantity of 10 c.c. of the oil is dissolved in 5 times its volume of purified Petroleum Benzin, cooled by a freezing mixture; Phosphoric Acid, specific gravity 1·707, cautiously added until the white crystalline magma commences to assume a yellowish or pinkish tint. The crystals are filtered under pressure, washed with cold purified Petroleum Benzin and dried by pressure between porous plates. The crystals are decomposed by warm Water and the volume of Cineol read off in a narrow graduated cylinder; the oil should yield not less than 55 p.c.

The green colour of the oil is generally supposed to be due to Copper, which may be detected by shaking the oil with an equal volume of Water containing a drop or two of diluted Hydrochloric Acid. The oil loses its green colour and the aqueous portion when tested with a drop or two or Potassium Ferrocyanide Solution, yields a reddish-brown colour if Copper be present. The *U.S.P.* includes a test for absence of Copper, which is given below in small type under the heading of Potassium Ferrocyanide.

Potassium Ferrocyanide.—On shaking 5 c.c. of the Oil with 5 c.c. of Water containing 1 drop of diluted Hydrochloric Acid, a reddish-brown colour should not be produced in the acid liquid when separated from the Oil, if a drop of Potassium Ferrocyanide Test Solution be added (absence of Copper).

Preparation.

SPIRITUS CAJUPUTI. Spirit of Cajuput.

Oil of Cajuput, 1; Alcohol (90 p.c.), *q.s.* to yield 10.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Not Official.

MISTURA CAJUPUTI.—Oil of Cajuput, 80 minims; Compound Spirit of Orange (*U.S.P.*), 80 minims; Powdered Tragacanth, 8 grains; powdered Gum Acacia, 120 grains; Glycerin, 1 fl. oz.; Chloroform Water, to 8 oz.

Dose.—1 to 4 fl. drm. = 3·6 to 14·2 c.c.

Not Official.

CALAMINA PRÆPARATA.

PREPARED CALAMINE.

Native Zinc Carbonate, calcined in a covered earthenware crucible at a moderate temperature, powdered and freed from gritty particles by elutriation. Genuine Calamine has a yellowish-grey colour; the reddish varieties are generally made on a basis of Barium Sulphate.

Medicinal Properties.—Mildly astringent, used in face lotions and dusting powders.

Calamina Artificiosa.—Dissolve 861 parts of Crystallised Sulphate of Zinc in Water, and add 15 fluid parts of Strong Solution of Perchloride of

Iron (*B.P.*). Next dissolve 890 parts of Crystallised Sodium Carbonate in a separate quantity of Water, mix the solutions. Shake well, collect the precipitate on a calico filter. Wash until free from Sulphate, well drain, heat in a lightly covered crucible until a portion of it ceases to effervesce on the addition of an acid. Cool and grind to an impalpable powder.—*Y.B.P.* 1893, 210; *P.J.* '93, i. 622; *C.D.* '93, i. 73.

Calamina Factitia (*B.P.C.*) uses the above process, with quantities as follows:—Zinc Sulphate, 56; Sodium Carbonate, 58; Strong Solution of Ferric Chloride, 1; Distilled Water, *q.s.*

LINIMENTUM CALAMINÆ.—Prepared Calamine, 20 grains; Zinc Oxide, 15 grains; Solution of Lime, 2 drm.; Water, 2 drm.; Olive Oil, to 1 fl. oz. —*Guy's.*

Variations of this are given in Great Northern, Middlesex and University Hospital Pharmacopœias. The following is sometimes prescribed, but unless treated in the manner here described it is difficult to dispense:—Calamine, 3 drm.; Zinc Oxide, 2 drm.; Lime Water, 4 fl. oz.; Olive Oil, 4 fl. oz.

Rub the powders with the Lime Water in a mortar to a smooth cream, and then add the whole of the Oil at once and stir together.

This has been incorporated in the *B.P.C.*

Prepared Calamine, 4·50; Zinc Oxide, 3·50; Solution of Lime, 50; Olive Oil, *q.s.* to produce 100.—*B.P.C.*

LOTIO ZINCI OXIDI.—Zinc Oxide, 60 grains; Prepared Calamine, 60 grains; Glycerin, 60 minims; Water, 1 fl. oz.

A mild astringent in chronic eczema and acne rosacea.

Most of the Hospital Pharmacopœias give a formula under the heading Lotio Calaminæ or Lotio Zinci Oxidi.

LOTIO CALAMINÆ.—Levigated Calamine, 40 grains; Zinc Oxide, 20 grains; Glycerin, 20 minims; Water (or Rose Water), *q.s.* to make 1 fl. oz. Elutriate the Calamine and Zinc Oxide by triturating with the Water and decanting from the siliceous matter, then add the Glycerin.—*Canadian Formulary* first issue).

This has been incorporated by the *B.P.C.* as follows:—

Prepared Calamine, 10; Zinc Oxide, 5; Glycerin, 5; Rose Water, *q.s.* to produce 100.

Lotio Calaminæ.—Levigated Calamine, 40 grains; Zinc Oxide, 20 grains; Glycerin, 20 minims; Lime Water, *q.s.* to make 1 fl. oz.—*Canadian Formulary* 1908.

UNGUENTUM CALAMINÆ.—Prepared Calamine, 1; Benzoated Lard, 5.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

CERATUM CALAMINÆ (*Ph. Lond.*).—Calamine, 7½; Beeswax, 7½; Olive Oil, 20.

This has been incorporated in the *B.P.C.* as follows:—

Ceratum Calaminæ.—Prepared Calamine, 2; Yellow Beeswax, 2; Olive Oil, 6.

Ph. Edin.—Calamine, 1; Simple Cerate, 5; commonly known as *Turner's Cerate.*

CALCII CARBONAS PRÆCIPITATUS.

PRECIPITATED CALCIUM CARBONATE.

B.P.Syn.—PRECIPITATED CHALK.

FR., CARBONATO DE CHAUX PRÉCIPITÉ; GER., CALCIUMCARBONAT;
ITAL., CARBONATO DI CALCIO; SPAN., CARBONATO DE CAL.

$CaCO_3$, eq. 99·26.

A white, inodorous, tasteless powder.

It may be obtained by precipitating a soluble Calcium salt, usually the Chloride with Sodium Carbonate.

Solubility.—Insoluble in Water and Alcohol. Soluble with effervescence in dilute mineral Acids and some of the organic Acids.

Medicinal Properties.—Antacid, astringent and desiccant. Used in dyspepsia with acidity; valuable in diarrhœa; as a dusting powder in eczema, and for burns.

Dose.—10 to 60 grains = 0·65 to 4 grammes.

Official Preparation.—Used in the preparation of Trochiscus Bismuthi Compositus.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Precipitated Chalk effervesces upon the addition of acids, yielding a colourless and odourless gas, which affords, when passed into Lime Water or into Barium Hydroxide Solution, a white precipitate.

When dissolved in just sufficient Hydrochloric Acid to effect solution, boiled and cooled, it answers the tests distinctive of Calcium, which are that, when mixed with sufficient Ammonia Solution to render the solution faintly alkaline, Ammonium Oxalate Solution produces a white precipitate, soluble in Hydrochloric Acid, insoluble in Acetic Acid; Ammonium Carbonate Solution produces a white precipitate which, after well boiling, is insoluble in Ammonium Chloride Solution.

The *U.S.P.* states that the salt should contain not less than 99 p.c. of pure Calcium Carbonate, but no process is given for the determination. The *B.P.* and *P.G.* neither state the requisite percentage nor method of determination. It is usually determined gravimetrically as Oxalate, the Calcium Oxalate being ignited and weighed as Calcium Oxide.

The more generally occurring impurities are Aluminium, Iron, Magnesium, Chlorides, Phosphates and Sulphates. Aluminium, Iron and Phosphates, if present, may be detected by Ammonia Solution in presence of Ammonium Chloride. The *P.G.* gives a specific test for Iron with Potassium Ferrocyanide Solution, which is described in small type below. The *U.S.P.* includes a test for heavy metals. The standard suggested (*C.D.* '08, i. 796) for Lead is 10 parts per 1,000,000, and for Arsenic 5 parts per 1,000,000. Both *P.G.* and *U.S.P.* fix a limit of soluble impurities, ascertained by evaporating an aqueous extract. Chlorides and Sulphates are indicated by Silver Nitrate and Barium Chloride or Nitrate Solutions respectively.

Ammonia.—If to 20 c.c. of the Hydrochloric Acid solution, Ammonia Water be added until of alkaline reaction, no turbidity or precipitation should take place, either before or after boiling, indicating the limit of Iron, Aluminium, Phosphates, etc., *U.S.P.* A solution of the salt in Acetic Acid should not give a precipitate on saturation with Solution of Ammonia, *P.G.*

Barium Nitrate.—The 1–50 solution obtained on boiling, by means of diluted Acetic Acid should not be at once affected by Barium Nitrate Solution, *P.G.*

Silver Nitrate.—The 1-50 aqueous solution obtained by dissolving in diluted Acetic Acid and boiling shall at the most be rendered only faintly opalescent after five minutes on the addition of Silver Nitrate Solution, *P.G.*

Potassium Ferrocyanide.—The solution obtained by dissolving 1 gramme of the salt by the aid of Hydrochloric Acid in 50 c.c. of Water shall not become blue on the addition of 0·5 c.c. of Potassium Ferrocyanide Solution, *P.G.*

CRETA PRÆPARATA. *See* p. 456.

CALCII CHLORIDUM.

CALCIUM CHLORIDE.

$CaCl_2\ 2H_2O$, eq. 145·85.

FR., CHLORURE DE CALCIUM; GER., CALCIUMCHLORID.

White, or nearly white, slightly translucent, hard fragments, having a sharp saline taste. Very deliquescent.

The official salt is obtained by the interaction of Hydrochloric Acid and Calcium Carbonate, the latter being added until the Acid is neutralised. The salt is dried at a temperature not exceeding 200° C. (392° F.). A slight dissociation and loss of Hydrochloric Acid occurs during the drying, and most commercial samples are alkaline.

The *U.S.P.* gives no specific temperature at which the salt should be dried, but states that when it has been overheated the solution has an alkaline reaction and a residue of Oxide remains undissolved; which, however, goes into solution in Hydrochloric Acid.

It should be kept in glass bottles with closely-fitting glass stoppers.

Solubility.—1 in 1 of Water; 1 in 3 of Alcohol (90 p.c.).

Medicinal Properties.—It increases the coagulability of the blood, and is therefore used in gastric, intestinal and pulmonary hæmorrhage, also in hæmophilia and aneurisms. Has been given internally also for chilblains, 20 grains night and morning, and in glandular enlargements, especially those of tubercular origin.

Given in pneumonia.—*Pr.* l. 263; liii. 343.

10 to 20 grains every 4 hours given in hæmophilia.—*L.* '97, ii. 1061; *L.* '98, ii. 144; *B.M.J.* '02, i. 1141; *P.J.* '03, i. 525.

A small pledget of Wool soaked in a solution containing 30 grains to the oz. of Water, used successfully in hæmophilia.—*L.* '03, i. 517.

If pulmonary hæmorrhage persists, 2 or 3 drm. Chloride or Lactate of Calcium should be given in the course of a few hours.—*T.G.* '07, 323.

In pneumonia, 5 to 10 grains dissolved in Water every 4 hours; 1 minim of Elixir of Saccharin covers the taste of 10 grains; does not interfere with use of other remedies (Lauder Brunton).—*B.M.J.* '07, i. 616.

Valuable in hæmorrhagic type of pneumonia, but its use deprecated in dry.—*B.M.J.* '07, i. 1176.

Can have no place in treatment of early stage of pneumonia (William Ewart).—*B.M.J.* '07, i. 779.

In hæmorrhagic gastric oozing, 10 grains thrice daily (Hale White).—*L.* '06, ii. 1193.

Rapidly effective, in 3 or 4 grain doses thrice daily, in purpura in children (*B.M.J.* '07. i. 199), and in 15 grain doses in boy of 16, p. 1365.

Given as a preventive in full doses for 3 days before any intranasal operation; and as a curative in 20 to 60 grain doses in hæmorrhage after extraction of teeth.—*B.M.J.* '07, i. 1054; ii. 83.

When used for hæmoptysis it must not be given for more than 3 or 4 days at a time, otherwise the blood will become less coagulable.—*Pr.* '07, i. 335.

It markedly diminished the amount of albumen excreted by patients with Bright's disease of the non-polyuric form, but who passed 3 to 15 grammes albumen per litre.—*L.* '07, i. 841.

The value of this salt in intestinal hæmorrhage, given in 10 or 20 grain doses every 3 hours has been shown (*B.M.J.* '04, 1453); 30 to 40 grains, dissolved in a little Water and injected into the rectum, has also been recommended (*B.M.J.* '04, ii. 1635); objection has been taken to this method on account of disturbing patient (*B.M.J.* '04, i. 1783), but it has been pointed out (*B.M.J.* '05, i. 103) that good results in hæmoptysis have been accompanied by very little discomfort to patient.

It is stated (*B.M.J.* '06, i. 26) that this substance acts as a harmless and simple preventive against free bleeding when administered prior to an operation, and at the same time is not less efficient than other hæmostatic agents. Administered in 1 drm. doses night and morning for 3 days previous to operation to prevent hæmorrhage in excision of the testicle in a case of tubercular disease of the seminal tract.—*M.P.* '06, ii. 38.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*This Salt has a very unpleasant taste which is difficult to cover. Elixir Calcii Chloridi accomplishes this better than Liquorice.*

Incompatibles.—Lime salts and Potassium salts are mutually antagonistic physiologically.—*B.M.J.* '87, ii. 1033.

Official Preparations.—Used in the preparation of Æther Purus.

Not Official.—Elixir Calcii Chloridi, Liquor Calcii Chloridi, Syrupus Calcii Chloridi.

Foreign Pharmacopœias.—Official in U.S.; Hung. (Calcium Chloratum Fusum), Port. (Chloreto de Calcio), Fr. (Chlorure de Calcium Cristallisé and Chlorure de Calcium Fondu), Mex. (Cloruro de Calcio), Span. (Cloruro Calcico). Not in the others.

Tests.—Calcium Chloride should answer the tests distinctive of Calcium given in the large type under Calcii Carbonas Præcipitatus. The aqueous solution yields with Silver Nitrate Solution a white curdy precipitate, insoluble in Nitric Acid, soluble in Ammonia Solution and in Potassium Cyanide Solution. A small quantity of the salt heated with Manganese Dioxide and Sulphuric Acid evolves a yellowish-green gas recognised as Chlorine by its odour and liberating Iodine from Potassium Iodide Solution, which on the addition of Starch Mucilage yields a blue coloration.

The *B.P.* does not fix a limit for the amount of pure Calcium Chloride which the salt shall contain, the *U.S.P.* requires that it shall contain not less than 99 p.c. of the pure salt. Neither Pharmacopœia describes a process of determination. The neutral aqueous solution may be titrated with Deci-normal Volumetric Silver Nitrate Solution, or the Calcium may be determined as Oxalate, the Oxalate washed, dried, ignited, and weighed as Calcium Oxide.

The more generally occurring impurities are Aluminium, Iron, Magnesium, Carbonates and Hypochlorite. Aluminium, Iron and Magnesium, if present, may be detected by the Ammonia Solution test given below in small type under the heading of Ammonia;

Carbonates by an effervescence following the addition of Hydrochloric Acid. Magnesium by Ammonium Phosphate Solution after separation of the Calcium as Oxalate in presence of Ammonium Chloride and a trace of Ammonia Solution. Hypochlorite might have been a likely impurity in a salt made according to the process described in *B.P.* '85; but its presence in a sample prepared according to the *B.P.* '98 directions is unlikely, especially when dried at the temperature officially directed. The *U.S.P.* includes Phosphates as capable of detection by Ammonia Solution test; it also includes a time-limit test for Arsenic and Lead, with Hydrogen Sulphide and a test indicating a limit of Magnesium and alkalis, it is performed by completely precipitating the Calcium from 10 c.c. of a 1 in 20 aqueous solution by means of Ammonium Oxalate Test-solution, evaporating the filtrate to dryness and igniting; not more than 0·1 of a gramme of fixed residue should remain. The salt is not official in *P.G.*

Ammonia.—If to the aqueous solution of the salt Ammonia Water be added until of alkaline reaction, no turbidity or precipitation should take place, either before or after boiling, *U.S.P.*

Hydrogen Sulphide.—The aqueous solution of the salt (1–20) slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for Arsenic or Lead, *U.S.P.*

Not Official.

LIQUOR CALCII CHLORIDI.—Chloride of Calcium 1, Distilled Water 5. —*B.P.* 1885.

This has been incorporated in the *B.P.C.* as follows:—
Calcium Chloride 16; Distilled Water, *q.s.* to produce 100.

ELIXIR CALCII CHLORIDI.—Chloride of Calcium, 60 grains; Citric Acid, 20 grains; Aromatic Elixir (*U.S.P.*), to 1 fl. oz.

Syrupus Calcii Chloridi. *Syn.* Elixir of Calcium Chloride.—Calcium Chloride 12·50, Citric Acid 5, Distilled Water 15, Aromatic Syrup, *q.s.* to produce 100.—*B.P.C.*

CALX CHLORINATA. *See* p. 298.

Not Official.

CALCII GLYCEROPHOSPHAS.

CALCIUM GLYCEROPHOSPHATE.

FR., GLYCÉROPHOSPHATE DE CALCIUM; GER., GLYCERINPHOSPHORSAURES CALCIUM; ITAL., GLICEROFOSFATO DI CALCIO; SPAN., GLICEROFOSFATO DE CAL.

A white, odourless, crystalline powder.

It is prepared by the action of Milk of Lime on Glycerophosphoric Acid, the product being purified by treatment with Alcohol.

Solubility.—1 in 22 of Water, less soluble in warm Water, and almost insoluble in boiling Water; insoluble in Alcohol (90 p.c.).

Medicinal Properties.—It improves the general nutrition in neurasthenia.

Dose.—5 to 15 grains = 0·32 to 1 gramme dissolved in Water.

Prescribing Notes.—*Liquid Glycerophosphate preparations keep best when undiluted, and any dilution should be done when the medicine is taken; but if* *prescribed in a diluted form the diluent should be Chloroform Water, not Distilled Water.*

Foreign Pharmacopœias.—Official in Belg., Fr., Mex. (Glicerofosfato de Calcio), Span. (Glicerofosfato de Cal), and Swiss (Calcium Glycerinophosphoricum).

Tests.—Calcium Glycerophosphate dissolves in Water, yielding a solution which is neutral in reaction towards Litmus paper. The aqueous solution yields with Ammonium Oxalate a white precipitate soluble in diluted Hydrochloric Acid; when the cold aqueous solution is warmed a white precipitate is thrown out, the salt being less soluble in warm than in cold Water. A little of the salt heated in a tube blackens and evolves the characteristic irritating odour of Acroleine; when ignited on platinum foil it burns with a luminous flame, leaving a white residue, which dissolved in Nitric Acid yields a solution giving on the addition of Ammonium Molybdate Solution a yellow precipitate insoluble in Nitric Acid, soluble in Ammonia Solution.

The Glycerophosphates do not answer the usual reactions of the Phosphates, that is to say they do not give an immediate precipitate with Ammonium Molybdate Solution, nor do they immediately precipitate with Magnesium Ammonio-sulphate Solution. On boiling with a mineral acid the Glycerophosphoric Acid is decomposed, and the solution then responds to the tests for Phosphoric Acid. The aqueous solution of the salt yields a white precipitate with Lead Subacetate Solution. The percentage of Phosphoric Acid may be determined volumetrically by titration of the aqueous solution with Deci-normal Volumetric Sulphuric or Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator, and then titrating the solution with Deci-normal Volumetric Potassium or Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator. In the first instance one molecule of mineral acid corresponds to two molecules of Phosphoric Acid, and in the second two molecules of alkali correspond to one molecule of Phosphoric Anhydride.

The more generally occurring impurities are Arsenic, heavy metals, *e.g.*, Lead, Copper, and Iron; Chlorides, Phosphates, and Sulphates; readily carbonisable organic impurities, and free Glycerin.

Arsenic, if present, may be detected by Bettendorf's test; heavy metals by Hydrogen Sulphide in a solution rendered faintly acid with Hydrochloric Acid; Iron by Ammonium Hydrosulphide Solution; Chlorides by Silver Nitrate Solution in a solution rendered acid with Nitric Acid; Phosphates and Sulphates generally exist as insoluble salts and are readily detected by the solubility, and also by Barium Chloride or Nitrate Solution; organic impurities by charring when the salt is treated with concentrated Sulphuric Acid; and free Glycerin by treating the dry salt with Absolute Alcohol, filtering and evaporating off the solvent.

GLYCEROL GLYCEROPHOSPHATIS.—Cudbear, 15 grains; Distilled Water, 10 fl. oz. Boil for 10 minutes, filter and dissolve in the warm filtrate, Calcium Glycerophosphate, 160 grains; Potassium Glycerophosphate, 80 grains; Sodium Glycerophosphate, 80 grains; Magnesium Glycerophosphate, 80 grains; Iron Glycerophosphate (in scales), 40 grains; Citric Acid, 30 grains; then add Glycerin, 10 fl. oz.; Chloroform, 5 minims; Alcohol, 40 minims; Orange Flower Water (triple), 2 fl. drm.; Cherry Laurel Water, 3 fl. drm.; Distilled Water, *q.s.* to produce 20 fl. oz.—*Bournemouth Formulary.*

This has been incorporated in the *B.P.C.* under the title **Glycerinum Glycerophosphatum Compositum.** *Syn.* Glycerol Glycerophosphatis.

SYRUPUS GLYCEROPHOSPHATUM.—The following is the formula given by Dr. Robin, who introduced the preparation:—Calcium Glycerophosphate, 6 grammes; Sodium, Potassium, and Magnesium Glycerophosphates, of each 2 grammes; Iron Glycerophosphate, 1 gramme; Tinctura Ignatia Amara, 30 minims; Pepsin, 3 grammes; Maltine, 1 gramme; Tincture of Kola, 10 grammes; Syrup of Cherries, to 200 grammes.—*P.J.* '95, i. 1191.

Nearly all commercial Syrups of the Glycerophosphates become turbid and throw down a bulky deposit on standing, and the same objection applies to **Syrupus Glycerophosphatum Compositus** (*B.P.C.*). The composition of this latter preparation has been altered twice in about twelve months. It first of all contained Citric Acid, which was replaced by Acetic Acid, which is now replaced in the *B.P.C. Supplement* by Glycerophosphoric Acid.

FERRI GLYCEROPHOSPHAS (Iron Glycerophosphate). — Yellow or yellowish-green scales, or as a white powder, soluble in cold Water, more readily in hot. Introduced as a nervine tonic. Has been recommended in anæmia and especially chlorosis.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Acidum Glycerophosphoricum.—A clear, colourless, or pale yellowish-syrupy liquid. Sp. gr. 1·127. Chiefly used for the preparation of the salts, but rarely used medicinally.

CALCII HYDRAS.

CALCIUM HYDROXIDE.

B.P.Syn.—SLAKED LIME.

$Ca(HO)_2$, eq. 73·47.

A white odourless powder, having a caustic taste.

The Pharmacopœia directs that 'it should be recently prepared,' but this is unnecessary if air be excluded.

It should be kept in well-stoppered glass bottles, and protected as far as possible from contact with the air.

Solubility.—Sparingly soluble in Water (1 in 900); the solution, on exposure to the air, soon acquires a film of Calcium Carbonate.

Medicinal Properties.—Antacid, astringent, sedative. The **Solution** (Lime Water) is useful in acid and gouty dyspepsia; in vomiting and diarrhœa of children, especially if given with the Milk, as it renders the curd less dense; in enteric fever it lessens the chances of hæmorrhage; also in the form of diluted **saccharated solution** to relieve chronic vomiting, and vomiting of pregnancy. The **Liniment** of Lime is applied to burns and scalds. When made with Linseed Oil it is known as Carron Oil.

Incompatibles.—Vegetable and Mineral Acids, alkaline and metallic salts, Tartar Emetic.

Official Preparations.—Liquor Calcis and Liquor Calcis Saccharatus. Used in the preparation of Calcii Hypophosphis, Chloroformum, Extractum Ipecacuanhæ Liquidum. **Lime Water** is used in the preparation of Argenti Oxidum, Linimentum Calcis, Lotio Hydrargyri Flava and Lotio Hydrargyri Nigra.

Not Official.—Liniment for freckles, Carron Oil.

Foreign Pharmacopœias.—Official in Fr. (Hydroxide de Calcium) and Span. (Cal Apagada). Not in the others.

Tests.—Slaked Lime when dissolved in Water or in diluted Hydrochloric Acid and neutralised should afford the tests distinctive of Calcium given in the large type under Precipitated Calcium Carbonate. The aqueous solution should be alkaline in reaction to red Litmus paper and to Phenolphthalein Solution, and may be titrated with Normal Volumetric Hydrochloric or Sulphuric Acid Solution by the use of the latter indicator. 1 c.c. of Normal Volumetric Acid Solution is equal to 0·036735 gramme of pure Calcium Hydroxide. When strongly heated the salt loses nearly one-fourth of its weight of Water.

The more generally occurring impurities are Aluminium, Iron, Magnesium, Potassium, Sodium; Carbonates, Chlorides, Phosphates and Sulphates; and Silica if present is detected by the residue remaining insoluble in diluted Hydrochloric Acid, especially if, after first dissolving in Hydrochloric Acid the solution is evaporated to dryness and redissolved in Hydrochloric Acid; Aluminium, Iron and Phosphates are shown by the appearance of a precipitate when the Hydrochloric Acid Solution is rendered distinctly alkaline with Ammonia Solution; Magnesium by the precipitate produced with Ammonium Phosphate after separation of the Calcium as Oxalate in a solution containing Ammonium Chloride and a slight excess of Ammonia Solution. Potassium and Sodium may be detected, if present, in the residue after complete separation of the Calcium by Ammonium Oxalate. The absence of effervescence on the addition of Hydrochloric Acid is indicative of the absence of Carbonate, whilst Chloride may be detected in the Nitric Acid Solution of the salt by Silver Nitrate Solution and Sulphates in another portion of the same solution by means of Barium Chloride or Nitrate Solution. Phosphate may be detected by adding Ammonium Molybdate Solution to a solution of the salt containing some free Nitric Acid.

Preparations.

LINIMENTUM CALCIS. LINIMENT OF LIME.

Solution of Lime, 1; Olive Oil, 1. (1 in 2)

Foreign Pharmacopœias.—Official in Belg., Solution of Lime and Medicinal Oil, equal parts; Fr. (Linim. Calcaire), Solution of Lime and Olive Oil, equal parts; Ital., Lime Water and Olive Oil, equal parts; Jap. and Mex., Lime Water 1, Sesame Oil 1; Port., Lime Water 9, Oil of Almonds 1; Span., (Linimento Oleo-Calcareo) Lime Water 65, Oil of Almonds 35; Austr., Dan. (Linimentum Calcicum), Dutch, Russ., Swed., Swiss and U.S., Solution of Lime and Linseed Oil, equal parts. All by weight, except U.S. Not in the others.

LIQUOR CALCIS. SOLUTION OF LIME. *B.P.Syn.*—LIME WATER.

A saturated Solution of Calcium Hydroxide (washed free of Chlorides) in Distilled Water. It should contain about ½ grain in the fl. oz.

It should be kept in well-stoppered glass bottles of a dark amber colour, and preserved as far as possible from contact with the air. It is best kept in full bottles.

When freshly prepared it forms a colourless and odourless liquid possessing a peculiar alkaline taste. It gradually absorbs Carbonic Anhydride from the air, and a crust of Calcium Carbonate forms on the surface of the liquid.

The Hydrate is less soluble in hot than in cold Water, and, if saturated, Lime Water should precipitate on boiling.

Dose.—1 to 4 fl. oz. = 28·4 to 113·6 c.c.

It is more palatable when given in Milk.

So-called aerated 'Lime Water' is sold in syphons, but we understand that it is aerated with Carbonic Acid gas, and in that case the name is misleading.

Foreign Pharmacopœias.—Official in Austr. and Hung. (Aqua Calcis); Dan., Dutch, Norw. and Swed. (Solutio Hydratis Calcici); Fr. (Eau de Chaux); Ger. and Jap. (Aqua Calcariæ); Ital. (Acqua di Calce); Mex., Port. and Span. (Agua de Cal); Russ. (Calcaria Caustica Soluta); Belg., Swiss (Calcium Hydricum Solutum); U.S., Liquor Calcis.

Water becomes saturated with much less Lime than ordered in any of the Pharmacopœias, therefore Liquor Calcis is of the same strength in all.

Tests.—Lime Water is strongly alkaline in reaction towards Litmus. It should yield the tests distinctive of Calcium described in the large type under Calcium Carbonate. It is officially required to contain 0·153 p.c. w/v of pure Calcium Hydroxide, as volumetrically determined by titration with Deci-normal Volumetric Sulphuric Acid Solution. Neither the *B.P.* nor the *P.G.* specify a particular indicator; the *U.S.P.* mentions Phenolphthalein Solution. The *P.G.* requires not less than 0·148 p.c. w/v, nor more than 0·166 p.c. w/v, the *U.S.P.* not less than 0·14 p.c. w/v, of pure Calcium Hydroxide.

The liquor should be free from the more generally occurring impurities mentioned under Calcium Hydrate, and in addition should be free from objectionable traces of Lead.

LIQUOR CALCIS SACCHARATUS. SACCHARATED SOLUTION OF LIME.

Calcium Hydroxide, 1; Refined Sugar, in powder, 2; Distilled Water, 20. (about 1 in 62)

Contains about 8 grains of CaO in 1 fl. oz. 1 oz. = about 14 fl. oz. Lime Water.

As suggested in our former editions the Sugar should be first dissolved in the Water, and the Calcium Hydroxide added to the Solution; after a few hours' occasional agitation, decant.

It should be kept in well-stoppered glass bottles of a dark amber colour, which should be kept full, and preserved as far as possible from contact with the air.

The Hydrate in this case also is less soluble in the hot than in the cold, and the liquor precipitates on boiling, but clears again on cooling.

A clear, colourless, and odourless liquid possessing a peculiar sweetish and alkaline taste.

Dose.—20 to 60 minims = 1·2 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Hung. (Aqua Calcis Saccharata). Not in the others.

Tests.—Saccharated Solution of Lime has a specific gravity of about 1·055, and is officially required to indicate 2·31 p.c. w/w of pure Calcium Hydroxide, as volumetrically determined by titration with Normal Volumetric Sulphuric Acid Solution. In this case also the *B.P.* specifies no indicator of neutrality. Phenolphthalein Solution is best for the purpose.

The liquor should be free from the impurities usually associated with the Hydroxide from which it is prepared, and in addition should not contain objectionable traces of Lead.

Not Official.

LINIMENT FOR FRECKLES.—Liniment of Lime, 8; Solution of Ammonia, 1; mix.

CARRON OIL.—Equal parts of Linseed Oil and Lime Water, shaken to form a cream.

One of the best **applications** to burns or scalds, more particularly when 1 or 2 p.c. of Phenol has been added.

This has been incorporated in the *B.P.C.* under the title **Linimentum Calcis cum Oleo Lini.**

CALCII HYPOPHOSPHIS.

CALCIUM HYPOPHOSPHITE.

FR., HYPOPHOSPHITE DE CALCIUM; GER., CALCIUM HYPOPHOSPHOROSUM; ITAL., IPOFOSFITO DI CALCIO; SPAN., HIPOFOSFITO CALCICO.

$Ca(PH_2O_2)_2$, eq. 168·83.

A white, odourless, lustrous crystalline salt, or as a white crystalline powder, having a nauseous bitter taste.

It should be kept in well-stoppered bottles and in a cool place. The salt readily undergoes oxidation, and on this account great care should be exercised in mixing it with substances which readily part with Oxygen, *e.g.*, Chlorates, Nitrates, and Peroxides.

It may be obtained by the combined action of Calcium Hydroxide, Phosphorus, and Water, the salt being purified by recrystallisation.

Solubility.—1 in 8 of Water, and scarcely more soluble in boiling Water. Insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Similar to those of Phosphorus, but without its unpleasant effects. Given in cases of nervous and general debility; it is by some supposed to be useful in phthisis.

No satisfactory evidence that Hypophosphites can influence nutrition in any way differently from other indifferent salts, and the whole of the Hypophosphite administered can be recovered unchanged from the urine.—*B.M.J.* '06, ii. 1460.

Dose.—3 to 10 grains = 0·2 to 0·65 gramme.

Prescribing Notes.—*Usually given in mixtures or in one of the various forms of Syrup.*

Not Official.—Glycerola Hypophosphitum, Syrupus Hypophosphitum, Syrupus Calcii Hypophosphitis (*Squire*) and Syrupus Calcii et Sodii Hypophosphitum.

Foreign Pharmacopœias.—Official in Belg., Jap. and Swiss (Calcium Hypophosphorosum), Dutch and Norw. (Hypophosphis Calcicus), Fr. (Hypophosphite de Chaux), Ital. (Ipofosfito di Calcio), Mex. (Hipofosfito de Calcio), Port. (Hypophosphito de Cal), Span. (Hipofosfito Calcico), U.S. Not in the others.

Tests.—The distinguishing tests for Calcium Hypophosphite are:

(1) that when heated to redness the crystals evolve spontaneously inflammable Hydrogen Phosphide and Hydrogen, and leave a reddish-coloured residue; (2) an aqueous solution rapidly reduces Potassium Permanganate Solution, yielding if the proportionate quantity of Permanganate be employed a practically colourless filtrate; (3) the aqueous solution reduces Mercuric Chloride Solution first to Mercurous Chloride and ultimately more completely to metallic Mercury. Upon its property of reducing Potassium Permanganate Solution is founded the official quantitative test of its purity, which requires that when 0·25 gramme of the salt is boiled for 10 minutes with 0·6 gramme of Potassium Permanganate in solution, and the liquid filtered, the filtrate shall be practically colourless. Several methods have been proposed with a view to affording a more accurate quantitative determination. Tyrer has suggested (*P.J.* '97, ii. 150) reduction of Copper Solution, previously eliminating any impurity likely to affect the result, by treatment with Barium Chloride Solution. Jowett points out (*Y.B.P.* '98, 412; *C.D.* '98, ii. 300) that Barium Phosphite is slightly soluble in Water, which would affect the results obtained, and proposes the following method:—About 0·3 gramme of the dried salt is dissolved in 10 c.c. of Water, 3 c.c. of a 10 p.c. Lead Acetate solution added, and the mixture allowed to stand 12 hours. It is then filtered, the precipitate thoroughly washed, and the washings added to the filtrate, which is acidified with Hydrochloric Acid, and then saturated with Hydrogen Sulphide, boiled, filtered, and the Lead Sulphide thoroughly washed. The mixed washings and filtrate are then evaporated to a low bulk and 5 c.c. Hydrochloric Acid and 1 gramme Potassium Chlorate added, and gently heated for half an hour, then concentrated to about 20 c.c., and the Phosphate finally determined either gravimetrically or volumetrically by the usual methods. The *U.S.P.*, although requiring that it shall contain not less than 98 p.c. of pure Calcium Hypophosphite, gives no process for its determination. The salt is not official in the *P.G.*

The more generally occurring impurities are Aluminium, Arsenic, Copper, Iron, Lead, Magnesium, Potassium, Sodium, Chlorides or Sulphates, Phosphates or Phosphites. The *B.P.* groups these collectively. A 1 in 20 aqueous solution of the salt acidified with Hydrochloric Acid should yield no turbidity or darkening in colour on the addition of Hydrogen Sulphide, indicating the absence of Arsenic, Copper and Lead, nor on the subsequent addition of Ammonia Solution should any appreciable darkening in colour ensue, indicating the absence of more than a trace of Iron. The 1 in 20 aqueous solution, after the complete precipitation of the Calcium as Oxalate, should afford no turbidity on the addition of Sodium Phosphate Solution, indicating the absence of Magnesium. The *U.S.P.* does not include tests for Aluminium, Magnesium, Potassium, Sodium or Phosphites; the modified Gutzeit's test is employed in testing for Arsenic, and the time-limit test for heavy metals. The *B.P.* employs Lead Acetate Solution to detect Phosphates and Phosphites, but no commercial sample has been found which does not give more or less precipitate or turbidity with Lead Acetate, which also precipitates Sulphates and Sulphites.

The *U.S.P.* takes the solubility of the salt in Water as a criterion of the absence of Phosphate and Sulphate.

Modified Gutzeit's Test.—If 5 c.c. of an aqueous solution of the salt (1–10) be measured into a beaker containing 3 c.c. of Nitric Acid diluted with about 10 c.c. of Water and evaporated to dryness on a water-bath the residue should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Time-limit Test.—A (1–20) aqueous solution of the salt acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Not Official.

GLYCEROLA HYPOPHOSPHITUM (*Squire*).—Calcium, Potassium, and Sodium Hypophosphites, of each 1; dissolve these in Water, 40; filter and add Sugar, 40; Orange-flower Water, 2; Cherry-laurel Water, 2; dissolve and add Glycerin, 12, and filter.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c.

Glycerol Hypophosphitis.—Hypophosphite of Potassium, 160 grains; Hypophosphite of Calcium, 160 grains; Hypophosphite of Manganese, 80 grains; Hypophosphite of Quinine, 80 grains; Hypophosphite of Strychnine, 2½ grains; Strong Solution of Hypophosphite of Iron (*B.P.C.*), 4 fl. oz.; Hypophosphorous Acid, 2 fl. drm.; Distilled Water, 3 fl. oz.; Glycerin, to produce 20 fl. oz.—*Bournemouth Formulary.*

This has been incorporated in the *B.P.C.* as follows:—

Glycerinum Hypophosphitum. *Syn.* GLYCEROL HYPOPHOSPHITIS.—Calcium Hypophosphite, 1·50; Manganese Hypophosphite, 0·75; Potassium Hypophosphite, 1·50; Quinine Hypophosphite, 0·75; Strychnine Hypophosphite, 0·025; Strong Solution of Ferric Hypophosphite, 20; Hypophosphorous Acid, 10; Distilled Water, 15; Glycerin, *q.s.* to produce 100.—*B.P.C.*

SYRUPUS HYPOPHOSPHITUM. — Calcium Hypophosphite, 45 grammes; Potassium Hypophosphite, 15 grammes; Sodium Hypophosphite, 15 grammes; Diluted Hypophosphorous Acid, 2 grammes; Sugar, 650 grammes; Tincture of Fresh Lemon Peel, 5 c.c.; Water, *q.s.* to make 1000 c.c.—*U.S.*

SYRUPUS CALCII HYPOPHOSPHITIS (*Squire*).—Dissolve Calcium Hypophosphite, 4 in Distilled Water, 38 add Sugar, 59; dissolve without heat and filter the Syrup.

Dose.—1 fl. drm. = 3·6 c.c. containing 3 grains = 0·2 gramme.

The *B.P.C.* Syrup is only one-third the strength, necessitating an excessive quantity of Syrup for a full dose of the salt.

SYRUPUS CALCII ET SODII HYPOPHOSPHITUM (*U.S.N.F.*).—Calcium Hypophosphite, 35; Sodium Hypophosphite, 35; Hypophosphorous Acid (*U.S.P.*), 1·5; Sugar, 775; Water, sufficient to make 1000.

1 fl. drm. contains 2 grains each of Calcium Hypophosphite and Sodium Hypophosphite.

The *B.P.C.* has incorporated the old formula (*U.S.N.F.* 1896) which employs Citric Acid.

Not Official.

CALCII IODAS.

CALCIUM IODATE.

A white, or more usually yellowish, very deliquescent, crystalline powder antiseptic and disinfectant. Under the name **Calcinol** it has been used as an antiseptic dressing in place of Iodoform.—*L.* '00, ii. 1867; *P.J.* '01, i. 27.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme, two or three times daily in Water, as an intestinal antiseptic.

Tests.—The aqueous solution affords the tests characteristic of Calcium given in large type under Calcium Carbonate.

It affords with Silver Nitrate Solution a white precipitate, sparingly soluble in Water and in dilute Nitric Acid, but readily soluble in Ammonia Solution. When mixed with Potassium Iodide Solution it yields on the addition of Tartaric Acid Solution or a solution of an acid Sulphate and Starch Mucilage a fine blue coloration. Barium Chloride Solution produces a white precipitate practically insoluble in Water and difficultly soluble in Nitric Acid. On the addition of Sulphurous Acid to an aqueous solution Iodine is liberated, and may be recognised by the violet colour of its solution in Carbon Bisulphide or by the blue colour produced on the addition of Starch Mucilage.

Not Official.

CALCII IODIDUM.

This salt may be obtained from concentrated solutions in crystalline needles. By evaporating its solution to dryness it may be obtained as a white deliquescent fusible mass which crystallises on cooling. It is readily soluble in Water and in dilute Alcohol. It has recently (*B.M.J.* '06, ii. 138) been shown that great benefit is derived from its use in the treatment of ulcers, it had a remarkable effect in reducing thick callous edges into thin healing ones. It is given in doses of 2 to 4 grains (0·13 to 0·26 gramme).

Of great value in leg ulcers.—*B.M.J.* '07, i. 991.

Suggested that the gastritis which has sometimes followed its administration was due to free Iodine given off by the salt on exposure to a bright light or air. It should, therefore, be kept unexposed to light, and dispensed in suitably coloured bottles.—*B.M.J.* '07, i. 1464.

CALCII PHOSPHAS.

CALCIUM PHOSPHATE.

Fr., Phosphate de Calcium; Ger., Calciumphosphat; Ital., Fosfatò di Calcio; Span., Fosfato Calcico.

A light, white, odourless and tasteless amorphous powder.

It is generally obtained commercially from Bone Ash. The Bone Ash is treated with Hydrochloric Acid and the resulting solution is precipitated with dilute Ammonia Solution, the precipitate being washed with cold Water to free it from Ammonium salts and dried at a temperature not exceeding 100° C. (212° F.). It is officially mentioned that it may be prepared by the interaction of Calcium Chloride and Sodium Phosphate, but it has been stated (*C.D.* '02, i. 190) that the salt produced by precipitation with the official Di-Sodium Hydrogen Phosphate is Di-Calcium Hydrogen Phosphate, and only in the event of Tri-Sodium Phosphate being used as a precipitant is a salt corresponding to the official requirements produced. A specimen produced by precipitation with Di-Sodium Hydrogen Phosphate when dissolved in Hydrochloric Acid and reprecipitated with Ammonia Solution showed a loss of over 29 p.c., whereas the official requirement is not less than 5 p.c.

Solubility.—Insoluble in Water; soluble in Diluted Hydrochloric Acid or Diluted Nitric Acid.

Medicinal Properties.—For rickets and mollities ossium, and other conditions of malnutrition; said to be useful in scrofulous affections, to promote union of bone fractures, in tardy teething, and in anæmia; given to counteract the draining of Phosphates during pregnancy and lactation, and to prevent decay of the teeth and toothache during pregnancy.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*More commonly ordered in smaller doses. Given as a powder, or in the form of Syrup.*

Official Preparations.—Contained in Extractum Euonymi Siccum and Pulvis Antimonialis.

Foreign Pharmacopœias.—Official in Austr., Belg., Ger., Hung., Russ. and Swiss (Calcium Phosphoricum); Dutch and Swed. (Phosphas Calcicus); Dan. (Phosphas Calcicus Præcipitatus); Fr. (Phosphate Di-acide de Calcium, Phosphate Mono-acide de Calcium and Phosphate Neutre de Calcium); Ital. (Fosfato Bicalcico); Jap. (Calcium Phosphoricum Præcipitatum); Mex. (Fosfato de Calcio); Port. (Phosphato de Cal); Span. (Fosfato Di-Calcico and Fosfato Tri-Calcico); U.S. (Calcii Phosphas Præcipitatus). Not in Norw.

Tests.—Calcium Phosphate when dissolved in Hydrochloric Acid answers the tests distinctive of Calcium given in the large type under Calcium Carbonate. Its solution in diluted Nitric Acid gives with Ammonium Molybdate Solution a yellow precipitate, which, when filtered off and washed, dissolves in Ammonia Solution, and affords on the addition of Magnesium Ammonio-sulphate Solution a white crystalline precipitate. The *B.P.* includes a method of gravimetrically determining the purity of the salt requiring that its Hydrochloric Acid Solution shall yield a white precipitate amounting to 95 p.c. by weight when reprecipitated with diluted Ammonia Solution, washed with cold Water and dried at 100° C. (212° F.). The *U.S.P.* states that it shall contain not less than 99 p.c. of pure Calcium Phosphate, but gives no method for its determination. The *P.G.* neither gives the requisite percentage nor a method of determination. The salt official in the *P.G.* is the Di-Calcium Phosphate and not the Tri-Calcium Phosphate.

The more generally occurring impurities are Aluminium, Arsenic, Copper, Iron, Lead, Magnesium, Carbonates, Chlorides, Silica and Calcium Oxalate. With the exception of the last named the *B.P.* group these collectively without any regard for their relative importance. Arsenic, the most important, is examined for in the *U.S.P.* by the modified Gutzeit's test, in the *P.G.* by Bettendorf's test. The *U.S.P.* employs the time-limit test, and *P.G.* Hydrogen Sulphide for the detection of Copper and Lead. Neither the *U.S.P.* nor *P.G.* includes a test for Magnesium or Silica. Calcium Oxalate is an unlikely impurity, and it has been questioned (*C.D.* '02, i. 190) whether the *B.P.* test for 'absence of Calcium Oxalate' is not a slip for 'absence of Alumina.' Both *U.S.P.* and *P.G.* state that when moistened with Silver Nitrate Solution the salt is coloured yellow, the *U.S.P.* mentions 'either before or after ignition,' which distinguishes it from Acid Calcium Phosphate, which, after ignition, remains white, when so moistened.

Potassium Sulphate.—5 c.c. of the solution prepared by means of Nitric Acid strongly acidulated with Nitric Acid should yield with 1 c.c. of Potassium Sulphate T.S. no turbidity upon standing, indicating the absence of Barium, *U.S.P.*

Silver Nitrate.—5 c.c. of a 1-20 solution prepared by the aid of Nitric Acid and acidulated with Nitric Acid yields with 0·5 c.c. of Silver Nitrate T.S. not more than a slight turbidity, *U.S.P.* The *P.G.* requires that a (1-20) aqueous solution of the salt obtained with Nitric Acid should be rendered at most opalescent with Silver Nitrate T.S. after 2 minutes.

Barium Nitrate.—If 1 part of Calcium Phosphate be shaken with 2 parts of Water, and the mixture filtered, the filtrate, after acidulating with Acetic Acid, should not be affected by Barium Nitrate Solution, *P.G.*

Stannous Chloride.—A mixture of 1 gramme Calcium Phosphate and 3 c.c. of Stannous Chloride Solution should not assume a dark colour in the course of an hour, *P.G.*

Hydrogen Sulphide.—The aqueous solution (1-20) obtained with Nitric Acid should give with excess of Solution of Ammonia on the addition of Hydrogen Sulphide T.S. a pure white precipitate, *P.G.*

Gutzeit's Test.—5 c.c. of a 1 in 10 solution of Calcium Phosphate in diluted Hydrochloric Acid should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Time-limit Test.—An aqueous solution (1-20) obtained by shaking the salt with Water, adding Hydrochloric Acid drop by drop and heating until solution is effected, should not respond to the time-limit test for heavy metals, omitting the addition of Ammonia Solution, *U.S.P.*

Not Official.

CALCII SULPHAS.

CALCIUM SULPHATE.

SULPHATE OF LIME. CALCINED GYPSUM. PLASTER OF PARIS.

FR., SULFATE DE CALCIUM; GER., GEBRANNTER GIPS; ITAL., GESSO CALCINATO; SPAN., YESO.

Native Calcium Sulphate ($CaSO_4$, $2H_2O$, eq. 170·81) rendered nearly anhydrous by heat.

A white odourless and tasteless powder.

It should be kept in well-closed jars, and should be protected as far as possible from moisture.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Fr., Ger., Hung., Jap., Mex., Norw., Russ., Swed., Swiss and U.S. Not in the others.

The native salt is used for the preparation of Calx Sulphurata.

Tests.—The distinguishing test for Calcium Sulphate is that when mixed with half its weight of Water it should form a smooth paste, rapidly becoming hard. The *P.G.* states that when so mixed it shall harden within 5 minutes. The saturated aqueous solution answers the tests characteristic of Calcium given in the large type under Calcium Carbonate; it should be neutral to Litmus paper, and should on the addition of Barium Chloride Solution yield a white precipitate, insoluble in Hydrochloric Acid.

The more generally occurring impurity is Carbonate, and the salt should not yield any effervescence when treated with dilute Hydrochloric or Nitric Acid.

ALX SULPHURATA (Calcii Sulphidum). *See* p. 302.

Not Official.

CALENDULA.

COMMON MARIGOLD.

The Florets of *Calendula officinalis*, L.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

TINCTURA CALENDULÆ FLORUM.—1 of Marigold Flowers, dried, in No. 20 powder, percolated with Alcohol (60 p.c.), to yield 5.

This is included in the *B.P.C. Formulary* 1901.

Calendula, in No. 20 powder, 20; Alcohol (95 p.c.), 100. Prepared by percolation.—*U.S.P.*

This has been incorporated in the *B.P.C.*

Medicinal Properties.—Used as an application for sprains and bruises; internally for amenorrhœa.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Foreign Pharmacopœias.—Official in U.S., 1 in 5 (Alcohol 94·9 p.c.). Not in the others.

Not Official.

CALOTROPIS.

Syn.—MUDAR.

The dried root-bark of *Calotropis procera*, R. Br., and of *Calotropis gigantea*, R. Br., freed from the outer corky layer; dose 3 to 10 grains = 0·2 to 0·65 gramme, as a tonic; as an emetic, 30 to 60 grains = 2 to 4 grammes; and **Tinctura Calotropis** (1 in 10), dose 30 to 60 minims = 1·8 to 3·6 c.c.; are official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

CALUMBÆ RADIX.

CALUMBA ROOT.

FR., RACINE DE COLOMBO; GER., KOLOMBOWURZEL; ITAL., COLOMBO;
SPAN., RAIZ DE COLOMBO.

The Root of *Jateorhiza Calumba*, Miers, cut in nearly circular transverse discs and dried.

The dried stem of *Coscinium fenestratum*, Colebr., (false Calumba Root) is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Medicinal Properties.—A bitter stomachic useful in chronic atonic dyspepsia, in promoting appetite, stimulating the gastric functions and removing flatulence. Given in convalescence from acute diseases, combined with alkalis or Bismuth. Like other bitters, Calumba ought not to be given in gastric ulcer, in acute gastritis, or when there is pain; nor ought it to be given for too long.

Prescribing Notes.—*Given in the form of Infusion, Liquor Concentratus, or Tincture with other medicines. It is one of the few bitters that can be given with salts of Iron.*

Official Preparations.—Infusum Calumbæ, Liquor Calumbæ Concentratus, and Tinctura Calumbæ.

Not Official.—Extractum Calumbæ, Fluidextractum Calumbæ, Infusum Calumbæ Concentratum.

Foreign Pharmacopœias.—Official in all.

Descriptive Notes.—Calumba root as met with in commerce varies much in character and quality, some specimens being of fresh appearance and yellowish tint, and others dull or greyish-yellow in colour and badly dried, and sometimes worm-eaten. The transverse or oblique slices average about 1½ inch (37 mm.) in diameter and about ⅓ inch (8 mm.) in thickness. The *B.P.* defines the size as about ⅛ to ½ inch (3 to 12 mm.) or more in thickness, and about 1 to 2 inches (2½ to 5 cm.) or more in diameter. The bark is ¼ inch or more in thickness, and harder and less shrunken than the starchy parenchymatous central portion, which is more or less depressed. The whole surface has a number of slender lines radiating from the centre and the bark is marked off by a darker cambium ring. The taste is bitter and mucilaginous and the odour characteristic. Under the microscope the distinctive features are the large irregular starch grains (0·09 mm. *P.G.*), a stellate hilum, and the irregularly thickened yellow sclerenchymatous cells in the bark, containing rhomboidal crystals of Calcium Oxalate. The active principle is not Berberine, as formerly supposed, but consists of two alkaloids resembling it (*P.J.* (4) xvi. p. 341). The infusion made with cold Water to avoid dissolving starch should be strained and then boiled to destroy a ferment or oxydase which causes the infusion, at first neutral, to become acid and turbid. To prevent the gum present from readily dissolving, the root is usually cut into small pieces instead of being pounded.

The root should be selected of good quality and of moderate size, as the larger pieces have less bark in proportion, and it is in this part that the activity of the drug chiefly resides. If old it is usually darker and duller in colour and more or less worm-eaten. A very bright colour usually indicates that the root has been washed and dried and may have lost some of its active principle. Calumba root is not often adulterated; sometimes small pieces with prominent woody wedges are occasionally found mixed with Calumba, but do not differ in the character of the starch or in taste, and are apparently pieces of the short underground stem from which the fusiform roots proceed. Another root has recently been found mixed with Calumba, resembling it in shape and size, but with a reddish tint, distinctly radiate structure, and containing bundles of acicular raphides in some parenchymatous cells and sphæraphides in others.

Preparations.

INFUSUM CALUMBÆ. Infusion of Calumba.

Calumba Root, 1; Distilled Water, cold, 20; infuse for half an hour; strain. (1 in 20)

Cold Water is used to avoid solution of the Starch which exists in the root.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

A corresponding preparation, **Infusum Coscinii**, is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Foreign Pharmacopœias.—Official in Belg., 1 of Fluid Extract in 20; Ital., 1 in 20; Span., 1 in 100. Not in the others.

LIQUOR CALUMBÆ CONCENTRATUS. CONCENTRATED SOLUTION OF CALUMBA.

An aqueous preparation of Calumba (preserved by the addition of Alcohol). 1 of Calumba in 2 of Liquor.

It contains 22·5 p.c. by volume of Alcohol (90 p.c.).

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Concentrated solution of Calumba has a specific gravity of 0·990 to 0·996, it contains about 4 p.c. w/v of total solids and about 20 p.c. w/v of Absolute Alcohol.

A corresponding preparation, **Liquor Coscinii Concentratus**, is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

TINCTURA CALUMBÆ. TINCTURE OF CALUMBA.

1 of Calumba Root in No. 20 powder, macerated with 10 of Alcohol (60 p.c.). (1 in 10)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Tincture of Calumba has a specific gravity of 0·915 to 0·920, it contains about 1 p.c. w/v of total solids and about 60 p.c. w/v of Absolute Alcohol.

A corresponding preparation, **Tinctura Coscinii**, is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Foreign Pharmacopœias.—Official in Belg., Fr., Mex., Port., Span., Swed., Swiss and U.S., 1 in 5; Ital. and Jap., 1 in 10; all except U.S. by weight. Not in the others.

Not Official.

EXTRACTUM CALUMBÆ.—Calumba Root exhausted with Alcohol (60 p.c.) and the product evaporated to a pill consistence. 16 parts of Root yield 1 to 1½ parts of Extract.

This has been incorporated in the *B.P.C.*

Dose.—½ to 2 grains = 0·08 to 0·13 gramme.

Foreign Pharmacopœias.—Official in Austr., Dutch, Hung. and Span., made with Alcohol (70 p.c.); Belg., Ital. and Mex., made with Alcohol (60 p.c.); Port., made with Alcohol (65 p.c.); Jap., made with Alcohol (45 p.c.); U.S., **Fluid Extract** only, made with Alcohol (about 66 p.c.). Not in Dan., Fr., Ger., Norw., Russ. or Swed.

FLUIDEXTRACTUM CALUMBÆ (*U.S.P.*).—A 1 in 1 Fluid extract prepared by macerating and percolating 1 of the Root with a mixture of 7 of Alcohol (94·9 p.c.) and 3 of Water. The Fluid Extract of the *Belg. Pharm.* is prepared from the Root with Alcohol (30°), the resultant fluid extract being required to contain at least 13 p.c. of dry residue.

INFUSUM CALUMBÆ CONCENTRATUM.—Calumba Root, in No. 10 powder, 40; Alcohol (90 p.c.), 25; Dilute Chloroform Water (1 in 100), *q.s.* to make 100; Prepare by macero-expression; the reserved liquid should be heated to 85° C., for 5 minutes before adding the Alcohol. Dose.—½ to 1 fl. drm.—*Farr* and *Wright*; *P.J.* '06, i. 165; '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* '07, 247.

This appears in the *B.P.C.*

CALX.

LIME.

Fr., Oxyde de Calcium; Ger., Gebrannter Kalk; Ital., Ossido di Calcio; Span., Cal Viva.

Calcium Oxide, **CaO**, eq. 55·59, obtained by calcining Chalk, Limestone, or Marble.

White or whitish, hard, odourless masses, possessing a characteristic caustic taste. When exposed to the atmosphere Lime rapidly absorbs Water and Carbonic Anhydride, and should therefore be kept in well-closed vessels, and protected as far as possible from contact with the air.

Solubility.—Decomposed by Water, forming Calcium Hydrate, under which heading the solubility is given.

Foreign Pharmacopœias.—Official in all.

Tests.—The distinguishing test for Lime is the heat evolved when mixed with about half its weight of Water, the masses swelling up and crumbling to powder. The *B.P.* mentions rather less than its own weight of Water, the *P.G.* with half its weight of Water, and the *U.S.P.* with about half its weight of Water, the *U.S.P.* and the *P.G.* stating, in addition, that with from 3 to 4 parts of Water, it forms a smooth magma. When mixed with Water and dissolved by the aid of Hydrochloric Acid, it yields a solution conforming to the distinctive tests for Calcium given in the large type under Calcii Carbonas Præcipitatus. The aqueous solution is alkaline in reaction towards red Litmus and to Phenolphthalein Solution. The *U.S.P.* requires that in the anhydrous state it shall contain not less than 90 p.c. of pure Calcium Oxide; the *B.P.* and *P.G.* specify no definite percentage. Neither Pharmacopœia refers to any method of quantitative determination.

The more generally occurring impurities are Aluminium, Iron, Magnesium, Potassium, Sodium, Carbonates, Chlorides, Phosphates, Sulphates, and Silica. These are grouped collectively in the *B.P.* The methods adopted for their detection in the case of Calcium Hydrate are applicable here also. The *P.G.* includes only a test for Carbonates and residue insoluble in Nitric Acid; the *U.S.P.* a limit of Carbonate, and a limit (0·5 p.c.) of matter insoluble in Hydrochloric Acid.

CALCII HYDRAS.—*See* p. 286.

CALX CHLORINATA.

CHLORINATED LIME.

Fr., Chlorure de Chaux; Ger., Chlorkalk; Ital., Cloruro di Calce.

A white, or greenish-white, dry, amorphous powder, evolving a strong chlorinaceous odour. Is a mixture of variable composition, consisting chiefly of Calcium Hypochlorite.

As it becomes moist and gradually decomposes on exposure to the air, it should be preserved in well-closed vessels in a cool and dry place.

Solubility.—Partially soluble in Water and in Alcohol (90 p.c.). Decomposed by acids with formation of Hypochlorous Acid, which in the case of Hydrochloric Acid reacts with it to form Chlorine.

Medicinal Properties.—Chiefly used as a disinfectant. A solution of 1 of Calx Chlorinata to 120 of Water is very powerfully antiseptic and is neither toxic nor caustic. Acts best at a temperature of 110° to 120° F.

A remarkably efficacious and absolutely harmless antiseptic. Useful as an external application in surgical, ophthalmic and gynæcological practice and also as an injection in affections of the rectum and bladder. *See* also below, Liquor Calcis Chlorinatæ.

Bleaching Powder frequently consists of little else than inert Calcium Chloride and Carbonate, the active Chlorine being spent. Generally speaking, it only destroyed the least resistant microbes, though in the case of anthrax spores on linen this substance proved more effective than Carbolic Acid.—*London County Council's Report on Disinfectants, L.* '02, i. 759.

Official Preparations.—Liquor Calcis Chlorinatæ. Used in the preparation of Chloroform and Liquor Sodæ Chlorinatæ.

Not Official.—Liquor Potassæ Chlorinatæ.

Foreign Pharmacopœias.—Official in Dan., Norw., Swed. (Calx Chlorata); Austr. and Russ. (Calcium Hypochlorosum); Fr. (Chlorure de Chaux); Belg., Ger., Hung., Jap. and Swiss (Calcaria Chlorata); Ital. (Cloruro di Calce); Mex. (Hipoclorito de Calcio Impuro); Port. (Cal Chlorada); Span. (Hipoclorito Calcico Clorurado); U.S. (Calx Chlorinata); Hung. and Norw., contain 20 p.c. of available Chlorine; Austr., Belg., Dan., Ger., Jap., Russ., Swed. and Swiss, 25 p.c.; Ital., 28·6 p.c.; Fr. 35 p.c.; Span., 32 p.c.; U.S. not less than 30 p.c.; Port., not indicated. Not in Dutch.

Tests.—The distinguishing tests for Calx Chlorinata are that when treated with Hydrochloric Acid it evolves a yellowish gas which at first reddens and then bleaches moistened blue Litmus paper; its aqueous solution decolorises Indigo Sulphate Solution; its Acetic Acid solution yields with Ammonium Oxalate Solution a white precipitate, insoluble in Acetic Acid, soluble in Hydrochloric Acid. It is officially required to contain 33 p.c. (more correctly 32·93 p.c.) of available Chlorine as indicated by titration of the Iodine liberated on mixing 0·5 gramme of the salt with 1·5 grammes of Potassium Iodide dissolved in 200 c.c. of Water and 6 c.c. of Hydrochloric Acid; at least 46·8 c.c. of Volumetric Sodium Thiosulphate Solution should be required. A detailed comparison of the *U.S.P.* and *P.G.* processes will be found below in the small type under the heading of Volumetric Determination. It should be noted that only a good and well-kept sample will yield the percentage of Chlorine required by the *B.P.* The *P.G.* requires 24·95 p.c. and the *U.S.P.* not less than 30 p.c. of available Chlorine, the latter Pharmacopœia triturating a definite weight of the substance with Water, making up to a standard volume and performing the assay on an aliquot portion.

Volumetric Determination.—The *P.G.* uses 0·5 gramme Calcaria Chlorata mixed with a solution of 1 gramme Potassium Iodide in 20 c.c. of Water, and acidulated with 20 drops Hydrochloric Acid, and directs that it should require at least 35·2 c.c. Tenth-normal Volumetric Sodium Thiosulphate Solution to combine with the liberated Iodine, *P.G.*

Introduce into a stoppered weighing bottle between 3 and 4 grammes of Chlorinated Lime and weigh accurately; triturate this thoroughly with 50 c.c. of Water, transfer the mixture to a graduated vessel, together with the rinsings, and add sufficient Water to make 1000 c.c. After thoroughly shaking add to 100 c.c. of the mixture 1 gramme of Potassium Iodide, 5 c.c. Diluted Hydrochloric Acid and sufficient Tenth-Normal Volumetric Sodium Thiosulphate Solution for complete decolorisation. Multiply the number of c.c. of Tenth-normal Volumetric Solution consumed by 0·3518, and divide the product by one-tenth of the weight of the Chlorinated Lime taken; the quotient represents the percentage of available Chlorine present, *U.S.P.*

Preparations.

LIQUOR CALCIS CHLORINATÆ. Solution of Chlorinated Lime.

Chlorinated Lime, 1; Distilled Water, 10. (1 in 10)

The Chlorinated Lime should be thoroughly mixed with the Water, and set aside in a stoppered bottle for three hours, shaking it at intervals, and finally strained through calico.

The Solution should yield, when fresh, about 3 p.c. of available Chlorine, but is liable to deterioration on keeping. It should be preserved in well-stoppered amber-coloured bottles and kept in a cool and dark place.

Medicinal Properties.—A powerful disinfecting and bleaching agent. Diluted 1 to 12 or 16 of Distilled Water, it is used as an antiseptic **lotion** for unhealthy ulcers, purulent ophthalmia, fetid cutaneous affections and scabies; as an **injection** in foul nasal, aural and vaginal discharges; as a **gargle** in septic tonsillitis and diphtheria.

Antidotes.—Emetics, White of Egg, Milk, Flour; *not* Acids.

Foreign Pharmacopœias.—Official in Belg., 3 in 100; Russ. (Calcium Hypochlorosum Solutum), 2·5 p.c. of Chlorine; Span., about 1 in 43. Not in the others.

Tests.—The distinguishing tests for Chlorinated Lime Solution are that it has a specific gravity of about 1·055 and shall yield not less than 2 p.c. of available Chlorine as determined by titration of the Iodine liberated, when 1 gramme of the liquor is mixed with 0·5 gramme of Potassium Iodide dissolved in Water and 1 c.c. of Hydrochloric Acid added; not less than 5·6 c.c. of Deci-normal Volumetric Sodium Thiosulphate should be required, corresponding to 1·97 p.c. of available Chlorine.

LIQUOR SODÆ CHLORINATÆ.—Solution of Chlorinated Soda.

An almost colourless liquid possessing an alkaline reaction, an astringent taste and a faint chlorinaceous odour. It is prepared by well rubbing 4 of Chlorinated Lime with 30 of Distilled Water and mixing this with 6 of Sodium Carbonate previously dissolved in 10 of Distilled Water, and filtering.

The method of preparation adopted in the *B.P.* 1885 recommended the solution of the Chlorinated Lime to be filtered, the solutions to be well mixed and again filtered. The *Companion*, 1894 edition, pointed out that this was unadvisable, and the method was altered in accordance with the *Companion* recommendation in the 1898 edition of the *B.P.*

It should be kept in well-stoppered amber-tinted glass bottles and in a cool and dark place. It has the reputation of being an unstable solution, but this is an error. It undergoes but slight change, even when kept under ordinary conditions during several months, or even after keeping for a week in an open white glass bottle.

The Labarraque Solution was prepared by mixing together the unfiltered solutions of one part of Chlorinated Lime with 2 parts of Soda crystals.

The proportions used in U.S. and other Pharmacopœias will be found below.

Medicinal Properties.—Antiseptic. Used internally in typhoid fever and in dysentery. Invaluable as a **gargle** in throat affections attended with fœtor, as in scarlet fever, diphtheria and septic tonsillitis, 1 fl. oz. in 12 to 16 fl. oz. of Water. Diluted with Water or Glycerin it forms an excellent application to sore nipples. It is also a powerful disinfecting agent, and is employed as a wash for foul ulcers.

For information on the treatment of typhoid and diphtheria by Chlorine *see* under 'Chlori Liquor.'

A paper by Klein on the disinfecting action of solutions of Sodium Hypochlorite.—*L.* '96, ii. 1509.

Dose.—10 to 20 minims = 0·6 to 1·2 c.c.

Foreign Pharmacopœias.—Official in Fr. (Chlorure de Soude dissous), Chlorinated Lime 1, Sodium Carbonate 2, Water 45; Mex. (Hipoclorito de Sodio liquido), Sodium Chloride 3, Manganese Dioxide 3, Sulphuric Acid 3, Sodium Carbonate 5, Distilled Water 20; Port. (Soluto de Soda Chlorada), Calcium Hypochlorite 1, Sodium Carbonate 2, Water 40; Span. (Solucion de Hipochlorito Sodico), Calcium Hypochlorite 1, Sodium Carbonate 2, Water 43; Swiss (Natrium Hypochlorosum Solutum), Calcium Hypochlorite 4, Sodium Carbonate 5, Water 120; U.S., Chlorinated Lime 90, Monohydrated Sodium Carbonate 65, Water to weigh 1000. Not in the others.

Tests.—Chlorinated Soda Solution has a specific gravity of about 1·054; it decolorises Indigo Sulphate Solution, and yields when acidified with Hydrochloric Acid a yellowish-green gas possessing a strong chlorinaceous odour and which first reddens and then bleaches moistened blue Litmus paper. It is officially required to indicate at least 2·51 p.c. of available Chlorine as determined by the titration of the Iodine liberated when 3·5 grammes of the solution are added to a solution of 1 gramme of Potassium Iodide in 100 c.c. of Water and the mixture acidulated with 3 c.c. of Hydrochloric Acid; at least 25·0 c.c. of Volumetric Sodium Thiosulphate Solution should be required. The *U.S.P.* requires it to contain at least 2·4 p.c. by weight of available Chlorine, as volumetrically determined by mixing a weighed quantity of 7 grammes of the solution with 50 c.c. of Water and 2 grammes of Potassium Iodide, adding 10 c.c. of Hydrochloric Acid and titrating the liberated Iodine with Tenth-normal Volumetric Sodium Thiosulphate Solution, of which not less than 48 c.c. should be required; 1 c.c. of Tenth-normal Volumetric Sodium Thiosulphate Solution is equivalent to 0·05 p.c. of available Chlorine. The preparation is not official in the *P.G.*

The more generally occurring impurities are Calcium and Carbonates. When acidified with Acetic Acid and warmed till Chlorine vapours cease to be evolved, it should not yield a pronounced turbidity on the addition of Ammonium Oxalate Solution, indicating the absence of more than a trace of Calcium; the gas evolved when the liquor is acidified with diluted Hydrochloric Acid should not cause a turbidity when passed into Lime Water, indicating the absence of Carbonates.

Not Official.

LIQUOR POTASSÆ CHLORINATÆ (Eau de Javelle).—Prepared by the interaction of Bleaching Powder and Potassium Carbonate. Contains about 3 p.c. available Chlorine.

CALX SULPHURATA.

SULPHURATED LIME.

Syn.—CALCII SULPHIDUM.

A white, or greenish-white amorphous powder possessing a characteristic odour of Hydrogen Sulphide. Should contain not much less than half its weight of Calcium Sulphide CaS., eq. 71·53, with Calcium Sulphate and Carbon.

It may be prepared by the reduction of native Calcium Sulphate by Carbon.

It should be kept in amber-tinted glass stoppered bottles and in a cool and dry place, as it is gradually decomposed by exposure to moist air.

Medicinal Properties.—Antisuppurative; internally for boils, pustules and abscesses. In the form of Pigmentum or Lotio Calcii Sulphurati for the cure of scabies; also used as a depilatory.

Daily doses of 1 grain as a prophylactic of influenza.—*B.M.J.* '95, i. 975.

Dose.—¼ to 1 grain = 0·016 to 0·065 gramme.

Prescribing Notes.—*Best prescribed in* **pill**, *made with Glucose. If the total weight of each pill be less than ½ grain it is made up to this weight with Milk Sugar. The pills are coated with Sandarach solution, and usually sent out in bottles.*

Foreign Pharmacopœias.—Official in Jap., Mex., Port. and U.S. Not in the others.

Tests.—The distinguishing tests for Calcium Sulphide are that when acidulated with Acetic Acid it evolves a gas having a powerful odour of Hydrogen Sulphide, leaving a residue of Calcium Sulphate and Carbon, and when filtered the filtrate yields with Ammonium Oxalate solution a white precipitate insoluble in Acetic, but soluble in Hydrochloric Acid. Both *B.P.* and *U.S.P.* employ the Copper Sulphate test as a means of determining the presence of a due proportion of Sulphide; the *B.P.* requiring that a solution of 1·4 grammes of

Copper Sulphate in 50 c.c. of Water shall, when acidified with Hydrochloric Acid and brought nearly to the boiling point, be completely precipitated by 0·8 gramme of Calx Sulphurata, indicating not much less than 50 p.c. of pure Calcium Sulphide; the *U.S.P.* that a solution of 1·9 grammes of Cupric Sulphate, when treated as indicated below shall be completely precipitated by 1 gramme of the substance, indicating the presence of at least 55 p.c. of pure Calcium Sulphide. The *B.P.* employs Potassium Ferrocyanide Solution, the *U.S.P.* excess of Ammonia Water to detect excess of Copper. Calx Sulphurata is not official in the *P.G.*

The Zinc process described under Barium Sulphide is also applicable to Calx Sulphurata.

Determination.—The *U.S.P.* gives a similar test, using 1 gramme of Sulphurated Lime with a cold solution of 1·9 grammes of Copper Sulphate in 50 c.c. of Water and the addition of 10 c.c. diluted Hydrochloric Acid in small portions. The mixture is directed to be digested on a water-bath for 15 minutes and filtered. The addition of an excess of Ammonia Water to the filtrate should impart no colour to it.

Not Official.

SOLUTIO CALCII OXYSULFURATI (Solutio Vlemingkx).—1 of Calcium Oxide slaked with 1 of Water, and mixed with 2 of washed Sulphur: of the foregoing mixture 2·5 is boiled with 20 of Water until it is so reduced as to yield 10 by weight when strained.—*Austr.*

1 of Calcium Oxide is treated with 5 of Water, and 2 of washed Sulphur with 15 of Water; mix and boil for one minute; when cold filter and wash the residue with Water to yield 12.—*Swiss.*

Calcium Sulfuratum Solutum.—Calcium Oxide, 10; Sulphur, 25; Water, 100.—*Belg.*

Various formulas have been given for Vlemingkx's Solution: the proportion of Calcium Oxide, Sulphur and finished product varies between 2, 4, 20; 3, 5, 20; 2·5, 5, 20; 4, 4, 20.

Lotio Calcii Sulphurati.—Calcium Hydrate, 4; Sublimed Sulphur, 4; Water, 35. Boil together, evaporate and filter, to produce 20 of solution. To be diluted with an equal quantity of warm Water.—*Westminster.*

Liquor Calcis Sulphuratæ.—Quicklime, 2; Sublimed Sulphur, 5; Water, *q.s.* to produce 100.—*B.P.C.*

CAMBOGIA.

GAMBOGE.

Fr., Gommegutte; Ger., Gummigutt; Ital., Gommagotta; Span., Gutagamba.

A gum-resin obtained from *Garcinia Hanburii*, Hook. f.

It is imported from Siam, and consists of about 75 p.c. of Resin and 15 to 20 of Gum, the Resin being the active ingredient.

Indian Gamboge, obtained from *Garcinia Morella*, Desr., is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Solubility.—About three-fourths is soluble in Alcohol (90 p.c.), the solution is rendered an opaque yellow by Water; three-fourths is also soluble in Ether. A solution in Ammoniated Alcohol is not rendered turbid by the addition of Water.

Medicinal Properties.—A powerful hydragogue cathartic; in small doses, diuretic. It is employed in the treatment of dropsy, attended with obstinate constipation; and in cerebral congestion. As it is apt to occasion much sickness and griping, it is best given in small doses, repeated at short intervals, until it operates; but it should never be given to children or very old persons, or in inflamed conditions of the abdominal or pelvic organs.

Dose.—½ to 2 grains = 0·032 to 0·13 gramme.

Ph. Ger. maximum single dose, 0·3 gramme; maximum daily dose, 1·0 gramme.

Prescribing Notes.—*It may be given in pill or emulsion, or dissolved in an alkaline solution; the last method has been recommended in dropsy.*

Official Preparation.—Pilula Cambogiæ Composita.

Foreign Pharmacopœias.—Official in Austr. (Gummiresina Gutti); Belg. (Guttæ Gummi); Fr., Ger. (Gutti); Ital., Mex. (Goma Guta); Port. (Gomma-Guta); Span., Swed. (Gummi-Resina Gutta); Swiss, U.S. (Cambogia). Not in the others.

Descriptive Notes.—It usually presents the cylindrical shape of the bambco joints in which it is collected; it may be solid or hollow in the centre. If of good quality it has a smooth, even fracture, free from grittiness, of a bright orange colour. Inferior qualities have a dull and sometimes gritty fracture. The same remarks apply to Indian Gamboge.

Tests.—The distinguishing tests for Gamboge are that when rubbed with Water it forms a yellow emulsion; that it should be completely dissolved by the successive use of Alcohol (90 p.c.) and of Water. It has been suggested (*P.J.* '02, ii. 495) that 75 p.c. should be soluble in Alcohol (90 p.c.), which agrees with the statement previously made in the *Companion* that three-fourths should be soluble in Alcohol (90 p.c.). This standard has been adopted by the *U.S.P.* using Alcohol (94·9 p.c.), but *P.G.* makes no reference to an Alcohol solubility.

The more generally occurring adulterants are Starch, mineral matter, and vegetable debris. Starch may be detected by the addition of Iodine to the cooled aqueous decoction; mineral matter by the ash left on incineration and vegetable matter by the increased insolubility in Alcohol (90 p.c.). The *B.P.* and *U.S.P.* require that when incinerated it shall yield not more than 3 p.c. of ash; the *P.G.* not more than 1 p.c.

Gamboge of good commercial quality contains from 60 to 80 p.c. of Resin (Gambogic Acid); from 15 to 25 p.c. of Gum; about 4 p.c. of Wax; moisture, mineral matter and a trace of Starch.

The *B.P.* states that it is completely dissolved by the successive action of Alcohol (90 p.c.) and Water; and the *U.S.P.* that not more than 25 p.c. should be insoluble in Alcohol (94·9 p.c.).

Preparation.

PILULA CAMBOGIÆ COMPOSITA. Compound Pill of Gamboge.

Gamboge, 1; Barbados Aloes, 1; Hard Soap, 2; all in powder;

Compound Powder of Cinnamon, 1; massed with Glucose Syrup. (about 1 in 6)

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Fr. (Pilule Anderson), Aloes, Gamboge, Oil of Anise, and Honey; Port. (Pilulas de Aloes e Gomma Guta), the same with Soap; Mex. (Pildoras de Anderson), Aloes 8, Gamboge 8, Oil of Anise 0·4, Soap 4, Water *q.s.*, also (Pildoras de Boncio), Aloes 7, Gamboge 7, Ammoniacum 7, Soap 4, Water *q.s.*; U.S. (Pil. Catharticæ Comp.), contains Gamboge about 1 in 12 (*see* Colocynth). Not in the others.

CAMPHORA.

CAMPHOR.

FR., CAMPHRE DU JAPON; GER., KAMPHER; ITAL., CANFORA; SPAN., ALCANFOR.

Refined Camphor is a white or colourless translucent crystalline solid. It is obtained in the raw state from *Cinnamomum Camphora*, Nees and Eberm., in Formosa and Japan; it is resublimed in this country and elsewhere.

It may also be produced synthetically by the oxidation of Camphene. Camphene exists in many essential oils, but commercially it is obtained from Pinene Hydrochloride or Borneol Hydrochloride by treatment with Alcoholic Potassium Hydroxide.

On account of its volatility it should be kept in well-closed vessels, and in a cool place.

Borneo Camphor (Borneol) is a solid substance obtained from *Dryobalanops aromatica*, Gärtn., in Borneo and its neighbourhood. Borneol is used in the production of artificial Camphor; two compound esters are known, Borneol Salicylate (Salit) and Borneol Valerianate (Bornyval).

Solubility.—1 in 700 of Water; 1 in 1¼ of Alcohol (90 p.c.); or by weight, 1 in 1; 4 in 1 of Chloroform; 12 in 7 of Ether; 1 in 4 of Olive Oil (slowly); 1 in 1½ of Oil of Turpentine; 2 in 1 of Glacial Acetic Acid; insoluble in alkalis.

3 of Camphor rubbed with 1 of Carbolic Acid crystals form a clear solution. 3 of Camphor and 3 of Chloral Hydrate rubbed together liquefy. Camphor also forms a liquid when mixed with many other substances, Menthol, Thymol, Naphthol, Salol, Butyl Chloral, and Salicylic Acid.

Medicinal Properties.—A stimulant sedative; antispasmodic, carminative, expectorant, diaphoretic, and anaphrodisiac. A local anæsthetic. A feeble antiseptic.

Stimulant in the prostration of febrile diseases; sedative in mania, delirium tremens and chordee, also useful in dysmenorrhœa, spasmodic asthma and chronic bronchitis; in hysteria, nymphomania and spermatorrhœa. Spirit of Camphor mixed with warm Water to bathe the nostrils is highly useful in hay fever, and relieves irritation of the nostrils in common cold; also used as an **inhalation.** The **Compound Tincture** is given with Tincture of Squill to allay spasmodic cough in bronchitis and phthisis. In large doses Camphor tends to cause cardiac depression, convulsions, and possibly collapse.

Externally, it is used as a counter-irritant to relieve pain in chronic rheumatism, neuralgia, and as an application to chilblains; also in chronic eczema and other painful skin diseases. The combination with Thymol, Phenol, or Chloral forms a good local anodyne for neuralgia.

10 grammes of 10 p.c. solution of Camphor in Olive Oil hypodermically injected for collapse.—*B.M.J.E.* '95, ii. 63; *P.J.* '95, ii. 380.

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Prescribing Notes.—*An excellent pill can be made by mixing Camphor,* 36 *grains; Curd Soap,* 4 *grains; 'Diluted Glucose,'* 10 *grains; and dividing into* 12 *or more pills as required. Its unpleasant taste is covered well by Milk, which is a good solvent for Camphor. The* **Spirit** *is given on Sugar, also in Milk. Camphor can be powdered quite readily with the addition of a small quantity of Alcohol* (90 *p.c.*).

Symptoms of poisoning by Camphor: convulsions, lividity, stupor, arrest of urinary secretion.

Official Preparations.—Aqua Camphoræ, Linimentum Camphoræ, Linimentum Camphoræ Ammoniatum, Spiritus Camphoræ and Tinctura Camphoræ Composita. Contained in Linimentum Aconiti, Linimentum Belladonnæ, Linimentum Opii, Linimentum Saponis, Linimentum Sinapis, Linamentum Terebinthinæ and Unguentum Hydrargyri Compositum. Of **Linimentum Camphoræ:** Linimentum Chloroformi, Linimentum Hydrargyri, Linimentum Terebinthinæ Aceticum.

Not Official.—Aqua Camphoræ Conc., Camphor Ball, Camphora cum Creta, Camphorated Quinine, Ceratum Camphoræ, Essentia Camphoræ, Spiritus Camphoræ Fortior, Æther Spirituosus Camphoratus, Spiritus Camphoræ Compositus, Syrupus Camphoræ Compositus, Vinum Camphoratum, Essential Oil of Camphor, Eau Sedative, Camphor Salicylate, Oxycamphor, Phenol Camphor, Thymol Camphor, Resorcin Camphor, and Camphoric Acid.

Antidotes.—Stomach-tube or emetics, stimulants freely, and warmth to the extremities.

Foreign Pharmacopœias.—Official in all.

Descriptive Notes.—It occurs in commerce in the form of 'Bells,' in rectangular pieces (Camphor squares) or in a pulverulent condition (Flowers of Camphor). It possesses a characteristic, powerful and penetrating odour and a pungent aromatic taste, subsequently producing a feeling of coldness in the mouth. It is described by the *U.S.P.* as the dextrogyrate modification of the saturated ketone $C_9H_{16}CO$. Squares containing Stearic Acid have been met with on the Continent. Genuine Camphor of Japanese manufacture has often an odour of Saffrol, which is less noticeable in Chinese or Formosa Camphor. Artificial Camphor has usually a faintly terebinthinate odour, and is liable to contain traces of Chlorine. Recently under the name of Pearl Camphor an artificial Camphor made in Germany and having a very pure odour has been offered in commerce in the form of small cylindrical pieces about $\frac{1}{8}$ in. (4 mm.) in diameter.

Tests.—The distinguishing tests for Camphor are its distinctive odour and physical appearance, the specific gravity (which should be 0·995), the melting point, which should be 175° C. (347° F.), and the boiling point, which should be 205° C. (401° F.). The *B.P.* only gives the specific gravity, which it states should be about 0·995; the

U.S.P. gives 0·990 at 25° C. (77° F.); the *U.S.P.* and *P.G.* give the melting point as 175° C. (347° F.); the *U.S.P.* gives the boiling point as 204° C. (399·2° F.); the *P.G.* gives neither specific gravity nor boiling point.

The more generally occurring impurity is mineral matter, which is detected by the residue left on ignition. Artificial or synthetic Camphor is sometimes used, and the *U.S.P.* includes a test for Chlorinated compounds, which are indicative of the synthetic article; the test which is peculiar to the *U.S.P.* is described below in small type under the heading of Silver Nitrate. The solution in Alcohol (90 p.c.) should be neutral to Litmus; should Stearic Acid be present the solution would be acid, and the quantity could be ascertained by determining the Acid value.

Silver Nitrate.—The *U.S.P.* gives the following test to detect chlorinated products. If a small piece of Camphor be dropped into a small porcelain dish, and a clean beaker moistened on the inner surface with Distilled Water be inverted over the smaller dish immediately after igniting the Camphor, a part of the products of combustion will be absorbed by the Water; if the beaker be rinsed with a little Distilled Water and the liquid filtered, the filtrate should yield no turbidity upon the addition of a few drops of Silver Nitrate T.S.

Preparations.

AQUA CAMPHORÆ. Camphor Water.

Dissolve 70 grains of Camphor in Alcohol (90 p.c.) *q.s.* to form $\frac{1}{2}$ fl. oz.; add this gradually to 160 oz. of Distilled Water, with agitation to form a solution. (1 in 1000)

The solution of the Camphor in Alcohol saves time and ensures a more uniform product. The alcoholic solution of Camphor may be kept ready for use.

Dose.—1 to 2 oz. = 28·4 to 56·8 c.c. = $\frac{7}{16}$ to $\frac{7}{8}$ grain of Camphor.

Foreign Pharmacopœias.—Official in Belg., Camphor 2, Alcohol 4, Water 994; Dan. (Mistura Camphorata), contains Camphor, Alcohol, Mucilage of Acacia, Syr. Cerasi and Water; Norw. (Emulsio Camphoræ), Camphor, Mucilage of Acacia, and Water; Port., Camphor 1, Water 100; Span. (Emulsio Alcanforado), Camphor, Sweet Almonds, Powdered Sugar, and Water; Swed. (Emulsio Camphoræ), Camphor, Gum Acacia, and Almond Emulsion; U.S., dissolve 8 of Camphor in 8 c.c. of Alcohol (95 p.c.) and triturate the solution with 15 of Purified Talc, and, after allowing the greater part of the Alcohol to evaporate spontaneously, continue the trituration with Distilled Water gradually added to make 1000 c.c.; then pour the mixture upon a well wetted filter, and pass the filtrate through the filter repeatedly until the Camphor Water is perfectly clear. Not in the others.

LINIMENTUM CAMPHORÆ. Liniment of Camphor. *B.P.Syn.*—Camphorated Oil.

A yellow oily fluid, possessing a strong characteristic odour of Camphor, prepared by dissolving 1 of Camphor in flowers, in 4 of Olive Oil. (about 1 in 5)

Solution will be more readily effected if the Camphor is sifted before using, and if the oil is warmed to about 38° C. (100·4° F.); agitating in a bottle or covered vessel to prevent vaporisation of the Camphor.

Foreign Pharmacopœias.—Official in Dan., Jap., Norw. and Swed., 1 and 4; with Olive Oil; Belg., 1 and 9; with medicinal oil; Dutch (Solutio Camphoræ Oleosa), Fr., Ger., Ital., Span. (Aceite Alcanforado), and Swiss, 1 and 9, all with Olive Oil; Port., 1 and Almond Oil 9; Austr. (Oleum Camphoratum), 1 and 3; Mex. (Aceite Alcanforada), 1 in 9; Hung., 1 and 2; Russ., 1 and 9; all with Sesame Oil; U.S., 1 and Cotton Seed Oil 4. All by weight. Ger. also includes Oleum Camphoratum Forte, 1 and 4.

Tests.—Camphorated Oil has a specific gravity of 0·920 to 0·926, and should theoretically contain 21·45 p.c. w/w of Camphor, which may be determined by heating a definite weight of the sample in a flat-bottomed dish on a water-bath until it ceases to lose weight. Olive Oil is stated (*Analyst* xxiii. 281) to suffer a gain in weight of 0·15 p.c. when heated for two hours at 120° C. (248° F.), and hence this figure should be added to the loss in weight when testing the samples under those conditions in order to obtain the true amount of Camphor present. But it has been subsequently shown (*C.D.* '01, i. 168) that it is best to make no such correction but to take the percentage of loss in weight as equal to the quantity of Camphor present.

Samples of the Liniment are frequently deficient in Camphor, and the loss of Camphor by volatilisation has been pleaded in justification of such deficiency, but it is generally conceded that if properly prepared it will not, when kept under ordinary conditions, lose any appreciable amount. The *U.S.P.* uses Cotton Seed Oil in the preparation of the Liniment, and Sesame Oil is employed by some of the Foreign Pharmacopœias. Mineral Oil or a mixture of a mineral and vegetable oil has been used as an adulterant, but their presence is readily detected by determining the percentage of Potassium Hydroxide required to saponify the residue remaining after the volatilisation of the Camphor. The refractive index of the oil is apparently almost unaffected by the presence of dissolved Camphor (*Analyst* xxv. 202), and the refractometer may be employed for the identification of the oil used. It is shown (*C.D.* '01, ii. 390) that the substitution of other oils for Olive Oil may, with the exception of Arachis Oil, be readily detected. The determination of the optical activity has also been suggested (*Analyst* xxv. 202) as a means of ascertaining the percentage of Camphor present in a sample. The rotation is increased by nearly 1° for each percentage of Camphor present, and the observed rotation of a sample in a 200 mm. tube gives at once, without calculation, the percentage of Camphor with sufficient accuracy for most purposes. It has been pointed out (*C.D.* '01, i. 167) that they show a slight over-estimation, the error varying with the amount of Camphor present; when 25 p.c. of Camphor is present the division will be 0·998, while with 1 p.c. it will be 0·987.

LINIMENTUM CAMPHORÆ AMMONIATUM. Ammoniated Liniment of Camphor. *B.P.Syn.*—Compound Liniment of Camphor. *N.O.Syn.*—Linimentum Ammoniatum Camphoratum.

Camphor, 5; Oil of Lavender, ¼; Strong Solution of Ammonia, 10; Alcohol (90 p.c.), *q.s.* to make 40. (1 in 8)

Dissolve the Camphor and the Oil in a portion of the Alcohol (about 24) and add the Ammonia gradually with agitation. The Camphor which is at first thrown out will readily redissolve. Add Alcohol *q.s.* to make 40.

Rubefacient and counter-irritant. Most useful in tic-douloureux and chronic rheumatism. Painful neuralgia is relieved by applying lint previously soaked in the liniment, covering with a dry napkin until redness is produced, then lightly rubbing the part with Laudanum or Liquor Meconicus.

Foreign Pharmacopœias.—Official in Belg. (Linimentum Ammoniacale Camphoratum), Liquid Ammonia 1, Camphorated Oil 9; also (Camphoræ Linimentum Compositum), Spirit of Soap 700, Spirit of Camphor 250, Liquid Ammonia 30, Oil of Rosemary 15, Oil of Thyme 5; Dan., Solution of Ammonia 5, Camphor 1, Rape Oil 14; Fr., Solution of Ammonia 1, Camphorated Oil 9; Ger., Solution of Ammonia 1, Camphorated Oil 3, Poppy Oil 1; Ital., Solution of Ammonia 1, Camphorated Oil 4; Mex., Solution of Ammonia 1, Camphorated Oil 9; Norw., Solution of Ammonia 2, Camphorated Oil 1, Rape Oil 2; Port., Liquid Ammonia 1, Camphorated Oil 4; Russ., Solution of Ammonia 1, Camphorated Oil 3, Sesame Oil 1; Span., Solution of Ammonia 1, Camphorated Oil 9; Swed. and Swiss, Solution of Ammonia 1, Camphorated Oil 3. All by weight. Not in the others.

Linimentum Ammoniæ cum Camphora.—Solution of Ammonia, 25; Liniment of Camphor, 25; Olive Oil, *q.s.* to produce 100.—*B.P.C. Supplement.*

SPIRITUS CAMPHORÆ. Spirit of Camphor. *N.O.Syn.*—Tinctura Camphoræ.

Camphor, 1; Alcohol (90 p.c.), *q.s.* to make 10. (1 in 10)

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Foreign Pharmacopœias. — Official in Austr., Belg., Dan., Dutch (Solutio Camphoræ Spirituosa), Fr. (Teinture de Camphré Conc.), Ger., Ital., Jap., Norw., Port., Swed., Swiss and U.S., 1 in 10; Hung., about 1 in 7; Russ., 1 in 13; Mex. (Alcohol Alcanforada), 1 and 19; Span., 1 and 24; Fr. has also a Teinture de Camphre faible, Camphor 1, Dilute Alcohol 39. All by weight except U.S.

Tests.—Spirit of Camphor has a specific gravity of 0·843 to 0·847. It should contain 10 p.c. w/v of Camphor, which may be determined by its optical rotation.

A paper on the determination of Camphor in Spirit of Camphor appears in *C.D.* '99, i. 154.

A process requiring less manipulative skill, and which is claimed to give very exact results, appears in *Y.B.P.* '01, 47. A weighed quantity of 10 grammes of the spirit is introduced into a 50 c.c. burette, graduated in $\frac{1}{10}$ c.c. and shaken with 30 to 35 c.c. of a saturated solution of Sodium Chloride. 1 c.c. of Petroleum Ether is dropped on the Camphor layer when it has collected as much as possible on the surface, and solution of the Camphor effected by careful agitation. After several minutes the volume of the Benzin solution can be read off. After subtracting the volume of added Benzin each further 1·02 c.c. will correspond to 1 gramme of Camphor (sp. gr. 0·98).

TINCTURA CAMPHORÆ COMPOSITA. Compound Tincture of Camphor. *B.P.Syn.*—Paregoric. Paregoric Elixir.

Tincture of Opium, 585 minims; Benzoic Acid, 40 grains;

Camphor, 30 grains; Oil of Anise, $\frac{1}{2}$ fl. drm.; Alcohol (60 p.c.), *q.s.* to make 20 fl. oz.

Dissolve the Benzoic Acid, Camphor, and Oil of Anise in a portion of the Alcohol (about 17 or 18); add the Tincture and finally Alcohol *q.s.* to make 20 fl. oz.

B.P. 1898 replaced the 40 grains of Opium by the corresponding quantity of Tincture of Opium, 585 minims, as previously suggested in the *Companion.*

The Pimpinella Oil is preferable as being more soluble in Alcohol (60 p.c.).

Dose.—30 to 60 minims = 1·8 to 3·6 c.c. = $\frac{1}{8}$ to $\frac{1}{4}$ grain Opium.

30 minims contain about $\frac{1}{80}$ grain of anhydrous Morphine (about $\frac{1}{60}$ grain of Morphine Hydrochloride), corresponding to 0·046 p.c. w/v of anhydrous Morphine.

The *Brussels Conference* agreed that Tinctura Opii Benzoica, the equivalent in the Foreign Pharmacopœias of our Compound Tincture of Camphor shall contain 0·05 p.c. w/w of Morphine. Tinctura Camphoræ Co. *B.P.* contains 0·05 p.c. (more correctly 0·046 p.c.) w/v of anhydrous Morphine.

Official Tincture of Opium contains 0·75 p.c. of anhydrous Morphine.

Foreign Pharmacopœias.—Official in Belg. (Opii Tinctura cum Acido Benzoico), Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Anethol 2, Alcohol (70 p.c.), 940; Dan. (Tinctura Thebaiaca Benzoica), Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 2, Diluted Alcohol 940; Dutch (Tinctura Opii Benzoica), Tincture of Opium 10, Benzoic Acid 4, Camphor 2, Oil of Anise 1, Diluted Alcohol 183; Fr. (Elixir Paregorique), Opium 5, Benzoic Acid 5, Camphor 2, Oil of Anise 5, Alcohol (60 p.c.), 985; Ger. and Russ. (Tinctura Opii Benzoica), Opium 1, Benzoic Acid 4, Camphor 2, Oil of Anise 1, Diluted Alcohol 192; Jap., Opium 1, Benzoic Acid 4, Purified Camphor 2, Fennel Oil 1, Diluted Alcohol 192; Norw. (Tinctura Opii Benzoica), Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 2, Diluted Alcohol 940; Mex. (Tinctura de Opio Alcanforado), Extract of Opium 3, Benzoic Acid 3, Camphor 2, Oil of Anise 3, Alcohol (60 p.c.) to 600; Port. (Tinctura de Opio Composta), Opium 1, Benzoic Acid 1, Camphor 1, Oil of Anise 1, Alcohol (65 p.c.) 196; Swiss, Tincture of Opium 10, Benzoic Acid 1, Camphor 1, Oil of Anise 1, Diluted Alcohol 187; U.S. (Tinctura Opii Camphorata), Opium 4, Benzoic Acid 4, Camphor 4, Oil of Anise 4, Glycerin 40, Diluted Alcohol to 1000. All by weight, except U.S. Swed. (Tinctura Opii Benzoica), Opium 5, Benzoic Acid 5, Camphor 3, Oil of Anise 2, Diluted Alcohol to 1000. Belg., Fr. and Swiss adopt the *Brussels Conference* standard.

Tests.—Compound Tincture of Camphor has a specific gravity of 0·915 to 0·920; contains 0·2 to 0·35 p.c. w/v of total solids; the percentage of Absolute Alcohol should be about 58·0 p.c. by volume; 100 c.c. should contain nearly 0·05 gramme of anhydrous Morphine; it should afford well-marked reactions for Benzoic and Meconic Acids, and when diluted with Water should assume an opalescent appearance.

It is frequently found deficient in Alcohol, in the requisite proportion of Tincture of Opium; the Benzoic Acid may be either of inferior quality or altogether omitted, and Oil of Anise may be absent. The specific gravity of the sample affords a fair indication of the percentage of Absolute Alcohol, and may be supplemented if necessary by an actual determination of the Alcohol by distillation. The Benzoic Acid may be determined by rendering 10 c.c. of the Tincture alkaline by the addition of Sodium Hydroxide Solution and removing the Alcohol by evaporation. The aqueous liquid may then be extracted with Ether, the ethereal solution separated, the aqueous fluid faintly acidified with Hydrochloric Acid and again shaken with Ether, the ethereal solution removed, the Ether evaporated spontaneously and the Benzoic Acid weighed, or the ethereal solution may be freed from mineral acid by carefully washing with Water and titrated with Twentieth-normal Volumetric Potassium or Sodium Hydroxide Solution. Each c.c. of Twentieth-normal Solution represents 0·00605 gramme of Benzoic Acid. The separated Benzoic Acid should possess the melting point, and should otherwise correspond to the tests given under Benzoic Acid. Meconic Acid may be detected by diluting a little of the Tincture with Alcohol (45 p.c.) until of a pale straw colour and adding a drop of Ferric Chloride Test-solution, when a deep red coloration will be produced. The quantity of Morphine present is too small to permit the employment of the *B.P.* method of determination. A process depending on the extraction of the Morphine from the evaporated Tincture by hot Amylic Alcohol is described (*Y.B.P.* '05, 461; *Analyst*, '05, 336); the extracted Morphine being subsequently recognised by Ferric Chloride Test-solution and the Nitric Acid colour test. It has been pointed out by Allen (*Analyst*, '02, 352) that cough mixtures, in addition to containing Paregoric, frequently contain Ipecacuanha in some form or other, and the alkaloids of the latter are liable to be mistaken for Morphine if colour reactions alone are relied upon. These colour reactions are given under the heading of Ipecacuanha and Psychotrine. A process for the analysis of the Tincture is recorded, and the use of hot Amylic Alcohol for the extraction of the Morphine is suggested in the paper.

Not Official.

AQUA CAMPHORÆ CONC.—Spirit of Camphor, 3 fl. drm.; Distilled Water, 40 fl. oz.—*Pharm. Form.* (*MacEwan*).

CAMPHOR BALL.—Camphor, 2; White Beeswax, 5; Spermaceti, 3; Oil of Almonds, 3; Tincture of Tolu, ¼; melt and pour into ½ oz. moulds.

The proportion of the Wax to Spermaceti varies in different forms, but the total of the two combined is generally much the same.

CAMPHORA CUM CRETA (Camphorated Chalk).—Camphor, 1; Precipitated Chalk, 8; powder the Camphor by rubbing it with a few drops of Alcohol (90 p.c.), mix in the Chalk, and pass the whole through a sieve.

This is used as a dentifrice, it is also made in the proportion 1 to 7 (*Mart.*) and 1 to 9 (*B.P.C.*).

CAMPHORATED CHLOROFORM. *See* Chloroform.

CAMPHORATED QUININE.—Camphor, in powder, 8 grains; Ammoniated Tincture of Quinine, *q.s.* to make 1 fl. oz.

A very useful combination for an ordinary cold in the head. Dose.—1 to 2 fl. drm.

Camphorated Quinine Capsules.—Quinine Sulphate, 60 grains; Ammonium Carbonate (powdered finely), 100 grains; Powdered Camphor, 50 grains; Soft Paraffin and Liquid Paraffin, *q.s.* to make a thin paste and fill 100 capsules. Each capsule represents about 30 minims of Camphorated Quinine.

CERATUM CAMPHORÆ.—Camphor, 2; White Beeswax, 3; Benzoated Lard, 4; Oil of Almonds, 3: melt together and stir till cold.

U.S.P. Ceratum Camphoræ is much weaker in Camphor:—Camphor Liniment, 10; White Wax, 35; White Petrolatum, 15; Benzoinated Lard, 40; it contains 1 of Camphor in 50.

Belg. (Unguentum Camphoratum), Camphor 1, Simple Ointment 4; Fr. (Pommade Camphrée), Camphor 2, Benzoinated Lard 7, White Wax 1; Mex. (Pomada Alcanforada), Camphor 1, White Wax 1, Lard 8.

B.P.C. **Unguentum Camphoræ.**—Camphor, 1; Soft Paraffin, 9.

B.P.C. **Unguentum Camphoræ Durum** (*Syn.* Camphor Ice).—Camphor, 10; Hard Paraffin, 22; Soft Paraffin, 68.

PHENOL CAMPHOR. *See* ACIDUM CARBOLICUM.

ESSENTIA CAMPHORÆ.—Camphor, 1; Alcohol (90 p.c.), 20. Given for coryza, 5 minims every hour in Water or on Sugar.

This is half the strength of the official Spiritus Camphoræ.

SPIRITUS CAMPHORÆ FORTIOR (Rubini's Essence).—A saturated solution, in Alcohol (90 p.c.), contains about 1 in 2¼.

This has been incorporated in the *B.P.C.* as **Essentia Camphoræ,** with the names Spiritus Camphoræ Fortior, and Rubini's Essence of Camphor as synonyms, as follows:—Camphor, 2; Alcohol (90 p.c.), *q.s.* to make 5.

ÆTHER SPIRITUOSUS CAMPHORATUS.—Camphor 15, Spirit of Ether 85.—*Dan.*, *Norw.* and *Swed.*

SPIRITUS CAMPHORÆ COMPOSITUS (*B.P.C.*).—Camphor, 0·25; Benzoic Acid, 0·50; Oil of Anise, 0·25; Liquid Extract of Liquorice, 1; Alcohol (60 p.c.), *q.s.* to produce 100.

SYRUPUS CAMPHORÆ COMPOSITUS.—Benzoic Acid, 3 drm.; Glacial Acetic Acid, 3 oz. 5 drm. 20 minims; Vinegar of Squill, 2 pints; Vinegar of Ipecacuanha, 40 fl. oz.; Anise Oil, 2 drm.; Camphor, 2 drm.; Tincture of Opium, 10 oz. 5 drm. 20 minims; Sugar, 28 lb.; Burnt Sugar, *q.s.*; Water, to make 4 gall. Dose.—1 drm. (= 1 minim of Tincture of Opium).—*Bristol Royal Infirmary.*

This has been incorporated in the *B.P.C.*

CAMPHOID (Martindale).—Camphor, 20; Absolute Alcohol (by weight), 20; Pyroxylin, 1. Employed as a solvent for Iodoform, the odour of which it is said to disguise.—*P.J.* '92, i. 831; *B.M.J.* '92, i. 1086.

VINUM CAMPHORATUM (*Ger.*).—Camphor, 1; Alcohol (90 p.c.), 1; Mucilage of Acacia, 3; White Wine, 45. *Swiss*, Camphor 2, Alcohol (90 p.c.) 3, Acacia 2, White Wine 93. All by weight.

ESSENTIAL OIL OF CAMPHOR.—Camphor Oil as it is distilled from Camphor Wood contains some quantity of solid Camphor which is separated by filtration and pressure, and sometimes by refrigeration. It has been used as an application in rheumatism.

Two kinds of Camphor Oil are known commercially, Japan and China Camphor Oil.

Japan Camphor Oil.—A yellow or yellowish-brown liquid possessing a strong odour of Saffrol. It has a specific gravity of 1·010 to 1·020, and an optical rotation in a 100 mm. tube of + 5·5°. It dissolves readily in Alcohol (90 p.c.).

A considerable portion of the Saffrol is frequently removed from the oil, which is then commonly known in the trade as 'White Oil of Camphor.' The abstraction of Saffrol is indicated by a decrease in the specific gravity.

China Camphor Oil.—A pale yellow or brownish-yellow liquid, possessing a strong camphoraceous odour. It has a specific gravity of 0·950 to 0·960, and an optical rotation in a 100 mm. tube of about + 30°. It dissolves readily in Alcohol (90 p.c.).

EAU SEDATIVE (Lotion Ammoniacale Camphrée, *Fr.*).—Spirit of Camphor, 10; Liquor Ammon., 60; Sodium Chloride, 60; Distilled Water, 1000.

Belg., Sodium Chloride 60, Liquid Ammonia 60, Spirit of Camphor 10, Water 870; *Mex.*, Sodium Chloride 60, Liquid Ammonia 60, Spirit of Camphor 10, Water 1000; *Swiss*, Sodium Chloride 60, Water 830, Spirit of Camphor 10, Liquid Ammonia 100.

CAMPHOR SALICYLATE (Camphossil).—A crystalline, unctuous, deliquescent mass. Condensation product of Camphor and Salicylic Acid. Introduced as an antiseptic and antipyretic.

Dose.—7½ grains = 0·5 gramme.

OXYCAMPHOR.—A white crystalline powder, soluble about 1 in 50 Water. Has been found useful in cases of dyspnœa, especially of pulmonary origin. Best given in cachets or gelatin capsules. It is easily altered by exposure to air.—*P.J.* '02, ii. 132.

Dose.—15 to 30 grains = 1 to 2 grammes.

Under the name of **Oxaphor,** a 50 p.c. solution of the above in Alcohol (90 p.c.) has been introduced. **Camphoroxol** is stated to be a 1 p.c. alcoholic solution of Camphor containing 3 p.c. Hydrogen Dioxide.

Thymol-Camphor and **Resorcin-Camphor** are oily fluids obtained by heating Camphor with equal parts of Thymol and Resorcin respectively.

CAMPHORIC ACID.—Colourless, crystalline leaflets, or a white, crystalline powder, with a faint camphoraceous odour.

It is a di-basic acid prepared by the oxidation of Camphor. It should be kept in well-closed vessels.

Solubility.—1 in 160 of cold Water; 1 in 8 of boiling Water; 1 in 1·5 of Alcohol (90 p.c.); readily in Ether.

Dose.—15 to 30 grains = 1 to 2 grammes, conveniently given in **cachets.**

Is a valuable remedy in cases of urinary calculi and of vesical catarrh. A 1 p.c. solution has been recommended in acute and chronic affections of the respiratory passages.—*P.J.* (3) xix. 507.

In 4 p.c. alcoholic solutions as spray or linctus, in laryngeal phthisis.

In cystitis, 15 grains 3 times a day.—*Y.B.P.* '02, 167.

One gramme 3 or 4 times a day, or 2 grammes in the evening, checks the night sweating in phthisis.—*L.M.R.* '88, 276.

Foreign Pharmacopœias.—Official in Dutch, Ger., Jap., Swiss and U.S.

Tests.—Camphoric Acid has a melting point of 186° to 187° C. (366·8° to 368·6° F.), and is dextrorotatory, a 10 p.c. alcoholic solution showing a value $[a]_D = +47\cdot8°$. The aqueous solution is acid in reaction towards blue Litmus paper. 1 gramme of the acid should require for neutralisation not less than 10·0 c.c. of Normal Volumetric Potassium or Sodium Hydroxide Solution, indicating not less than 99·31 p.c. of pure Camphoric Acid.

The more generally occurring impurities are Chlorides, Sulphates, Nitrates, and mineral matter. The saturated aqueous solution should not be rendered turbid by Silver Nitrate nor by Barium Chloride Solution. When a solution of Ferrous Sulphate is poured carefully on to the cold saturated aqueous solution of the acid mixed with an equal quantity of Sulphuric Acid, no dark coloration should be developed at the line of junction of the two fluids. It should leave no weighable residue after ignition.

Not Official.

CAMPHORA MONOBROMATA.

MONOBROMATED CAMPHOR.

$C_{10}H_{15}BrO$, eq. 229·33.

Fr., Camphre Monobromé; Ger., Monobromkampher; Ital., Canfora Monobromata; Span., Alcanfor Monobromado.

Colourless, prismatic needles, or scales, with a camphoraceous odour and taste.

It is a substitution product of Camphor, the Hydrogen radicle of the latter being replaced by the halogen Bromine.

It should be kept in well-closed bottles.

Solubility.—Almost insoluble in Water; soluble 1 in 12 of Alcohol (90 p.c.); 10 in 7 of Chloroform; 1 in 2 of Ether; 1 in 8 of Olive Oil; sparingly in Glycerin.

Medicinal Properties.—Hypnotic and sedative. Given in hysteria, epilepsy, chorea, spermatorrhœa, and delirium tremens; but its use requires caution. It has been stated to be an antidote to Strychnine.

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Prescribing Notes.—*It can be prescribed in* **pills** *with 'Diluted Glucose,' or can be dissolved in Almond or Olive Oil and emulsified with Mucilage and Water. It is also given with Extract of Belladonna.*

Larger doses than 5 grains are sometimes given in delirium tremens.

Foreign Pharmacopœias.—Official in Dutch, Fr., Ital., Jap., Mex. (Alcanfor Monobromado), Port., Span. (Alcanfor Monobromado), Swiss and U.S. Not in the others.

Tests.—Monobromated Camphor has a melting point of 76° C. (168·8° F.), and a boiling point of 274° C. (525·2° F.). It should be neutral in reaction towards Litmus paper. When boiled with Silver Nitrate Solution a precipitate of Silver Bromide is formed. It is soluble in cold concentrated Sulphuric Acid without alteration in colour and without decomposition, and is again precipitated when this solution is poured into Water. When fused with metallic Sodium in a dry test-tube and the residue dissolved in Water, the resulting solution acidified with Nitric Acid yields with Silver Nitrate Solution a copious, faintly yellowish precipitate almost insoluble in weak Ammonia Solution.

The more generally occurring impurities are Bromides, Hydrobromic Acid, and mineral residue. The presence of Bromides is readily detected by the formation of an opalescence or precipitate when treated with Silver Nitrate Solution; Hydrobromic Acid by the reaction towards blue Litmus paper. It should be completely volatilised by heat leaving no weighable residue, showing the absence of mineral matter.

CANNABIS INDICA.

INDIAN HEMP.

Fr., Chanvre Indien; Ger., Indischer Hanf; Ital., Canape Indiana; Span., Cañamo.

The dried flowering or fruiting tops of the female plant of *Cannabis sativa*, Linn.; from which, of course, the Resin has not been removed; grown in India.

O'Shaughnessy introduced Indian Hemp into this country, and Peter Squire made the extract for him.

The official variety may consist, according to the official monograph, of either the flowering or fruiting tops, and is frequently of very inferior quality, since the fruiting tops yield less Resin.

Preparations of Cannabis Indica show marked variation in physiological activity, owing to age, and perhaps other causes.

The loss of strength would appear to be due to the oxidation of the active principle. It seems desirable that Indian Hemp used in medicine should be obtained as fresh as possible, and that, as suggested by Dr. Marshall, the drug and its preparations should be preserved in hermetically-sealed packages if they are to be kept for any considerable time before use. The drug should be purchased once a year only, when the new harvest comes in. This is generally in April or May.—*P.J.* '02, i. 342, 362, 392; '02, ii. 131, 263, 284; *C.D.* '02, ii. 296; *Y.B.P.* '02, 52, 168, 401.

A description of the names which are applied to the different forms of the drug, *e.g.*, Ganja, Guaza, Bhang, Chur, Churrus or Charas, Haschish and Majun; and useful hints regarding the collection and storage of the drug.—*P.J.* '02, ii. 131.

The important constituent is a Resin (Extract of Indian Hemp); the active principle is stated to be a red Oil, **Cannabinol**, which is liable to become oxidised and inert. The ethereal extract from Charas yielded four distinct chemical substances: (1) about 1·5 p.c. of a Terpene, boiling at 160° to 180° C. (320° to 356° F.); (2) 2 p.c. of a Sesquiterpene, boiling at 258° to 259° C. (496·4° to 498·2° F.); (3) 0·15 p.c. of a Paraffin, $C_{29}H_{60}$, melting point, 63° to 64° C. (145·4° to 147·2° F.); (4) 33 p.c. of a toxic red oil, Cannabinol, $C_{18}H_{24}O_2$, boiling at 265° C. (509° F.), under a pressure of 20 mm.—*J.C.S. Trans.* '96, 539; '99, 20.

A Cannabinol prepared according to Wood, Spivey and Easterfield's process was found to be physiologically inactive, and it was therefore concluded, though apparently without sufficient reason, that it is not the active principle of Cannabis, and so far as present information extends, the active principle has not yet been isolated.—*C.D.* '02, ii. 296; *P.J.* '02, ii. 131, 171; *Y.B.P.* '02, 399.

Medicinal Properties.—Sedative, anodyne, and antispasmodic. Has been used with success in migraine and delirium, neuralgia, pain of last stages of phthisis, and in acute mania; also in menorrhagia and dysmenorrhœa. It is combined with Belladonna in whooping-cough, and in infantile convulsions, hepatic and renal colic; it is given in tetanus and hydrophobia.

Prescribing Notes.—*Usually prescribed in the form of Extract or Tincture. Dose of the Extract ¼ to 1 grain (with a sufficiency of Liquorice Powder to form a pill); but as it varies considerably in strength it is better to commence with the smaller dose; toxic symptoms have been produced with 1 grain. Dose of the Tincture, 5 to 15 minims, which can be taken on Sugar, or diffused in Water by the aid of 1 fl. drm. of Mucilage of Acacia to each fl. oz. of Water; the Mucilage should be diluted with twice its volume of Water before the addition of the Tincture.*

Two interesting cases of toxic symptoms, caused in one case by taking the whole of the active ingredient of a mixture in the last dose, owing to omission of Mucilage for suspension. The other, a nervous patient, for whom the *B.P.* minimum dose was prescribed, and who took a dose from the bottle without measuring, and inadvertently took rather more than a double dose.—*L.* '03, i. 1042.

Official Preparations.—Extractum Cannabis Indicæ. Of the **Extract,** Tinctura Cannabis Indicæ. The **Tincture** is contained in Tinctura Chloroformi et Morphinæ Composita.

Not Official.—Cannabinæ Tannas, Cannabinon, and Fluidextractum Cannabis Indicæ.

Antidotes.—In case of over-dose, after employing stomach-tube, or emetics, hot brandy-and-water may be given, vegetable acids, such as lemon juice, vinegar, and the like. Strychnine should be injected and a blister applied to the nape of the neck.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Hung., Ital., Jap., Norw. (Fructus Cannabis), Port. (Canhamo), Russ., Mex. (Marihuana), Swed., Swiss and U.S. Not in Ger.

It does not produce constipation or loss of appetite; on the contrary, it restores the appetite which has been lost by chronic Opium and Chloral drinking. —*L.* '89, i. 625.

In chorea and pertussis.—*L.* '02, i. 1159.

Descriptive Notes.—Indian hemp is imported from Bombay under the name of Guaza, in compressed or flattened masses, consisting of the flowering and fruiting tops of the plant, matted together with its resinous secretion. From Calcutta it is sometimes imported in a rolled or cylindrical form under the name of Ganja (*P.J.* (4) xv. 129; xi. p. 782) but this form, which is much more active, rarely remains in this country, being exported to the West Indies (*P.J.* (4) x. p. 522.) The best quality of either kind is seldom exported from India, since the natives are aware that it rapidly loses its activity on keeping and therefore retain the current crop for home use, exporting that of the previous year (*P.J.* (4) xiv. p. 342). The form of the drug official in the *B.P.* is the compressed form of Guaza. The upper leaves which accompany the flower are alternate and 1–3 partite, whilst the lower leaves have 5–7 linear serrate leaflets and are opposite. The bracts as well as the leaves have characteristic resin glands and one-celled curved hairs with a cystolith contained in the enlarged base of each. The bract below the fruit is ovate-lanceolate.

During the last few years compressed Cannabis Indica has been imported from Zanzibar, Delagoa Bay, and from the North of France, but according to Dr. W. E. Dixon is not nearly so active as the Indian drug (*P.J.* (4) xx. p. 550). This difference in strength is said to be due to the fact that the female plant yields less resin if male plants are present in the fields. In India the male plants are always removed before the plant flowers by experts employed for that purpose.

Tests.—Three typical samples of Ganja, collected at the proper season and imported direct from India, when examined in the author's laboratory yielded a total extract to Alcohol (90 p.c.) of 15·52, 15·77 and 16·85 p.c.; when evaporated to dryness and again dissolved in spirit the Alcohol-soluble matter amounted to 14·45, 14·75 and 16·7 p.c., leaving 1·07, 1·02 and 0·68 p.c. of insoluble brown extract. The ash of the 3 samples amounted respectively to 12·70, 12·30 and 11·90 p.c.

Preparations.

EXTRACTUM CANNABIS INDICÆ. Extract of Indian Hemp.

Exhaust Indian Hemp, in coarse powder, with Alcohol (90 p.c.) by percolation; evaporate to a soft extract.

Dose.—$\frac{1}{4}$ to 1 grain = 0·016 to 0·06 gramme.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Hung., Ital., Jap., Mex. (Extracto de Marihuana), Port., Russ., Swiss and U.S. Not in the others. U.S. has also **Fluidextractum Cannabis Indicæ** (1 in 1).

Commercial extracts have been shown (*P.J.* '02, i. 234, 281, 301) to vary greatly in their physical characters, and to contain a doubtful and variable amount of extractive matter insoluble in Alcohol (90 p.c.). The use of an ethereal instead of the official extract, or, better still, one made with Absolute Alcohol, is suggested. Spiritus Ætheris *B.P.* is recommended as a menstruum for preparing the Tincture.

TINCTURA CANNABIS INDICÆ. Tincture of Indian Hemp.

Dissolve 1 of Extract of Indian Hemp in 18 of Alcohol (90 p.c.); filter if necessary, and add Alcohol (90 p.c.), *q.s.* to yield 20.

(1 in 20)

22 minims contain 1 grain of Extract.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

Foreign Pharmacopœias.—Official in Jap. and Port., 1 Extract in 20; the following are from Herb: Hung., Ital. and Mex., 1 in 5; Russ. and Swiss, 1 in 10; all by weight; U.S., 1 in 10. Not in the others.

Tests.—Tincture of Cannabis Indica has a specific gravity of 0·845 to 0·850; it contains about 4 p.c. w/v of total solids and about 87 p.c. w/v of Absolute Alcohol.

Not Official.

FLUIDEXTRACTUM CANNABIS INDICÆ (*U.S.*).—10 of Cannabis Indica, in No. 30 powder, exhausted by percolation with Alcohol (94·9 p.c.), reserving the first 9, evaporating the remainder (not above 50° C.) to a soft extract which dissolve in reserved portion, and add Alcohol (94·9 p.c.) *q.s.* to make 10.

CANNABINÆ TANNAS.—An amorphous, yellowish powder, sparingly soluble in Water, Alcohol, and Ether. Soluble in acidulated Alcohol.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme, mixed with Sugar and taken as a powder or in a **cachet.**

Was introduced as a hypnotic, but its effects are very uncertain.—*T.G.* '85, 329, 379.

It is occasionally prescribed for menorrhagia.

CANNABINON.—A soft resinous substance, generally found as a 10 p.c. trituration with Milk Sugar, also introduced as a hypnotic, but the dose (1½ grains) was followed by excitement, collapse, and cramps.—*T.G.* '85, 286; *L.M.R.* '86 434; contra-indicated in cardiac disease.—*L.* '87, i. 542.

Dose.—¼ to 1 grain = 0·016 to 0·06 gramme.

CANTHARIS.

CANTHARIDES.

FR., CANTHARIDE; GER., SPANISCHE FLIEGEN; ITAL., CANTARIDE;
SPAN., CANTARIDA.

The dried Beetle, *Cantharis vesicatoria*, Latr.

It is collected in Spain, France, Russia, Sicily, and Hungary.

The powder should be dry and kept closely corked, for if at all damp it is apt to acquire a putrid odour. A piece of Camphor kept in it prevents mites.

Mylabris.—The dried beetle, *Mylabris phalerata*, is official in the *Ind.* and *Col. Add.* for India and the African and Eastern Colonies; other species of *Mylabris* may be used provided they yield an equal amount of Cantharidin.

Medicinal Properties.—Externally its effects are rubefacient and irritant; by continued application it is vesicant. For the latter purpose the Emplastrum or Liquor Epispasticus is used, and is especially effective in inflammation of deep-seated parts, as in pleuritis, pericarditis, pneumonia, sciatica, neuralgia, and over the præcordial region in acute rheumatism; applied to rheumatic joints it removes pain and swelling; applied over the epigastrium it often checks obstinate vomiting and gastric pain. It acts for a longer period, and is less irritating to the patient, than Ammoniacal or Acetic Acid embrocations. It ought not to be applied to a paralysed limb. Internally in small doses it is diuretic and aphrodisiac. It is given in gleet, in impotence, and incontinence of urine due to paralysis, but it should be given cautiously, for it irritates the kidneys and sometimes produces strangury, and it should never be given to aged people or to children, or in cases of nephritis.

Continuous counter-irritation of the spine by blisters in the neighbourhood of the cervical and lumbar enlargements the most successful treatment of rheumatoid arthritis.—*L.* '07, ii. 895.

The Tincture in 5-minim doses three times daily in Water arrests hæmorrhage from the kidney.—*B.M.J.* '98, ii. 1551.

It is the basis of most of the applications used to increase the growth of hair.

In chronic inflammation of the bladder it should *not* be used as a counter-irritant, on account of its irritating effects on the urinary organs, when absorbed. In such cases a solution of Silver Nitrate (½ drm. to 1 fl. oz. of Water) is to be preferred.

Thirty-two cases out of 56 of cystitis cured by teaspoonful doses of the following solution: Cantharidin, 1 milligramme, dissolved in 1 gramme of Alcohol, and diluted to 100 grammes with Water.—*B.M.J.E.* '95, ii. 6.

Ph. Ger. maximum single dose, 0·05 gramme; maximum daily dose, 0·15 gramme.

Official Preparations.—Acetum Cantharidis, Emplastrum Calefaciens, Emplastrum Cantharidis, Liquor Epispasticus, Tinctura Cantharidis, and Unguentum Cantharidis. Collodium Vesicans is prepared from Liquor Epispasticus.

Not Official.—Cantharidin, Potassium Cantharidate, Charta Epispastica, Emplastrum Vesicans, Linimentum Crinale, Liquor Cantharidis Concentratus, Unguentum Stimulans, and Boni's Blister.

Antidotes.—Emetics or stomach-tube, followed by Barley Water, Gruel, white of Egg; inject Morphine for pain.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—The dried beetle, *Cantharis vesicatoria*, Latr., has shining coppery green, or green coloured wing cases, and is of an oblong shape, 18 to 25 mm. long (1·5 to 3 cm., and 6 to 8 mm. broad, *P.G.*), and has an unpleasant odour. The insects or powder should be dried when received into stock (preferably in the presence of quicklime) at a temperature not exceeding 40° C. and kept from access of air in a stoppered bottle, the glass stopper being smeared with Vaseline, or they will be destroyed by mites and undergo partial decomposition. The *Mylabris phalerata*, Pall., which is given in the *Ind.* and *Col. Add.* as a permissible substitute for Cantharis in India and the African and Eastern Colonies, has elytra or wing cases, which are black with two wavy or orange-brown transverse bands, and a large spot of the same colour at the base of each elytron. It is oblong, 25 mm. or more in length and 9 mm. in breadth. Other species containing 'the same percentage' of Cantharidin as *M. phalerata* (amount not stated) may be also employed for official preparations in those countries. Under the name of Chinese Cantharides it is occasionally found in English commerce, mixed largely with the smaller species, *Mylabris Cichorii*, Fabr., these insects forming a cheap source of Cantharidin, but the *M. Cichorii* contains less than *M. phalerata*. *M. bifasciata*, Oliv., a Cape of Good Hope insect yields about 1 p.c. of Cantharidin. The new crop of Cantharides can be purchased in early autumn. The *U.S.P.* requires that Cantharides should be thoroughly dried at a temperature not exceeding 40° C. (104° F.) and that the powder should contain few or no hairs; but the insect itself is hairy. The microscopical characters of powdered Cantharides are given in *P.J.* (4) xxv. p. 185.

Tests.—Numerous processes have been devised for the determination of Cantharidin. That adopted by the *P.G.* is essentially as follows:—A weighed quantity of 25 grammes of the powdered Cantharides is treated with 100 grammes of Chloroform and 2 c.c. of Hydrochloric Acid; the mixture is allowed to stand for 24 hours with occasional agitation, and 52 grammes of the Chloroform solution is filtered off through a dry, closely-covered filter. The Chloroform is distilled off and the residue is treated with 5 c.c. of Petroleum Ether; allowed to stand for 12 hours with occasional shaking, the liquid filtered through a 5 cm. filter paper, which has previously been weighed after extraction with Petroleum Ether; the residue is washed on to the filter with 10 c.c. of Petroleum Ether without endeavouring to detach the crystalline residue adhering to the flask. Both the flask and the filter are washed with Water containing a drop or two of Ammonium Carbonate Solution (1 of Ammonium Carbonate in 3 by weight of Water and 1 part by weight of Ammonia Solution) till the washings are colourless; then washed with 5 c.c. of Water dried and weighed. The crystalline residue should amount at least to 0·1 gramme corresponding to 0·8 p.c. w/w of Cantharidin.

This standard is considered (*P.J.* '01, ii. 715) to be too high; the average yield of commercial Spanish flies is nearer 0·6 p.c.

Mylabris Cichorii is richer in Cantharidin than Cantharides, and the use of these flies as a source of the vesicant has therefore been suggested. The employment of Cantharidin in place of Cantharides for the production of the galenical preparations has been advocated in several quarters. If this view were supported by clinical evidence it would obviate the difficulties encountered by the variations of commercial samples, and would enable other species of Cantharis possibly containing a larger percentage of the active principle to be utilised. The new Belgian Pharmacopœia employs Cantharidin for the preparation of an ointment.

The ash of Cantharides should not exceed 8·0 p.c.

Preparations.

ACETUM CANTHARIDIS. Vinegar of Cantharides.

Cantharides, bruised, 2; Glacial Acetic Acid and Distilled Water, mixed in equal volumes, *q.s.* to yield 20; by maceration for 24 hours and subsequent percolation. (1 in 10)

A corresponding preparation, **Acetum Mylabridis,** is official in the *Ind. and Col. Add.* for India and the African and Eastern Colonies.

It has been suggested (*P.J.* '98, i. 259; *C.D.* '98, i. 422) to replace Cantharides by Cantharidin, dissolving 1 of Cantharidin in 200 of Glacial Acetic Acid and adding Acetic Acid *q.s.* to yield 2000. This formula has been incorporated in *B.P.C.* under the title **Acetum Cantharidini.**

Foreign Pharmacopœias.—Official in Port., about 1 in 6; Dutch (Acetum Mylabridis), 1 in 10. Not in the others.

Tests.—Vinegar of Cantharides has a specific gravity of 1·064 to 1·070, should contain not less than 2·5 p.c. w/v of total solids, and 1 c.c. should require for neutralisation not less than 8 c.c. of Normal Volumetric Potassium or Sodium Hydroxide Solution, indicating not less than 47·66 p.c. w/v of absolute Acetic Acid.

COLLODIUM VESICANS. Blistering Collodion.

Blistering Liquid, 20; Pyroxylin, ½; dissolve by agitation in a well-closed vessel.

U.S. is made with Flexible Collodion.

See also Cantharidin, below.

Foreign Pharmacopœias.—Official in Dan., Ger., Jap., Mex. (Collodion Cantaridado), Norw., Port., Russ., Swiss and U.S. Not in the others.

EMPLASTRUM CALEFACIENS. *B.P.Syn.*—Warming Plaster.

Infuse 1 of Cantharides, in coarse powder, in 5 of boiling Distilled Water; strain and evaporate to 1⅔ on a water-bath; add Yellow Beeswax, 1; Resin, 1; Resin Plaster, 13; Soap Plaster, 8.

(about 1 in 25)

A corresponding preparation, **Emplastrum Calefaciens Mylabridis,** is official in the *Ind.* and *Col. Add.* for India and the African and Eastern Colonies.

EMPLASTRUM CANTHARIDIS. Cantharides Plaster.

Cantharides, in powder, 7; Yellow Beeswax, 4; Lard, 4; Resin, 4; Soap Plaster, 1. (nearly 1 in 3)

Melt the Resin first, and add to it the plaster, Wax, and Lard; when all are completely fluid add the Cantharides gradually with stirring, continuing the same until cold.

A corresponding preparation, **Emplastrum Mylabridis,** is official in the *Ind.* and *Col. Add.* for India and the African and Eastern Colonies.

It has been suggested (*P.J.* '98, i. 259; *C.D.* '98, i. 422) to replace Cantharides by Cantharidin, dissolving 1 of Cantharidin in Chloroform *q.s.* and stirring it with 999 of a mixture in equal parts of Yellow Wax, Prepared Suet, and Resin. The solution is stirred into the melted mixture and the Chloroform should be dissipated in the formation of the plaster. This formula has been incorporated in *B.P.C.* under the title **Emplastrum Cantharidini.**

Foreign Pharmacopœias.—Official in Belg., Dutch, Fr., Hung., Ital., Mex., Span. and Swed., about 1 in 3; Austr., Dan., Ger., Jap., Norw., Port., Russ. and Swiss, about 1 in 4. Not in U.S.

Emplastrum Cantharidum Perpetuum, Swiss, 3 in 10; Dan., Nor. and Swed. (Emp. Canth. cum Euphorbio), about 1 in 7; Hung., 1 in 5½; Ital. (Empiastro de Cantaride mite), 1 in 21; Austr., Ger. and Russ., 1 in 10. Not in the others. Norw. includes an Emplastrum Cantharidis Colatum; Ger. includes an Emplastrum Cantharidum pro usu veterinario, about 1 in 5.

LIQUOR EPISPASTICUS. Blistering Liquid.

10 of Cantharides, percolated with Acetic Ether to produce 20 of Liquor. (1 in 2)

A corresponding preparation, **Liquor Epispasticus Mylabridis,** is official in the *Ind.* and *Col. Add.* for India and the African and Eastern Colonies.

Span. has Tintura Cloroformica de Cantaridas, White Wax, 1; Cantharides, 100; Chloroform, *q.s.* to make 100. By weight.

See also Cantharidin, below.

TINCTURA CANTHARIDIS. Tincture of Cantharides.

Macerate 1 of Cantharides, in No. 40 powder, with 80 of Alcohol (90 p.c.). (1 in 80)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.; if frequently repeated, 2 to 5 minims = 0·12 to 0·3 c.c.

Ger. and U.S. are much stronger.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

It has been suggested (*P.J.* '98, i. 259; *C.D.* '98, i. 422) to replace Cantharides by Cantharidin, dissolving 1 of Cantharidin in 100 of Chloroform and adding Alcohol (90 p.c.) *q.s.* to yield 10,000.

This formula has been incorporated in *B.P.C.* with an increase of the Chloroform to 125, under the title **Tinctura Cantharidini.**

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr., Ger., Ital., Jap., Port., Russ., Span., Swed., Swiss and U.S., 1 in 10; Mex., 1 and 10; Hung., 1 and 5. All by weight except U.S.

The *Brussels Conference* adopted a strength of 10 p.c. for the Tincture, employing Alcohol (70 p.c.).

Tests.—Tincture of Cantharides has a specific gravity of about 0·835; it contains about 0·25 p.c. w/v of total solids and about 90 p.c. w/v of Absolute Alcohol.

UNGUENTUM CANTHARIDIS. CANTHARIDES OINTMENT.

Cantharides, bruised, 1; Benzoated Lard, 10: digest at 120° F. (48·9° C.) for 12 hours and strain through calico, using gentle pressure towards the end.

(about 1 in 10)

Employed to promote discharge from a blistered surface. Being very painful this is seldom practised.

A corresponding preparation, **Unguentum Mylabridis,** is official in the *Ind.* and *Col. Add.* for India and the African and Eastern Colonies.

It has been suggested (*P.J.* '98, i. 259; *C.D.* '98, i. 422) to replace Cantharides by Cantharidin, dissolving 1 of Cantharidin in Chloroform *q.s.*, and stirring it into a mixture of 499 of Yellow Beeswax and 2500 Olive Oil (by weight) previously melted. The Chloroform should be dissipated in the formation of the Ointment.

This formula has been incorporated in *B.P.C.* under the title **Unguentum Cantharidini,** in which the proportions are given as 0·0325, 16, and 84.

Foreign Pharmacopœias.—Official in Fr. (Pommade Epispastique Verte), about 1 in 33, and P. E. Jaune, 1 in 17¾; Ger. and Jap., Oil of Cantharides 3, Yellow Wax 2; Port., about 1 in 23; Ital. (Pomata di Cantaridi), 1 in 10; Swed., 1 in 5 (fort., 1 in 4); Span., 3 in 10; Swiss, Cantharidine, 1 in 250; U.S. (Ceratum Cantharidis), 32 in 100; Mex. (Unguento de Canteridas), about 1 in 18. Not in Austr., Dutch or Hung. Ger. and Swiss have Unguentum Cantharidum pro usu veterinario (1 in 5); Belg. (Unguentum Cantharidini, Cantharidin), 1 in 2000; (Unguentum Cantharidis cum Euphorbio), Cantharides, 1 in 5.

Ger. and Jap. have Oleum Cantharidatum; Mex. has Aceite de Cantaridas.

Not Official.

CANTHARIDIN. $C_{10}H_{12}O_4$, eq. 194·62.—White, inodorous, crystalline scales.

Solubility.—1 in 1150 of Rectified Spirit; 1 in 700 of Rectified Ether, sp. gr. 0·720; 1 in 55 of Chloroform; 1 in 150 of Acetic Ether, but even when dissolved at 60° F. part separates on standing; 1 in 200 of Almond Oil; 1 in 65 of Oil of Cloves.

Acetone is the best solvent for Cantharidin, which it dissolves 1 in 40, and as it is cheaper it possesses a double advantage over Acetic Ether. Acetone makes a good Liquor Epispasticus; it also dissolves Pyroxylin, and is therefore suitable for making Collodium Vesicans. Acting upon this suggestion *B.P.C.* have included a **Collodium Cantharidini:**—Cantharidin, 0·35 gramme; Acetone Collodion, *q.s.* to make 100 c.c., but in the *B.P.C. Supplement* the Cantharidin is first dissolved in 30 c.c. of Acetone, then Acetone Collodion added to make up 100 c.c.

Foreign Pharmacopœias.—Official in Belg., Fr., Mex., Port., Span. and Swiss.

Tests.—Cantharidin melts at 218° C. (424·4° F.), and when heated further sublimes in white needles. The aqueous solution is neutral towards Litmus paper. Solutions of Cantharidin possess powerful vesicating properties; it dissolves without change of colour in concentrated Sulphuric Acid, and again separates when diluted with Water. It leaves no residue upon ignition.

POTASSIUM CANTHARIDATE.—Colourless, needle-shaped crystals; soluble in Water; insoluble in Ether and in Chloroform. Should be preserved in well-stoppered bottles.

Liebreich's Solution contains 0·2 gramme Cantharidin and 0·4 gramme Potassium Hydroxide in 1000 c.c. of sterilised Water; 1 c.c. contains 0·0002 gramme Cantharidin in the form of Potassium Cantharidate. **Dose.**—0·5 c.c.; given hypodermically, also internally in diseases of tubercular origin, in lupus and in syphilis; has since been replaced by a tincture made with Cantharidin, 1, in Tincture of Orange Peel, 5000. **Dose.**—0·5 c.c., and never more than 0·75 c.c., mixed with liqueur-glassful of Water.—*B.M.J.* '02, ii. 1231; *P.J.* '02, ii. 708.

Official in Fr., Mex. and Span.

CHARTA EPISPASTICA (*B.P.* 1885).—Powdered Cantharides, 4; White Wax, 16; Spermaceti, 6; Olive Oil, 8; Resin, 3; Canada Balsam, 1; Distilled Water, 24. Conveniently spread on paper ruled in divisions of 1 square inch.

Fr. has Sparadrap Vesicant and Sparadrap de Cantharidate de Potassium.

EMPLASTRUM VESICANS.—Cantharidin, 1; Chloroform, a sufficiency; Yellow Beeswax and Wool Fat, in equal proportions, 499 parts. The Chloroform is used to dissolve the Cantharidin, and is afterwards dissipated on a water-bath. —*University.*

LINIMENTUM CRINALE.—Cantharidin, 1 grain; Acetic Ether, 6 fl. drm.; dissolve and add Alcohol (90 p.c.), 6 fl. oz.; Castor Oil, 2 fl. oz.; Oil of Lavender, 15 minims.

This Liniment is highly recommended for application to the head where the hair is falling off; but after applying it a few times the head should be washed or the Cantharidin may accumulate, and cause too much irritation. It may be diluted with equal parts (or more) of Alcohol (90 p.c.) for delicate skins.

LIQUOR CANTHARIDIS CONCENTRATUS.—1 fl. oz. = 1 oz. of Cantharides. It is obtained by repercolation with Acetic Ether, and is standardised to contain 0·5 p.c. of Cantharidin. This Liquor forms a convenient substitute for Cantharides in making the various preparations; it effects a great saving of time and produces a better result.

Acetone is better as a solvent, but cannot at present be employed for official preparations.

UNGUENTUM STIMULANS (Erasmus Wilson's).—Cantharides, in Powder, 3; Lard, 12; macerate with a moderate heat for twenty-four hours, and filter through paper.

In place of the Cantharides, 6 of Liquor Epispasticus or 3 of Liquor Cantharidis Concentratus may be employed, evaporated to a thin extract, and mixed with the melted Lard.

BONI'S BLISTER.—Camphor, 20; Chloral Hydrate, 30; melt and add powdered Cantharides, 10; digest for an hour at 150° F.; filter.

CAOUTCHOUC.

INDIA-RUBBER.

Fr., Caoutchouc; Ger., Kautschuk; Ital., Caucciù; Span., Caucho.

The prepared milk-juice of *Hevea brasiliensis*, and various other species. The best commercial variety is known as Para rubber.

Official Preparation.—Liquor Caoutchouc. The **Liquor** is used in the preparation of Charta Sinapis.

Foreign Pharmacopœias.—Fr., Ger., Jap., Mex., Span., Swiss and U.S. (Elastica). Not in the others.

Descriptive Notes.—In Brazil Para rubber is obtained from *Hevea brasiliensis*, Muell. Arg., and other species, but in Ceylon from *Hevea brasiliensis* only.

The *B.P.* statement that it is brownish-black externally and mottled with a pale tint internally, except that mottling scarcely describes the gradual paling from the surface to the centre, applies also to Ceylon or biscuit Para rubber; this is now imported and is a remarkably pure product, though deficient in the antiseptic bodies and empyreumatic odour derived from the smoke of burnt Palm nuts that characterises the Brazilian Para rubber. Caoutchouc is easily cut with a knife if first wetted with Water.

Tests.—Caoutchouc melts at about 125° C. (257° F.), which figure is given in both *U.S.P.* and the *B.P.*, the *P.G.* gives 120° C. (248° F.). When melted it forms a fluid or semi-fluid mass, which on strongly cooling again becomes solid and still maintains its stickiness. It is insoluble in Water, Alcohol (90 p.c.) and in dilute solutions of the alkali Hydroxides. It dissolves in Benzol, Carbon Bisulphide, Chloroform, Petroleum, Ether and Oil of Turpentine. This statement must not be taken to mean that the rubber is entirely soluble in these liquids, but when treated with them it swells up and becomes gelatinous and soft, a portion being left in a disintegrated condition. This behaviour would suggest that rubber consists of constituent parts, one constituent part of which dissolves leaving the less soluble part in an insoluble but disintegrated condition.

Preparation.

LIQUOR CAOUTCHOUC. Solution of India-rubber.

India-rubber, 1; Benzol, 10; Carbon Bisulphide, 10.

CAPSICI FRUCTUS.

CAPSICUM.

Fr., Poivre de Guinée; Ger., Spanischer Pfeffer; Ital., Peperone;
Span., Pimiento de Indias.

The dried ripe Fruit of *Capsicum minimum*.

Imported from Zanzibar, Sierra Leone, etc., and distinguished in commerce as Guinea Pepper, Chillies, or Bird Pepper. That from Nepaul has the finest flavour, and the powdered fruit is often preferred to the ordinary Cayenne Pepper.

It yields its virtues to Water, Alcohol, Ether, Acetic Ether, and the fixed and volatile Oils.

Medicinal Properties.—Stomachic and carminative, used chiefly as a condiment. Given in dyspepsia and flatulent distension, and to promote appetite in alcoholism. Used externally as a rubefacient, and counter-irritant in rheumatism and lumbago and for chilblains.

Dose.—$\frac{1}{6}$ to 1 grain = 0·01 to 0·06 gramme in pill.

Tinct. Capsici, 1½ drm. (increased); Tinct. Aurant., 4 drm.; Syr. Aurant., 4 drm.; Quinine Hydrochloride, 6 grains; Water, to 6 oz. Take a tablespoonful as required, three to four times a day, in dipsomania.

Official Preparations.—Tinctura Capsici, and Unguentum Capsici. The **Tincture** is contained in Tinctura Chloroformi et Morphinæ Composita.

Not Official.—Emplastrum Capsici, Extractum Capsici Liquidum, Gossypium Capsici, Linimentum Capsici, Liquor Capsici Compositus, Oleo-resinæ Capsici, Tinctura Capsici Ætherea, Tinctura Capsici Fortior, Unguentum Oleoresinæ Capsici, and Capsicum with Wool Fat.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Ger., Jap., Mex. (Chile), Port. (Pimentao), Russ., Swed., Swiss and U.S. Not in the others.

Descriptive Notes.—The fruits of *Capsicum minimum*, Roxb., which are officially called Capsicum, are known in commerce as Chillies or Bird Pepper; they vary considerably in pungency and colour. Those of Sierra Leone are usually yellowish-red, without pedicel or calyx, and are the most pungent of all. Those from Zanzibar are redder and usually have the stalk and calyx attached, and are somewhat less pungent. The Japanese are bright red, much less pungent, and the larger variety exceeds the dimensions given in the *B.P.* Like all ordinary Capsicum fruits the pericarp is glabrous, translucent and coriaceous; the seeds are flat and 10 to 20 in number. The official description limits it to those having the following characters:—Colour, dull orange-red; shape, oblong-conical and obtuse; size, ½ to ¾ in. (12 to 20 mm.) long, and ¼ in. (6 mm.) in diameter; the calyx and slender peduncle may be present or not. The bright red Cayenne Pepper of commerce is usually prepared from Natal or Egyptian varieties of *Capsicum annuum*, L., which are eight or nine times as large as the fruit of *Capsicum minimum*. Nepaul Cayenne Pepper is usually of yellowish-brown tint, and has an odour of Violets, and is prepared from the yellowish-red fruit of the Nepaul variety of *Capsicum annuum*. The bright red Bird Pepper that is given to canaries, and has hardly any pungency, is prepared from the fruit of *Capsicum annuum* var. *grossum*, Sendtn., grown in Spain, and known there as 'Pimento' or from the fruit of *Capsicum tetragonum*, Miller, grown in Hungary, and known there as 'Paprika.' In both countries the fresh fruit is used as a condiment with food. Coconada Capsicums are stated to be the produce of *Capsicum annuum*, L., var. *abbreviatum*, Fingerh., and Natal and Indian Capsicums of the var. *acuminatum*, Fingerh. The bright red Cayenne Pepper of commerce is largely made from the variety imported from Natal. J. E. Wallis has shown that the powder of *Capsicum minimum*, *Capsicum annuum*, and Japanese Chillies can be distinguished under the microscope, and suggests that the following description should be included in the Pharmacopœia as a means of excluding substitutes for, or admixtures with, the official Capsicum:—'The pericarp shows an epidermis of thick and straight-walled rectangular cells which have few pits, are often arranged in groups of 5 or 7 in a row and have an evenly striated cuticle.' (*See Pharm. Jour.* (4) xiii. p. 552; xv. p. 3.) The *U.S.P.* requires that the powdered Capsicum contains few or no starch grains or sclerenchymatous fibres, and refers the fruit to *Capsicum* *fastigiatum*, Blume. The large fruits of *Capsicum annuum*, 5 to 10 cm. long, and 4 cm. at the base, are official in the *P.G.* According to Gerrard, Alcohol (90 p.c.) is the best and most perfect solvent of the active principle of Capsicum (*Y.B.P.* '05, 453; *P.J.* (4) xxi. p. 153). The pungent principle is most abundant in the placenta which yields 0·9 p.c., the rest of the fruit yielding only 0·2 p.c. The powder of Capsicums soon becomes mouldy, if not kept dry.

Tests.—Capsicum leaves about 6·0 p.c. of ash, which figure should not be exceeded.

Preparations.

TINCTURA CAPSICI. TINCTURE OF CAPSICUM.

Macerate 1 of Capsicum, in No. 20 powder, with 20 of Alcohol (70 p.c.). (1 in 20)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

Foreign Pharmacopœias.—Official in Belg., 1 and 10; Mex., 1 in 5; Dan. and Dutch, 1 and 10; Ger., Jap., Russ., Swed. and Swiss, 1 in 10; all by weight. U.S., 1 in 10. Not in the others.

Tests.—Tincture of Capsicum has a specific gravity of about 0·895; contains from 0·7 to 1·5 p.c. w/v of total solids and about 70 p.c. w/v of Absolute Alcohol.

UNGUENTUM CAPSICI. CAPSICUM OINTMENT.

Bruised Capsicum, 120 grains; Spermaceti, 60 grains; Olive Oil (by weight), 1 oz.; strain after digestion on a water-bath for one hour.

It has been suggested to use half the quantity of Liquid Extract of Capsicum (2 in 1) in place of Capsicum.

Not in the Foreign Pharmacopœias.

Not Official.

CAPSICUM WITH WOOL FAT.—1 of Liquid Extract of Capsicum (2 in 1), incorporated with 9 of Hydrous Wool Fat. This was suggested by Gerrard as an improvement on the ointment.

EMPLASTRUM CAPSICI (*Gerrard*).—Liquid Extract of Capsicum (2 in 1), 10; Resin Plaster, 95; evaporate the Alcohol and mix the residue with the plaster. This formula closely resembles that incorporated in *B.P.C.*

EMPLASTRUM CAPSICI (*U.S.*).—Apply a thin coating of Oleo-resin of Capsicum, by means of a brush, so as to form a thin coating over an area 15 centimetres square, leaving a margin round the sides.

EXTRACTUM CAPSICI LIQUIDUM (*Gerrard*).—Exhaust 100 of Capsicum Fruit in No. 60 powder with Alcohol (90 p.c.); distil off the Alcohol until the needed extract weighs 50. This has been incorporated in *B.P.C.* Fluidextractum Capsici (*U.S.P.*) is half this strength.

GOSSYPIUM CAPSICI.—Gerrard's form is to saturate evenly 9 of Cotton-Wool under pressure, with a mixture of 2 of Liquid Extract of Capsicum (2 in 1) and 7 of Alcohol (90 p.c.), and then dry. It is coloured with Eosin to keep the colour more uniform. *B.P.C.* formula is just half the strength of this.

LINIMENTUM CAPSICI.—Stronger Tincture of Capsicum, 35 c.c.; Oleic Acid, 12·5 c.c.; Oil of Lavender, 0·625 c.c.; Alcohol, *q.s.* to make 100 c.c. This preparation corresponds to Linimentum Capsici, *B.P.C.*, and to the Liniment recommended in Martindale, 1906.

LIQUOR CAPSICI COMPOSITUS (*Austr.*) Linimentum Capsici Compositum.—Powdered black Pepper and powdered Capsicum fruit, of each, 100; Potash Soap and Camphor, of each, 25; Alcohol (90 p.c.), 800; digest for eight days, express and add Oil of Rosemary and Eugenol, of each, 5; Cinnamic Aldehyde, 1; Ammonia (10 p.c.), 200.

Linimentum Capsici Compositum (*B.P.C.*). *Syn.* Liquor Capsici Compositus.—Corresponds very closely with the formula previously given in *Pocket Companion*, Liquor Capsici Compositus of *Austr. Add.* 1900, but not with *Austr. Pharm.* 1906, which is given above.

OLEO-RESINA CAPSICI. *Syn.* Capsicin.—The *U.S.P.* percolates Capsicum in No. 40 powder with Acetone, distilling off the Acetone, and straining out the fatty matter which separates, but Gerrard stated (*Y.B.P.* '05, 453) that Alcohol (90 p.c.) is a better solvent. The *B.P.C.* (1907) incorporated the *U.S.P.* process, but in the *B.P.C. Supplement* (1908) it has been amended as suggested by Gerrard. It is a thick liquid of a yellowish-red colour, which becomes very fluid when gently heated, and at a high temperature volatilises. Half a grain only, thus volatilised in a large room, will cause all who respire the air of the room to cough and sneeze. It is soluble in Alcohol, Ether, and Oil of Turpentine.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ minim = 0·007 to 0·03 c.c.

Foreign Pharmacopœias.—Official in U.S.

The active principle of Capsicum has been obtained by Thresh in well-defined, pearly white crystals, to which he has given the name **Capsaicin.**

TINCTURA CAPSICI ÆTHEREA.—Substitute Pure Ether for the Alcohol (90 p.c.), of Tinctura Capsici.—*L.* '90, i. 1066.

TINCTURA CAPSICI FORTIOR (Turnbull's Tincture of Capsicum).—Capsicum, in No. 40 powder, 10; percolated with Alcohol (90 p.c.), *q.s.* to yield 30.—*B.P.C. Formulary* 1901.

This corresponds with Stronger Tincture of Capsicum, *B.P.C.*

Used externally for swollen chilblains as a counter-irritant, but *not* when the skin is *broken*. For **chilblains,** saturate a piece of sponge or flannel with the Tincture, and rub the chilblain well until a strong tingling is produced; continue daily until recovery. A small dossil of Lint or Cotton, dipped into the Tincture, is an excellent remedy for toothache.

Used by aurists to paint behind the ears as a counter-irritant.

Dose.—1 to 3 minims = 0·06 to 0·18 c.c., but principally used externally.

UNGUENTUM OLEO-RESINÆ CAPSICI.—Oleo-resin of Capsicum, 2; Yellow Wax, 1; Benzoated Lard, 8.—*B.P.C. Formulary* 1901.

This corresponds to Unguentum Oleo-resina Capsici, *B.P.C.*

Not Official.

CARBO ANIMALIS.

ANIMAL CHARCOAL. BONE BLACK.

This substance and the purified Animal Charcoal are now deleted from *B.P.* They are used in pharmacy chiefly as decolorising and deodorising agents.

Foreign Pharmacopœias.—Official in Fr., Jap., Mex., Port. and U.S.

CARBO LIGNI.

WOOD CHARCOAL.

Fr., Charbon Végétal Officinal; Ger., Holzkohle; Ital., Carbone Vegetale; Span., Carbon Vegetal Medicinal.

A smooth, black, odourless, tasteless powder prepared by exposing wood to a red heat without access of air.

Oak, Beech, Hazel, Willow, and Poplar are employed.

Medicinal Properties.—Antiseptic, absorbent and deodoriser. Given in cases of distension by intestinal gas, and in foul eructations and diarrhœa in dysentery and typhoid; also in dyspepsia attended with flatus, acidity and pain. It will absorb and neutralise poisonous alkaloids. Externally, as a poultice, it cleanses and absorbs the fetor of ulcers and gangrenous parts.

Dose.—60 to 120 grains = 3·9 to 7·7 grammes.

Prescribing Notes.—*It has been given in powder diffused in Water, also in the form of* **capsules, cachets,** *and* **biscuits.** *The most palatable way is to mix it with* **chocolate.**

Foreign Pharmacopœias.—Official in all except Dan., Jap., Norw. and Swed.; Mex. (Carbón Vegetal).

Tests.—It should, according to the official requirements, leave 7·5 p.c. of ash when burned at a high temperature with free access of air; the *P.G.* permits only an insignificant amount of ash, and that it should burn without flame. The *U.S.P.* includes a test with Potassium Hydroxide Solution which ensures evidence of complete carbonisation.

Potassium Hydroxide.—If 1 gramme be boiled with a mixture of 3 c.c. of Potassium Hydroxide T.S. and 5 c.c. of Water for several minutes, the filtrate should be colourless or nearly so, *U.S.P.*

CARBONIS BISULPHIDUM.

CARBON BISULPHIDE.

B.P.Syn.—CARBON DISULPHIDE.

CS_2, eq. 75·55.

A colourless, very volatile, highly refractive, limpid liquid, having an ethereal and not unpleasant odour when quite pure, but usually possessing a very disagreeable odour due to impurity.

Should be preserved in well-stoppered dark amber-tinted glass bottles, partially filled, or in tin cans, in a cool atmosphere and away from naked flames, and not exposed to light.

It is produced by heating Charcoal and Sulphur together at a high temperature, the crude product being condensed and subsequently rectified.

Solubility.—About 1 in 500 of Water, readily soluble in Absolute Alcohol, Ether (sp. gr. 0·720), Chloroform, and the fixed and volatile Oils.

It is a good solvent for Iodine, Phosphorus, Precipitated Sulphur, etc.

Medicinal Properties.—It is official as a solvent for India-rubber and Phosphorus. It is a powerful poison, and is not often given internally.

1 or 2 oz. daily of a saturated Solution in Peppermint Water have been given as a substitute for Bergeon's treatment of phthisis.—*B.M.J.* '88, i. 421.

A claim has been made that this should not remain in obscurity, but retain its place as a valuable remedy in tuberculosis.—*B.M.J.E.* '04, ii. 72.

Internally in pneumonia, in 5 p.c. aqueous solution hourly.—*B.M.J.E.* '06, ii. 68.

Official Preparations.—Used in the preparation of Liquor Caoutchouc and Pilula Phosphori.

Foreign Pharmacopœias.—Official in Belg., Fr., Port., Span. and U.S. Not in the others.

Tests.—Carbon Bisulphide has a specific gravity of about 1·268, *U.S.P.* gives 1·256 to 1·257 at 25° C. (77° F.); and a boiling point of about 46° C. (114·8° F.); the *B.P.* and *U.S.P.* give 46° to 47° C. (114·8° to 116·6° F.). It burns with a bluish flame, yielding Carbon Dioxide and Sulphur Dioxide as products of combustion.

The more generally occurring impurities are dissolved Sulphur, Sulphur Dioxide, and Hydrogen Sulphide. Dissolved Sulphur is shown by the residue left on evaporation, Sulphur Dioxide by its bleaching action towards moistened blue Litmus paper, and Hydrogen Sulphide by Lead Acetate.

Litmus.—Blue Litmus paper moistened with Water should not be affected by Carbon Bisulphide, *B.P.* and *U.S.P.*

Residue.—When a portion of Carbon Bisulphide is allowed to evaporate spontaneously in a glass vessel, no residue should be left, *B.P.* and *U.S.P.*

Lead Acetate.—Lead Acetate T.S., agitated with Carbon Bisulphide, should not be blackened, *B.P.* and *U.S.P.*

CARDAMOMI SEMINA.

CARDAMOM SEEDS.

Fr., Cardamomes; Ger., Kardamomen; Ital., Cardamomo;
Span., Cardamomo Menor.

The dried, ripened Seeds of *Elettaria Cardamomum*. *B.P.* states that the seeds should be kept in their pericarps, and separated when required for use.

1 of Fruit yields about ¾ of Seeds.

Medicinal Properties.—Stomachic, carminative, and flavouring agent; a useful adjuvant to purgatives to prevent griping.

Official Preparation.—Tinctura Cardamomi Composita. Contained in Extractum Colocynthidis Compositum, Pulvis Cinnamomi Compositus, Pulvis Cretæ Aromaticus, Tinctura Gentianæ Composita, Tinctura Rhei Composita. Of the **Tincture** contained in Decoctum Aloes Compositum, and Mistura Sennæ Composita.

Not Official.—Oleum Cardamomi, Tinctura Cardamomi, Tinctura Carminativa, and Mistura Carminativa.

Descriptive Notes.—The Cardamoms of commerce are derived from several species, but the official kind is limited to the fruits of typical *Elettaria Cardamomum*, Maton, by the measurements given, viz., ⅖ to ⅘ in. (1 to 2 cm.), and by the 'pale buff' colour. The varieties of this Cardamom, as met with in trade, are known as Malabar, Mysore, and Mangalore, whether imported from those districts or from Ceylon, where Cardamoms are largely cultivated. The Malabar variety consists of short, plump, firm capsules well filled with seeds; those of Mangalore are similar, but more or less warty on the surface; and those of Mysore are longer and less compactly filled with seeds, and consequently can be more easily compressed between the fingers. These varieties may also be met with in a bleached form, obtained by moistening them and submitting them to the action of Sulphurous Acid gas, in which case they present a smoother surface, the natural longitudinal striations being somewhat obscured in the process. For galenical purposes the shorter fruits showing the natural striations are to be preferred since their natural colour shows their good quality and their plumpness indicates a large proportion of seed to husk, and seeds more fully matured than in the Mysore kind. The fruits are usually collected before they are quite ripe to prevent the pericarp splitting open. Such partially open fruits as do occur are apparently sorted out and husked by being passed between rollers, or by similar means, since a certain amount of 'split' seed is offered in commerce.

The seeds should not be removed from the pericarps until required for use. The loose seeds obtainable in commerce present the possibility of being obtained from other than the official species, and in any case are likely to be deficient in aroma from exposure to the air.

The distinguishing microscopical characters of the powdered official Cardamoms are the perisperm cells, containing small starch grains, and prismatic Calcium Oxalate crystals, the dark coloured polyhedral cells of the inner integument, and the thick-walled linear cells with oblique ends, of the epidermal layer. The presence of the pericarp in the powder may be detected by the straight-walled, polygonal cells of the epidermal parenchyma, spiral vessels, and small cells containing brown resin.

The other varieties of Cardamom occurring in commerce at more or less regular intervals are the var. *majus* of the official kind, known as Wild Ceylon Cardamom, which have longer, greyish fruits; the Greater or Korarima Cardamom (*Amomum Korarima*, Pereira), which is about 1½ in. (37 mm.) long and ¾ in. (19 mm.) broad at the base, and of a dull brownish colour; the cluster Cardamom (*Amomum Cardamomum*, L.), which is whitish, spherical, nearly smooth, and about ½ in. (12·5 mm.) in diameter; all of these have seeds resembling the true Cardamom in flavour. The Bengal Cardamom (*A. aromaticum*, Roxb.), the Nepaul (*A. subulatum*, Roxb.) and the bitter-seeded Cardamom, all having a brown pericarp, are more rarely imported; but the seeds, freed from the husk, and when offered in commerce in the form of powder for use in pills are not so easy of recognition as the fruit, and are best detected by a microscopical examination, *see P.J.* (4) vi. p. 280. The official seeds are dark reddish-brown and 3 mm. (⅛ in.) in diameter, angular and transversely wrinkled.

Tests.—Cardamoms are officially required to yield not more than 4 p.c. of ash. Determinations of the ash of Pericarps, Seeds, and Pulvis made in the author's laboratory yielded: Pericarps (three samples), 10·4, 12·0, 13·4 p.c.; Seeds (three samples), 2·38, 2·81, 3·85 p.c.; Pulvis (three samples), 7·56, 6·33, 9·93 p.c.; these results seem to indicate that the Pulvis Cardamomi was not obtained from the seeds only as directed in the Pharmacopœia. Even whole fruits had but an average of 5·5 p.c. A maximum ash limit of 6 p.c. has been recommended.

Foreign Pharmacopœias.—The Fruit is official in Austr., Dan., Dutch, Ger., Hung., Jap., Mex. (Cardamomo menor), Norw., Port., Russ., Swed., Swiss and U.S. Not in Ital.

Preparation.

TINCTURA CARDAMOMI COMPOSITA. COMPOUND TINCTURE OF CARDAMOMS.

Cardamom Seeds, bruised, 1 oz.; Caraway Fruit, bruised, 1 oz.; Raisins of commerce, freed from seeds, 8 oz.; Cinnamon Bark, bruised, 2 oz.; Cochineal, in powder, 220 grains; macerated with 80 fl. oz. of Alcohol (60 p.c.). (1 in 80)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in U.S., 1 in 40, contains Glycerin, and is made with the Fruit of the Cardamoms. Not in the others.

Tests.—Compound Tincture of Cardamoms has a specific gravity of 0·945 to 0·950; it contains about 6 p.c. w/v of total solids and about 56 p.c. w/v of Absolute Alcohol.

Not Official.

OLEUM CARDAMOMI.—A pale yellow aromatic oily liquid distilled from Cardamom Seeds; which contain about 4 to 6 p.c.

Tests.—Cardamom Oil is distilled chiefly from Ceylon Cardamoms. It has a specific gravity of 0·933 to 0·943, an optical rotation of + 26° to + 34°, in a 100 mm. tube. It is soluble in 4 parts and more of Alcohol (70 p.c.), and should possess a Saponification value of 132.

Schimmel states that Mysore (Ceylon) Cardamom Oil has a specific gravity of 0·895 to 0·905; but Parry has been unable to confirm these figures and shows that there is practically no difference between the two Oils.

TINCTURA CARDAMOMI.—Cardamom Seeds, bruised, 1; Alcohol (60 p.c.), *q.s.* to yield 10; by percolation.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

The *B.P.C.* Tincture, also 1 in 10, is made by maceration.

Foreign Pharmacopœias.—Official in U.S., 1 of Fruits in 5 of Alcohol (48·9 p.c.), by percolation; Port. and Swiss, 1 in 5 (weight).

TINCTURA CARMINATIVA (*B.P.C. Formulary* 1901). — Cardamom Seeds, bruised, 600 grains; stronger Tincture of Ginger (*B.P.* '85), 1¼ fl. oz.; Oil of Cinnamon, 100 minims; Oil of Caraway, 100 minims; Oil of Cloves, 100 minims; Alcohol (90 p.c.), *q.s.* to yield 20 fl. oz.; macerate the Cardamoms in 15 fl. oz. of the Spirit for a week, decant, express, and dissolve the Oils in the mixed Tinctures, and add the remainder of the Alcohol.

Dose.—2 to 10 minims = 0·12 to 0·6 c.c.

This has been incorporated in the *B.P.C.*

By replacing the Cardamom Seeds with $\frac{1}{25}$ of Oil of Cardamoms the maceration is avoided.

MISTURA CARMINATIVA.—Sodium Bicarbonate, 60 grains; Aromatic Spirit of Ammonia, 72 minims; Compound Tincture of Cardamoms, 144 minims; Glycerin, 240 minims; Dill Water, to 6¼ fl. oz.

This corresponds to Mistura Carminativa (*B.P.C.*).

Several formulas are given in *Ph. Form.*

CARUI FRUCTUS.

CARAWAY FRUIT.

FR., CARVI; GER., KÜMMEL; ITAL., CARVI; SPAN., ALCARAVEA.

The dried Fruit of *Carum Carvi*, L.

Cultivated in different parts of Europe. The herb flowers in the second year, and the fruit ripens in July or August. Yields from 3 to 7 p.c. of Oil, varying with the source of the Seeds.

Medicinal Properties.—Aromatic, stomachic, and carminative. Used in flatulent colic, as an adjuvant to other medicines, to prevent griping of purgatives, and as a flavouring agent.

Official Preparations.—Aqua Carui, and Oleum Carui. Contained in Confectio Piperis, Pulvis Opii Compositus, Tinctura Cardamomi Composita, Tinctura Sennæ Composita. The **Oil** is contained in Pilula Aloes Barbadensis.

Foreign Pharmacopœias.—Official in Austr., Ger., Mex. (Alcaravea), Port. (Alcaravie), Swed., Swiss and U.S. Not in the others.

Descriptive Notes.—The principal varieties of Caraway fruit met with in commerce in this country are the English, Dutch and Russian, which differ in size, colour and aroma. The English command the highest price, and are light brown in colour and slightly larger than the Dutch, which are a dark brown and cheaper, and are the kind usually sold by grocers. According to the official description they should be 'about' $\frac{1}{6}$ to $\frac{1}{4}$ in. (4 to 6 mm.) long and about $\frac{1}{25}$ in. (1 mm.) broad, tapering towards each end, and would include these two. The Russian Caraways are small and mixed with a considerable quantity of stalks and debris and are chiefly used in veterinary medicine. The Mogador Caraway is occasionally imported. It is the largest of all, and is usually slightly enlarged at the upper end, and consequently would be excluded by the *B.P.* statement that they are tapering at each end. The Dutch, Norwegian and East Russian are chiefly used in Germany for distillation. The value of the oil depends upon the amount of Carvone it contains. The exhausted seeds are dried and sometimes used for purposes of adulteration, but they may be detected by their darker colour, weaker taste, and shrivelled appearance, and (under a good lens) by the torn outer layer of cells. Under the microscope the most noticeable features of the powder are the pitted walls of the cells of the outer epidermis, which, like those of Anise, are striated, but are more oblong in outline, and about twice as long as broad; the parallel, thin-walled, elongated, oblong cells of the inner epidermis about four times as long as broad; the absence of raphides and hairs.

Tests.—Caraway Fruit leaves about 6 p.c. of ash on incineration, and 8 p.c. should not be exceeded. Six samples of the Fruit examined in the author's laboratory showed from 5·72 to 7·1 p.c.; 5 samples of the powdered fruit gave from 5·87 to 7·15 p.c.

Preparations.

AQUA CARUI. CARAWAY WATER.

Caraway Fruit, 1; Water, 20; distil, 10. (1 in 10)

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c.

Foreign Pharmacopœias.—Official in Jap. and Swed. Not in the others.

OLEUM CARUI. Oil of Caraway.

A colourless or pale yellow, mobile liquid, possessing a characteristic and aromatic odour and a spicy taste.

The Oil distilled from Caraway Fruit. It consists principally of a terpene, Dextro-limonene, and an oxygenated compound of a ketone nature, Carvone. It is the latter to which the oil owes its medicinal properties.

It should be kept in well-stoppered amber-coloured glass bottles and protected as much as possible from the light. It should be kept in a cool place.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Foreign Pharmacopœias.—Official in Austr. (Carvone), Ger., Jap. (Carvonum), Port., Swiss and U.S.; Swed. (Carvone). Not in the others.

Tests.—Caraway Oil has a specific gravity of 0·907 to 0·920 and an optical rotation of from + 70° to + 80° in a 100 mm. tube. The *B.P.* gives the specific gravity but no optical rotation, neither does it make any mention of the solubility of the oil in Alcohol (90 p.c.); it gives the specific gravity as 0·910 to 0·920; the *U.S.P.* gives 0·900 to 0·910 at 25° C. (77° F.). The *U.S.P.* gives the optical rotation as + 70° to + 80° in 100 mm. tube at a temperature of 25° C. (77° F.). The oil should yield a clear mixture with an equal volume of Alcohol (90 p.c.), and with 3 to 10 volumes of Alcohol (80 p.c.). The *U.S.P.* gives the Alcohol solubility. As pointed out above, Carvone is official in place of the oil in several Foreign Pharmacopœias, and commercial oils are frequently met with from which the Carvone has been abstracted. Such abstraction is shown by the specific gravity and by the optical rotation; oils from which the Carvone has been taken having a specific gravity of about 0·848 and an optical rotation of over + 100°.

Carvone forms crystalline compounds with Hydroxylamine, with Hydrogen Sulphide, and with Phenylhydrazine, but its actual determination, owing to difficulties inseparable from the process, can only be made with approximate accuracy. A measured quantity of 5 c.c. of the oil is treated in a test-tube with 5 c.c. of Phenylhydrazine and the tube allowed to stand in boiling Water for an hour. The excess of Phenylhydrazine is removed by adding whilst hot 5 c.c. of Glacial Acetic Acid, and after shaking diluting with Water to 20 c.c. The contents are then cooled, the crystals removed by filtration and washed with Water until of a pale yellow colour. They may be recrystallised from a definite volume of Alcohol (90 p.c.).

Not more than 15 p.c. of the oil should distil below 185° C. (365° F.), and at least 55 to 65 p.c. should distil above 200° C. (392° F.); the fraction distilling between 220° to 230° C. (428° to 446° F.) should amount to at least 40 to 50 p.c.

The higher the specific gravity and the greater the solubility in Alcohol (50 p.c.) the more Carvone is likely to be contained in the sample.

Not Official.

CARVONE.—A colourless or pale yellow fluid possessing a characteristic aromatic odour and taste. When obtained from the Oils of Caraway and Dill it is stated to be dextrogyrate, and lævogyrate when obtained from Oil of Spearmint.

Tests.—Carvone has a specific gravity of not less than 0·960 and a boiling point of 229° to 230° C. (444·2° to 446° F.). It should be soluble in 2 parts by weight of Alcohol (68 to 69 p.c.). It forms crystalline compounds with Hydroxylamine, Hydrogen Sulphide and Phenylhydrazine, and may be determined quantitatively by means of Hydroxylamine or Phenylhydrazine. Carvone which has been exposed to the air when dissolved in an equal volume of Alcohol (90 p.c.) yields a reddish-violet coloration with Ferric Chloride Test-solution, which disappears on the further addition of Ferric Chloride Test-solution.

It is official in Austr., Ger., Jap. and Swed. in place of the Oil.

CARYOPHYLLUM.

CLOVES.

FR., GIROFLE; GER., GEWÜRZNELKEN; ITAL., GAROFANI;
SPAN., CLAVO DE ESPECIA.

The dried Flower-buds of *Eugenia caryophyllata.*

Imported from Penang, Bencoolen, Amboyna, and Zanzibar. Yield from 15 to 18 p.c. of Oil.

Medicinal Properties.—Aromatic, stomachic, carminative, antispasmodic. Administered to check nausea, vomiting, and flatulence, and to promote digestion. But chiefly used as an adjuvant to other medicines. The oil, as a counter-irritant, is a useful ingredient in liniments for whooping-cough and bronchitis; it is also used as an anodyne in toothache.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Prescribing Notes.—*The Oil may be given upon a lump of Sugar, and is a useful constituent of aperient pill masses. The Infusion is a nice flavouring for many mixtures.*

Incompatibles.—*See* under Infusum Caryophylli.

Official Preparations.—Infusum Caryophylli, and Oleum Caryophylli. Used in the preparation of Infusum Aurantii Compositum. Contained in Pulvis Cretæ Aromaticus. The **Oil** is contained in Pilula Colocynthidis Composita, and Pilula Colocynthidis et Hyoscyami.

Not Official.—Infusum Caryophylli Concentratum and Eugenol.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Clavo de Especia), Norw., Port. (Cravinho), Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Cloves consist of the dried flower-buds of *Eugenia caryophyllata*, Thunb., the lower portion of which is formed of a calyx tube, enclosing in its upper half the ovary filled with minute ovules. It derives its name from the French word for a nail, *clou*, from its resemblance to a short nail in shape. The finest varieties in English commerce are imported from Penang, Bencoolen and Amboyna, and in French commerce from Réunion and Madagascar.

Those from Ceylon and the Seychelles are of medium quality and size and darker coloured. Those from Zanzibar and Pemba are more slender and the globular head is often broken. These last two varieties form about four-fifths of the world's production. The official Cloves should be ⅝ in. (15 mm.) long, and should emit oil when indented with the finger nail. The 'stems' or stalks of the flowers are imported separately, and used for distillation of oil. Cloves exhausted of oil by distillation have been used to adulterate genuine Cloves, but yield no oil when pressed with the nail and float horizontally when put in Water. Powdered Cloves have been adulterated with Clove stalks and with the fruit of Cloves, known in commerce as Mother Cloves. The former may be detected by the presence of sclerenchymatous cells and the latter by the presence of starch granules, neither of which occur in Cloves.

Tests.—Cloves yield when incinerated about 5 p.c. of ash, and 8 p.c. should not be exceeded. Eight samples examined in the author's laboratory yielded from 4·78 to 5·4 p.c., 5 samples of the powder yielded from 5·2 to 6·97 p.c. of ash. The Ether extract should amount to 20 p.c. The *B.P.* limit of ash is 7 p.c., and the *U.S.P.* 8 p.c.

Preparations.

INFUSUM CARYOPHYLLI. Infusion of Cloves.

Cloves, bruised, 1; Distilled Water, boiling, 40; infuse for fifteen minutes; strain. (1 in 40)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Incompatibles.—Lime Water, salts of Iron, mineral acids, Gelatin.

OLEUM CARYOPHYLLI. Oil of Cloves.

Fr., Essence de Girofle; Ger., Nelkenöl; Ital., Essenza di Garofani; Span., Esencia de Clavo.

A pale yellow, limpid, highly refractive liquid possessing a characteristic aromatic odour and taste; distilled from Cloves. The yield of oil is from 15 to 18 p.c.

It becomes darker in colour with age and on exposure to air, and should therefore be kept in well-stoppered, dark amber-tinted glass bottles, and protected as far as possible from contact with the air.

The oil contains from 70 to 85 p.c. of Eugenol, a phenol having the formula $C_{10}H_{12}O_2$, a sesquiterpene, Caryophyllene, Methyl Alcohol, Furfurol, and a trace of Vanillin.

Solubility.—1 in 60 of Alcohol, (60 p.c.); in all proportions of Alcohol (90 p.c.), Ether, and Strong Acetic Acid.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Foreign Pharmacopœias.—Official in Austr. (Eugenol), Belg. (Eugenol), Dan., Dutch (Eugenol), Fr., Ger. (Eugenol), Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed. (Eugenol), Swiss and U.S.

Tests.—Clove Oil has a specific gravity of 1·048 to 1·068, it is officially required to be not below 1·050; the *U.S.P.* gives 1·040 to

1·060 at 25° C. (77° F.). Some genuine oils are occasionally met with of a lower specific gravity than that given in the *B.P.*, but rarely lower than 1·045. Both the *B.P.* and the *U.S.P.* require the oil to form a semi-solid yellowish mass when shaken with an equal volume of strong Ammonia Solution; the *U.S.P.* also mentions that concentrated Potassium Hydroxide Solution produces a similar result. When dissolved in Alcohol (90 p.c.) it is officially required to yield a blue coloration on the addition of Ferric Chloride Test-solution. The *U.S.P.* dissolves 2 drops of the oil in 4 c.c. of Alcohol (94·4 p.c.) and adds a drop of Ferric Chloride Test-solution, when a bright green colour will be produced, but a drop of a solution of Ferric Chloride Test-solution diluted with 4 times its volume of Water produces a blue coloration changing to yellow. This is as far as the official tests take us.

The optical rotation of the oil is about −1° in a 100 mm. tube. No appreciable quantity of the oil should distil below 246° C. (474·8° F.). Eugenol may be determined approximately by treating a weighed quantity of 10 grammes of the oil in a flask with a long graduated neck with 100 c.c. of a 10 p.c. Potassium Hydroxide Solution, adding sufficient of the Hydroxide Solution to bring the level of the aqueous liquid to the zero mark, and reading off the volume of the unabsorbed portion which rises to the surface. This volume multiplied by 0·908 (the specific gravity of Caryophyllene) gives approximately the percentage by weight of the latter. The results are only approximate, owing to the solubility of the Caryophyllene in the Potassium Hydroxide Solution and Potassium Eugenate. The *U.S.P.* describes this process, but works by volume and not by weight. Thus determined, the *U.S.P.* Oil of Cloves is required to contain at least 80 p.c. of Eugenol. No method of determination is given in the *P.G.*

A more accurate process is that of Thoms, which consists in converting the Eugenol into Benzoyl-eugenol by means of Benzoyl Chloride. A weighed quantity of 5 grammes of the oil is treated in a beaker having a capacity of about 150 c.c., with 20 grammes of Sodium Hydrate solution (15 p.c.) and 6 grammes of Benzoyl Chloride. The mixture is well shaken until uniformly mixed. After cooling, 50 c.c. of Water are added, and the mixture heated until the crystalline mass has again become oily, and is again allowed to cool. The clear supernatant liquid is filtered off and the crystalline mass in the beaker is again treated with two successive quantities of 50 c.c. of Water. The moist Benzoyl-eugenol is treated with 25 c.c. of Alcohol (90 p.c. by weight) and heated on a water-bath until solution is effected. The beaker is removed from the water-bath and agitated until the Benzoyl-eugenol has separated in fine crystals. The mass is then cooled to 17° C. (62·6° F.), the crystalline precipitate transferred to a small weighed filter paper, the filtrate collected in a graduated cylinder and washed with Alcohol (90 p.c. by weight) until it measures 25 c.c. The filter and crystals are transferred to a weighing bottle, dried at 100° C. (212° F.) till constant in weight and then weighed. The solubility of pure Benzoyl-eugenol in Alcohol

(90 p.c. by weight) has been experimentally proved to be 0·55 gramme, and the latter weight should be added to the weight of the crystals obtained. 266·11 parts of Benzoyl-eugenol represent 162·86 parts by weight of Eugenol.

The quality of Clove Oil is reduced by the abstraction of a portion of Eugenol, the addition of oil from Clove stems, and the addition of Turpentine or Petroleum. The abstraction of Eugenol is shown at once by the altered physical characteristics of the oil as well as by a determination of the amount of this constituent. Turpentine or Petroleum is revealed by a low boiling point and by the solubility of the oil in Alcohol (90 p.c.). Clove Oil from the stems can only be satisfactorily detected by the difference in odour, though the presence of Acetyl-eugenol in Clove Oil and not in oil from the stems has been suggested as a means of distinction.

The *U.S.P.* includes a test for Phenol with Ferric Chloride T.S., requiring that no blue or violet coloration should be produced when the oil is shaken with 20 times its volume of hot Water, cooled, the excess of oil removed by filtration through a wet filter paper and the filtrate tested with a drop of Ferric Chloride Test-solution.

Determination.—A measured quantity of 10 c.c. of the Oil is introduced into a flask with a long neck graduated in tenths, and 100 c.c. of Potassium Hydroxide Test-solution added, the mixture being shaken for five minutes. After complete separation of the liquids, sufficient of the Potassium Hydroxide Solution is added to raise the lower limit of the oily layer to the zero mark of the scale, and the volume of the residual liquid is read off. This should not amount to more than 2 c.c., indicating the presence of at least 80 p.c. of Eugenol, *U.S.P.*

Not Official.

INFUSUM CARYOPHYLLI CONCENTRATUM.—1 of Cloves in No. 10 powder, macerated for seven days in 2½ of Alcohol (20 p.c.), and subsequently percolated so as to make 5 of concentrated Infusion.

This corresponds to Infusum Caryophylli Concentratum, *B.P.C.*, and closely resembles Inf. Caryoph. Conc. given in *Ph. Form.* It is intended for dilution, 1 of this and 7 of Distilled Water.

EUGENOL.—A phenol, having the formula $C_{10}H_{12}O_2$, eq. 162·86, is the principal constituent of Clove Oil. It is a colourless, pale yellow, highly refractive liquid, possessing a powerfully aromatic odour and taste. It darkens on exposure to air and light, and should be preserved in well-closed, dark amber-tinted glass bottles, and kept as far as possible from contact with the air.

Tests.—Eugenol has a specific gravity of 1·072 to 1·074. Its boiling point is 251° to 253° C. (483·8° to 487·4° F.). It dissolves with difficulty in Water, but is readily soluble in Alcohol (90 p.c.), Ether, and Glacial Acetic Acid. A clear liquid, readily becoming turbid on exposure to air, is formed when 1 gramme of Eugenol is mixed with 26 c.c. of Water and 4 c.c. of Sodium Hydroxide Solution (15 p.c.). A flocculent precipitate, partially adherent to the sides of the vessel, is produced when 5 drops of Eugenol are shaken with 10 c.c. of Lime Water. An alcoholic solution of Eugenol yields with Ferric Chloride Test-solution a blue coloration, and with diluted Ferric Chloride Test-solution (1 to 10) a blue coloration changing to greenish-yellow. One part by weight of Eugenol should be soluble in two parts by weight of Alcohol (68 to 69 p.c.). Eugenol is converted into a crystalline body by means of Benzoyl Chloride, and this property may be utilised for its determination. The method is described under Oil of Cloves. Eugenol is official in place of Clove Oil in the new editions of the Austrian, Belgian, and Dutch Pharmacopœias. It was made official in the fourth edition of the German Pharmacopœia, which includes a test for the presence of Phenol.

Eugenoform (Sodium Eugenol Carbinol).—Colourless foliaceous crystals, readily soluble in water; slightly soluble in Alcohol (90 p.c.); insoluble in Ether. Introduced as an intestinal and stomachic antiseptic.—*P.J.* '99, ii. 40.

Dose.—7½ to 15 grains = 0·5 to 1 gramme, twice a day.

CASCARA SAGRADA.

CASCARA SAGRADA.

B.P.Syn.—Rhamni Purshiani Cortex; Sacred Bark.

Fr., Cascara Sagrada; Ger., Sagradarinde, Amerikanische Kreuzdornrinde; Ital., Cascara Sagrada; Span., Cascara Sagrada.

The dried Bark of *Rhamnus Purshianus.*

Obtained from California, best collected in spring and early summer. Bark which has been gathered for two years is much preferred to the recently-dried bark.

Medicinal Properties.—Tonic laxative. Acts principally on the large intestine. Indicated in obstinate and habitual constipation, especially of old or delicate persons, and in an atonic condition of the stomach and bowels, as in anæmia. It should not be given as a purgative, but in such a constant continuous manner that a normal condition will be brought about. It is better to give two small doses, say 20 minims of the liquid extract night and morning, than one large dose. The dose should be reduced gradually.

Prescribing Notes.—*Usually given in the form of Extract in Pills or Pilules, or one of the fluid preparations. The Extract is best made into Pills with the addition of one-tenth of its weight of Gum Acacia in powder, and massed with Alcohol* (90 *p.c.*). *It is also advantageously combined with Extract of Belladonna, Extract of Nux Vomica, and Euonymin. Obtainable in the form of Compressed Tablets. Capsules may be had containing a very concentrated Fluid Extract, equivalent to* 15 *and* 30 *minims of the ordinary Fluid Extract, and other strengths as desired. In Mixtures and other fluid preparations it goes well with Aromatic Spirit of Ammonia and Spirit of Chloroform.*

Elixir of Cascara (Kasak) is an agreeable and reliable preparation. *See* below.

Official Preparations.—Extractum Cascaræ Sagradæ, Extractum Cascaræ Sagradæ Liquidum, and Syrupus Cascaræ Aromaticus.

Not Official.—Capsules of Cascara, Elixir of Cascara, Extractum Cascaræ Liquidum Insipidum, Mistura Cascaræ Sagradæ, Mistura Cascara Sagrada Composita, Mistura Cascara Aperiens, Mistura Laxativa, Pilulæ Cascaræ Compositæ, Pilula Cascara et Belladonnæ et Nucis Vomicæ, Fluidextractum Rhamni Purshiani Aromaticum, Vinum Rhamni Purshiani.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ital., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S. Not in the others.

Descriptive Notes.—The bark of *Rhamnus Purshianus*, DC., as met with in commerce, varies much in appearance and quality. Genuine Cascara Sagrada is more or less externally furrowed longitudinally, and of a reddish-brown tint, with lenticels about ¼ inch long, forming slender, whitish, transverse scars in places; it has a characteristic leather-like odour. When the outer surface is scraped the reddish-brown colour of the layer beneath becomes visible; it is of a duller red tint than that of *Rhamnus Frangula*, L. The inner surface is longitudinally striate with projecting medullary rays, and in some pieces faintly corrugated transversely, and is turned red by alkalis. The *B.P.* limits the thickness to about $\frac{1}{16}$ inch (1·5 mm.), *U.S.P.* 1 to 5 mm., which indicates that the thin bark is to be used, probably for the reason that older and thicker bark is usually more bitter. The *U.S.P.* directs that the bark should be kept at least one year before being used, but the *B.P.* does not give any such direction. The recently collected bark is stated to cause vomiting, hence the importance of the mandate. The inner surface varies from pale brown to dark brown, or walnut colour if badly dried. The transverse fracture of the bark is buff coloured or pale brown, but when the bark is kept it becomes darker; that which is thus darkened, as seen in transverse section, is therefore to be preferred, as indicating that it was not recently collected. An inferior variety of thick bark known in the United States as spurious or 'winter' bark, is said to be removed in winter by steaming the branches to soften the bark, and then cutting it off with knives. Another winter form is spoke-shaved, and therefore in chips. The new crop is collected from the end of April till July, and reaches London in August. Sometimes the bark of *R. Californicus*, Esch., and its var. *tomentella*, Benth., is substituted for it, but, according to Rusby, it is only bark that is received from Texas, Arizona, Colorado and New Mexico that is likely to contain it, since the species occurs sparingly only in North California and not in Oregon and Washington, whence supplies of *R. Purshianus* have come during recent years. The chief difference is that the bark of *R. Californicus*, Esch., is of a greyer tint externally, and the lenticels are less numerous and easily become obscured, and the transverse fracture is less dark and more yellow (J. G. Steele) than that of *R. Purshianus*, and the taste is intensely bitter. Under the microscope the bark of *R. Purshianus* is seen to have parallel medullary rays, consisting commonly of two rows of cells, whilst those of *R. Californicus* are shorter, crooked, and not parallel, and are composed of three or more rows (Prescott). The bark of *R. Purshianus* is apt to stain paper yellow, due to the presence of Frangulin. The powdered bark of *R. Purshianus* may be distinguished from that of *R. Frangula* by the presence of sclerenchymatous cells; mucilage is absent. In both, the contents of the parenchymatous cells turn purplish with caustic alkali (*Vogl*). The bark of *Rhamnus Frangula* has no sclerenchymatous cells and contains mucilage.

Tests.—Cascara Bark yields on incineration about 5 p.c. of ash; 8 p.c. should not be exceeded. A limit of 6 p.c. of ash has been suggested. Specimens of good quality bark examined in the author's laboratory showed from 5·6 to 7·8 p.c. of ash.

Preparations.

EXTRACTUM CASCARÆ SAGRADÆ. EXTRACT OF CASCARA SAGRADA. *B.P.Syn.*—EXTRACTUM RHAMNI PURSHIANI.

Cascara Sagrada, in No. 20 powder, is exhausted by percolation with Distilled Water and evaporated to dryness on a water-bath.

The powdered Bark is moistened with Water and allowed to swell, before it is packed loosely in the percolator.

It is an aqueous exhaustion; in *B.P.* 1885 it was by percolation with Proof Spirit.

Dose.—2 to 8 grains = 0·13 to 0·52 gramme.

Extractum Rhamni Purshiana (*U.S.*) is made by exhausting 100 of Cascara Bark in No. 60 powder by percolation with Alcohol (12·5 p.c.), evaporation to dryness, and mixing with sufficient peeled Russian Liquorice Root in No. 80 powder to make the product 25.

Foreign Pharmacopœias.—Official in Belg., Fr., Ital., Mex. and U.S. Not in the others.

EXTRACTUM CASCARÆ SAGRADÆ LIQUIDUM. Liquid Extract of Cascara Sagrada. *B.P.Syn.*—Extractum Rhamni Purshiani Liquidum.

5 of Cascara Bark exhausted by percolation with Distilled Water; the percolate evaporated to 3; 1 of Alcohol (90 p.c.) mixed with 1 of Distilled Water is added, and the whole is made up to 5 by the addition of more Water if necessary.

It is almost the same as *B.P.* 1885.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Sometimes given with Ferri et Ammonii Citras and Ammonia.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ital., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S., all with diluted Alcohol. U.S. is 38 p.c. Alcohol. Dan. and Swed. contain Glycerin. Not in the others.

Tests.—Liquid Extract of Cascara has a specific gravity of 1·055 to 1·070; may contain from 17 to 27 p.c. w/v of total solids and about 20 p.c. w/v of Absolute Alcohol.

SYRUPUS CASCARÆ AROMATICUS. Aromatic Syrup of Cascara.

Liquid Extract of Cascara Sagrada, 8; Tincture of Orange, 2; Alcohol (90 p.c.), 1; Cinnamon Water, 3; Syrup, 6.

(1 of Liquid Extract in 2½)

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.

Not Official.

CAPSULES OF CASCARA.—Two strengths, containing concentrated Extract equal to 15 and 30 minims respectively of Fluid Extract.

FLUIDEXTRACTUM RHAMNI PURSHIANÆ AROMATICUM (*U.S.*).—Cascara Sagrada, in No. 40 powder, 1000; Glycyrrhiza, in No. 30 powder, 100; Magnesium Oxide, 125; macerate with 2000 of Water for 12 hours, then dry it at a gentle heat. Percolate this with 250 c.c. of Glycerin mixed with 500 c.c. of Alcohol (94·9 p.c.) and 250 c.c. of Water, subsequently complete the percolation with diluted Alcohol until exhausted; reserve the first 800 of the percolate and evaporate the remainder to a soft Extract, dissolve this in the reserved portion. Add 10 c.c. of Compound Spirit of Orange, and *q.s.* of Diluted Alcohol to make 1000 of fluid Extract.

EXTRACTUM CASCARÆ SAGRADÆ LIQUIDUM INSIPIDUM.—Liquid Extract of Cascara Sagrada, 100; Liquor Ammoniæ Fortior, 7; heat them together on a water-bath for 3 hours or until the bitterness has disappeared, and finally make up the volume to 100 with the requisite quantity of Alcohol (90 p.c.) and Water.

The formula given in *B.P.C.* employs 5 of Potassium Hydroxide in place of the Ammonia given above. The *B.P.C. Supplement* gives a formula for a Miscible Extract of Cascara. It is the aqueous fluid extract of the *B.P.* to which Solution of Potassium Hydroxide is added before evaporation, and the Alcohol (90 p.c.) is replaced by Glycerin. It is stated that the miscible extract should be used in the place of the 'tasteless' liquid extract when making *B.P.C.* preparations.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Many formulas have appeared from time to time, with the object of obtaining a tasteless extract without loss of activity, using either Lime, Magnesia, Potassium Hydroxide, or Ammonia; we prefer Ammonia, as, apart from the fact that it makes a better preparation, the excess of Ammonia is volatilised, whereas the Potassium Hydroxide remains in the finished solution. The word 'tasteless' as applied to any of them is a misnomer, and some of the preparations are practically inert. The Bark has a fairly strong flavour peculiar to itself, quite apart from the bitterness.

There is a similar preparation in *Austr.*, named Extractum Rhamni Purshiani Fluidum, in which Magnesia is employed.

ELIXIR CASCARÆ. *Syn.* AROMATIC CASCARA.—Liquid Extract of Cascara Sagrada, 34·5: Liquid Extract of Liquorice, 34·5; Glycerin, 29; Soluble Gluside, 0·75; Oil of Anise, 0·05; Oil of Peppermint, 0·05; Oil of Cloves, 0·025; Oil of Dill, 0·025; Oil of Cinnamon, 0·025; Alcohol, to make 100.

This corresponds with the *B.P.C.* formula; it is also given in *Ph. Form.* as the Elixir Cascara c. Glycerin of the *Australian Ph. Form.*

Various formulas for Aromatic Cascara are given in the Hospital Pharmacopœias under the heading Mistura Cascaræ Composita, in most of which Liquid Extract of Liquorice forms an important flavouring ingredient.

MISTURA CASCARÆ SAGRADÆ. Cascara Mixture.—Liquid Extract of Cascara Sagrada, 1 fl. drm.; Liquid Extract of Liquorice, 30 minims; Aromatic Spirit of Ammonia, 40 minims; Chloroform Water, to ½ fl. oz.—*London.*

Liquid Extract of Cascara, 30 minims; Liquid Extract of Liquorice, 30 minims; Aromatic Spirit of Ammonia, 20 minims; Chloroform Water, to 1 fl. oz.—*St. Thomas's.*

This formula has been incorporated in the *B.P.C.*

MISTURA CASCARÆ SAGRADÆ COMPOSITA. Compound Cascara Mixture.—Liquid Extract of Cascara, 1 fl. drm.; Liquid Extract of Liquorice, 30 minims; Sulphate of Soda, 60 grains; Solution of Ammonia, 5 minims; Water, to 1 fl. oz.—*St. Mary's.*

Liquid Extract of Cascara Sagrada, 20 minims; Liquid Extract of Liquorice, 30 minims; Tincture of Belladonna, 5 minims; Tincture of Nux Vomica, 5 minims; Aromatic Spirit of Ammonia, 20 minims; Chloroform Water, *q.s.* to make 1 fl. oz. —*St. Thomas's.*

This formula has been incorporated in the *B.P.C.*

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Magnesium Sulphate, 60 grains; Glycerin, 1 fl. drm.; Liquid Extract of Cascara Sagrada, 1 fl. drm.; Liquid Extract of Liquorice, 60 minims; Tincture of Hyoscyamus, 20 minims; Tincture of Nux Vomica, 5 minims; Compound Decoction of Aloes, to 1 fl. oz.—*London.*

MISTURA CASCARÆ APERIENS.—Magnesium Sulphate, 30 grains; Cascara Sagrada Mixture, to ½ fl. oz.—*London.*

MISTURA LAXATIVA.—Liquid Extract of Cascara Sagrada, 1 fl. drm.; Liquid Extract of Liquorice, 1 fl. drm.; Sodium Bicarbonate, 5 grains; Chloroform Water, to 1 fl. oz.—*University* 1904; in the 1907 edition it is made up to 1 fl. oz. with Water.

PILULA CASCARÆ COMPOSITA (Martindale).—Extract of Cascara, 1½; Extract of Nux Vomica and Alcoholic Extract of Belladonna, of each ⅛;

Milk Sugar, 1. In grains for one pill, or in grammes for fifteen.—*B.M.J.* '93, ii. 596.

PILULA CASCARÆ ET BELLADONNÆ ET NUCIS VOMICÆ.—Extract of Cascara Sagrada, 4/5 grain; Extract of Nux Vomica, 1/10 grain; Alcoholic Extract of Belladonna, 1/10 grain. Mix and divide into one grain pills.—*B.P.C.*

Dose.—1 to 3.

PILULA CASCARA ET EUONYMIN. *See* EUONYMIN.

VINUM RHAMNI PURSHIANI (*Austr.*).—Malaga Wine, 150; Fluid Extract of Cascara Sagrada, 100; Syrup of Orange, 50. Digest eight days and filter. Dutch, Cascara Sagrada Bark 1, Malaga Wine 10.

CASCARILLA.

CASCARILLA.

FR., CASCARILLE; GER., CASCARILLRINDE; ITAL., CASCARIGLIA;
SPAN., CHACARILLA.

The dried Bark of *Croton Eluteria*, J. J. Bennett.

It contains from ½ to 2 p.c. of an aromatic Oil.

Medicinal Properties.—Aromatic and stomachic. With some physicians it is a favourite bitter tonic. Used for the same purposes as Calumba.

Prescribing Notes.—*The Infusion quickly changes, and will scarcely keep good for a day in summer, but with an aromatic Tincture it keeps well.*

The Tincture is frequently prescribed with diluted mineral acids, which, however, usually cause a separation of resin; 4 fl. drm. of Mucilage in an 8-oz. mixture will keep the resin diffused.

Official Preparations.—Infusum Cascarillæ and Tinctura Cascarillæ.

Not Official.—Mistura Cascarillæ Composita, Infusum Cascarillæ Concentratum.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Ger., Ital., Jap., Norw., Port., Russ., Swed. and Swiss. Not in Fr., Hung., Mex. or Span. An **extract** is official in Ger.

Descriptive Notes.—Cascarilla bark varies much in size and quality as found in commerce. The best qualities are in quills, or in small curved pieces. The outer dull brown or dark grey cork has longitudinal and transverse small cracks and a silver grey surface with minute black dots, a short resinous fracture, and a dark reddish-brown bast, showing thin whitish medullary rays but no sclerenchymatous cells. It is bitter and agreeably aromatic. The *B.P.* directions are not quite sufficient to characterise the true bark, since the 'silvery grey patches spotted with minute black dots' occur also in a false bark (referred to *Croton lucidus*, Linn.), which causes vomiting and other deleterious effects, and Hartwich has recently shown that of eight Croton barks substituted for Cascarilla since 1901 all agree with it in having 'no groups of sclerenchymatous cells' although differing from Cascarilla bark in other characters (*P.J.* (4) xxiii. p. 485). A very slender bark, obtained by spoke-shaving the twigs, often occurs in commerce; this is available for pastilles and incense, but is excluded from use in pharmacy by the *B.P.* description of 'quills from 1 to 3 inches (2½ to 7½ cm.)

or more in length, and from about $\frac{1}{6}$ to $\frac{1}{2}$ inch (4 to 12 mm.) in diameter.' The general bark is characterised by its aromatic odour and taste, and the greyish-brown layer beneath the whitish coat, where the latter is exfoliated. Under the microscope the powdered bark is distinguished by the characteristic cells containing dark brown secretion, the cork cells thickened chiefly on one side, the absence of stone cells and the presence of starch (*Koch*). The properties of the bark are due to a bitter principle, resin, and 1·3 p.c. of volatile oil. The ash varies from 6 to 10 p.c. (*Y.B.P.* 1906, p. 209). During recent years it has been deficient in the amount of bitter principle (Naylor, *Y.B.P.* 1906, p. 209). The bark of *Croton lucidus*, which closely resembles that of Cascarilla in appearance, differs in absence of aroma, reddish-brown tint externally, and in the presence of sclerenchymatous cells. Other substitutes differ from true Cascarilla in odour, as well as in the presence of sclerenchymatous cells in the cortex (*P.J.* (4) xxi. p. 7).

Tests.—Cascarilla leaves about 8 p.c. of ash on incineration, and rarely more than 10 p.c. The average ash of eight samples examined in the author's laboratory showed 8·7 p.c.

Preparations.

INFUSUM CASCARILLÆ. Infusion of Cascarilla.

Cascarilla, in No. 10 powder, 1; boiling Distilled Water, 20; infuse for 15 minutes; strain. (1 in 20)

Half the strength of *B.P.* '85.

Dose.—$\frac{1}{2}$ to 1 fl. oz. = 14·2 to 28·4 grammes.

Incompatibles.—Lime Water and metallic salts.

Not in the other Pharmacopœias.

TINCTURA CASCARILLÆ. Tincture of Cascarilla.

1 of Cascarilla, in No. 40 powder, percolated with Alcohol (70 p.c.), to yield 5. (1 in 5)

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Austr., Dan., Ital., Jap., Norw., Russ., Swed. and Swiss, 1 in 5. Not in the others.

Tests.—Tincture of Cascarilla has a specific gravity of 0·895 to 0·905; contains from 2 to 3 p.c. w/v of total solids and about 67 p.c. w/v of Absolute Alcohol.

Not Official.

MISTURA CASCARILLÆ COMPOSITA.—Tincture of Squill, 10 minims; Compound Tincture of Camphor, 20 minims; Infusion of Cascarilla, to 1 fl. oz.—*Royal Free.*

Ammonium Carbonate, 5 grains; Tincture of Squill, 12 minims; Aromatic Syrup, 60 minims; Infusion of Cascarilla, to 1 fl. oz.—*Brompton.*

Compound Tincture of Camphor, 15 minims; Vinegar of Squill, 15 minims; Infusion of Cascarilla, to 1 fl. oz.—*St. Thomas's.*

This formula has been incorporated in the *B.P.C.*

INFUSUM CASCARILLÆ CONCENTRATUM.—Cascarilla Bark, in No. 40 powder, 40 parts; Tincture of Cascarilla, 7·5 parts; Alcohol (90 p.c.), 20 parts; Dilute Chloroform Water, 1 in 1000, sufficient to make 100 parts. Prepare by macero-expression.—*Farr* and *Wright*; *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* 1907, 249.

This formula appears in the *B.P.C.*

Not Official.

CASSIÆ OLEUM.

OIL OF CASSIA.

A yellowish or brownish liquid, becoming darker and thicker by age and exposure to the air, having the characteristic odour of Cassia, and a sweetish, spicy, and burning taste. It is a volatile Oil distilled from *Cinnamomum Cassia*.

It should be kept in well-stoppered amber-tinted glass bottles, in a cool place, and away from the light.

The principal constituent of Cassia Oil is Cinnamic Aldehyde, of which it should contain at least 75 p.c. Cinnamyl Acetate and traces of Cinnamic Acid are also present. A stearoptene, Ortho-methyl-coumaric aldehyde, has been shown to be a constituent of the oil.

Soluble in an equal volume of Alcohol, the solution being slightly acid to Litmus paper; also soluble in an equal volume of Glacial Acetic Acid.

This Oil is official in the German and U.S. Pharmacopœias under the name 'Oleum Cinnamomi.'

Medicinal Properties.—It possesses the aromatic, carminative and antiseptic properties of Cinnamon bark, but the oil is a powerful local stimulant.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Foreign Pharmacopœias.—Official in Belg., Ger., Jap., Norw., Swiss and U.S.

Tests.—Cassia Oil has a specific gravity of 1·053 to 1·065. It should be optically almost inactive, and should never vary more than one degree to the right or left in a tube of 100 mm. It should be soluble in 3 to 4 parts of Alcohol (70 p.c.), and in all proportions in Alcohol (90 p.c.).

When shaken with an equal volume of Nitric Acid at 0° C. (32° F.), a crystalline mass should result. With Ferric Chloride Solution the alcoholic solution of the oil should give a brown coloration. The oil forms a crystalline compound with Sodium Bisulphite Solution (30 p.c.), and this reaction is utilised as a means of determining the percentage of Cinnamic Aldehyde. A measured quantity of 10 c.c. of the oil is shaken in a flask with a long thin neck graduated to one-tenth c.c., with 10 c.c. of a 30 p.c. Sodium Bisulphite Solution, and warmed in a water-bath until the contents are liquefied. When this has occurred more Sodium Bisulphite Solution is added, the mixture being constantly heated and occasionally shaken until the flask is quite three-fourths filled. The heating in the water-bath is continued until no solid particles are visible, and the odour of Cinnamic Aldehyde has disappeared. When this is effected the contents of the flask are allowed to cool, and sufficient of the 30 p.c. Sodium Bisulphite Solution added to bring the lower level of the oily layer to the zero mark on the graduated neck of the flask, and the number of c.c. is read off. The *U.S.P.* requires that the residual liquid should not measure more than 2·5 c.c., indicating at least 75 p.c. by volume of Cinnamic Aldehyde. The *P.G.* process is to take a measured quantity of 5 c.c. of the oil, and after mixing it with 45 c.c. of a 30 p.c. Sodium Bisulphite Solution, to heat it in a water-bath for two hours with intervals of frequent shaking. Not more than 1·5 c.c. of oil shall remain undissolved, indicating at least 70 p.c. by volume of Cinnamic Aldehyde.

The more generally occurring sophistications are Colophony Resin and Petroleum, Lead and Copper. For the detection of Colophony Resin and Petroleum, the *U.S.P.* mixes 1 c.c. of the oil with 3 c.c. of a mixture of 3 volumes of Alcohol (94·9 p.c.) and 1 volume of Water, when a clear solution should result, and if to this solution 2 c.c. of a saturated Lead Acetate Solution in a mixture of 3 volumes of Alcohol (94·9 p.c.) and 1 volume of Water be added, no precipitate should be produced. The *P.G.* includes a somewhat similar test, dissolving the oil in 3 to 4 parts of Alcohol (90 p.c.), and treating the solution with half its volume of freshly-prepared Lead Acetate Solution. An additional test for Resin is given in the latter Pharmacopœia, 100 parts of the oil, heated on a water-bath until all volatile constituents have been dissipated, should not yield more than 8 parts of residue. The value of this test may be much enhanced by performing it in a tared fractionating flask, and recording the temperature at which the distillate passes over. A quantity of 50 grammes of the oil should be weighed into the flask, and the oil distilled over a direct flame. After the Water has passed over, the thermometer rapidly rises to 240° C. (464° F.), and the major portion of the oil passes over between 240° C. (464° F.) and 260° C. (500° F.). The appearance of white fumes indicates the end of the distillation; the residue should be viscid and tough, and not hard and brittle. The presence of Petroleum is detected by the solubility of the distillate in Alcohol (70 p.c.). The presence of Lead and Copper is due to the solvent action of the Cinnamic Acid produced by the Aldehyde oxidation on the metal of the containing vessels, and is readily detected by Hydrogen Sulphide. Lead is chiefly present in unrectified oils. The *P.G.* includes a colour test with Ferric Chloride Solution for Phenol, requiring that the colour produced on the addition of the Ferric Chloride Solution shall be brown, and not a green or blue.

CINNAMIC ALDEHYDE (C_9H_8O, eq. 131·07).—This Aldehyde is the principal constituent of oils of Cassia and Cinnamon. It may also be prepared artificially by the action of Sodium Hydroxide upon a mixture of Benzaldehyde and Acetic Aldehyde.

A clear, colourless, or pale yellow, highly refractive liquid possessing a characteristic aromatic odour and a sweetish spicy and subsequently burning taste. It should contain not less than 95 p.c. of pure Cinnamic Aldehyde.

Its use in medicine is similar to that of Oil of Cassia.

Dose.—$\frac{1}{2}$ to 2 minims = 0·03 to 0·12 c.c.

Foreign Pharmacopœias.—Official in Austr., Swed. and U.S.

Tests.—Cinnamic Aldehyde has a specific gravity of 1·054 to 1·056, and boils about 247° C. (476·6° F.). It is optically inactive. It should conform to the tests given under Cassia Oil. It forms a crystalline compound with Sodium Bisulphite, and when mixed with an excess of a 30 p.c. solution of the salt should dissolve completely leaving practically no oily residue.

It should be free from the sophistications mentioned under Oils of Cassia and Cinnamon.

The *U.S.P.* method of determination is to introduce 12 drops of the Aldehyde into a carefully counterpoised 150 c.c. flask and carefully ascertain the exact weight. 5 c.c. of Distilled Water and a few drops of Rosolic Acid Solution are added and the solution exactly neutralised by the addition of Tenth-normal Volumetric Sodium Hydroxide Solution. A measured quantity of 50 c.c. of a 20 p.c. Sodium Bisulphite solution is then added, and the flask is immersed in a water-bath of boiling Water. Sufficient Semi-normal Volumetric Hydrochloric Acid Solution is added to maintain the neutrality of the liquid and a drop or two of Rosolic Acid Solution, the flask being kept continuously heated and frequently agitated. The number of c.c. of Semi-normal Hydrochloric Acid Solution used is noted when a permanent state of neutrality is reached. A blank test with the same materials without the Cinnamic Aldehyde is used as a control, and the number of c.c. of Semi-normal Volumetric Hydrochloric Acid used in the blank is subtracted from the number of c.c. used in the original. Each c.c. of the difference corresponds to 0·033 gramme Cinnamic Aldehyde.

Not Official.

CASSIA BEAREANA.

A small tree, attaining the height of 20 or 30 feet, growing in equatorial East Africa. A **decoction** of the roots has been recommended in the treatment of blackwater fever and in hæmaturia. The decoction is prepared by the natives by boiling about a dozen pieces of the root, about 1 inch long, in a gallon of Water, and it is administered in teacupful doses. The powdered bark is applied as a dressing to ulcers.—*L.* '02, i. 283; '03, i. 190; *P.J.* '01, ii. 616; '02, i. 42; *C.D.* '03, i. 372.

A **fluid extract** (1 in 1) is also made, dose 30 to 60 minims = 1·8 to 3·6 c.c.

CASSIÆ PULPA.

CASSIA PULP.

Fr., Pulpe de Casse; Ger., Röhrenkassie; Ital., Cassia; Span., Canafistula.

The Pulp from the Fruits of *Cassia Fistula.*

Imported from the East or West Indies.

Medicinal Properties.—Laxative. Useful in small doses for habitual constipation. Large doses occasion nausea, flatulence, and griping; generally given in combination, as in Confection of Senna.

Dose.—60 to 120 grains = 4 to 8 grammes, as a laxative; 1 to 2 oz. = 28·4 to 56·8 grammes, as a purgative.

Official Preparation.—Contained in Confectio Sennæ; 1 part in 8 nearly.

Foreign Pharmacopœias.—Austr., Fruit and Pulp; Belg., Fruit; Ital., Mex., Port. and U.S., Fruit. Not in the others.

Descriptive Notes.—The fruit of the *Cassia Fistula*, L., is a cylindrical, indehiscent pod, separated by thin internal transverse partitions into numerous cells each of which contain a single seed, immersed in a blackish pulp. The pods are chiefly imported from Dominica in the West Indies, but those from the East Indies, which are smaller, smoother, and have a blacker pulp are usually preferred, the pulp of this kind being considered more active. Some of the East Indian pods come from Sourabaya in Java, *viâ* Amsterdam. Pods in which the seeds rattle when shaken are considered old and inferior. The pulp usually forms about 30 p.c. of the weight of the pods. The official description, viz., '1½ to 2 ft. long (35 to 50 cm.) and from ¾ to 1 in. (18 to 25 mm.) in diameter, the sutures being marked by two smooth longitudinal bands,' excludes the fruits of *Cassia grandis*, L., which has larger compressed pods, of which the ventral suture is marked by two prominent marginal ridges, and the surface of the pods has prominent veins. It also excludes the smaller fruits of *Cassia moschata*, H. B. and K., which have a brown pulp. The term viscid applied to the pulp implies that old pods with hard dry pulp should not be used. The extracted pulp will not keep in the viscid condition, soon becoming mouldy, especially in a damp place, and is therefore sometimes met with in commerce in the form of tough extract not easily miscible with the other ingredients of Confectio Sennæ unless first rubbed down with Water. It should therefore be prepared fresh for this purpose. Cassia pulp is said to be one of the ingredients used in Turkey for adulterating Opium.

Not Official.

CASTOREUM.

Fr., Castoréum; Ger., Bibergeil; Ital., Castoreo; Span., Castoreo.

The dried preputial follicles and their secretion, obtained from the Beaver, *Castor Fiber*, L., the oil sacs being rejected.

Medicinal Properties.—Moderately stimulant and antispasmodic; occasionally used in hysteria and spasmodic disorders.

Dose.—Of the powder 5 to 10 grains = 0·32 to 0·65 gramme.

Prescribing Notes.—*The Tincture when mixed with Water will yield a deposit after a time; it should therefore be prescribed with Mucilage of Gum Acacia, 3 fl. drm. in 8-oz. mixture.*

Foreign Pharmacopœias.—Official in all except Belg., Dan., Dutch, Ger., Jap., Swed. and U.S. Both the Canadian and Russian varieties are official in Russ. Austr. not more than 40 p.c. insoluble in hot Alcohol, and not more than 4 p.c. of ash.

Descriptive Notes.—The Castoreum of commerce is chiefly imported from the Hudson's Bay Territory. It consists of two pyriform sacs about 2 in. (5 cm.) long, usually compressed and wrinkled, and one of the sacs is rather longer than the other. The contents of the sac are of a reddish-brown colour, resinous, and softening readily when warmed. Castoreum has a characteristic odour. It is liable to deteriorate unless kept quite dry.

TINCTURA CASTOREI.—Castor, in coarse powder, 1; Alcohol (90 p.c.), 20; macerate seven days, agitating occasionally, strain, press, and add Alcohol *q.s.* to yield 20. (1 in 20)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Austr., Hung., Norw. and Port., 1 in 5; Fr., Ital., Russ. and Swiss, 1 in 10; Mex., 1 and 10; Span., 1 in 25; all by weight. Not in Belg., Dan., Dutch, Ger., Jap., Swed. or U.S.

Russ. contains a Tincture made with Russian Castor, and also one made with Canadian Castor.

CATECHU.

CATECHU.

B.P.Syn.—Catechu Pallidum.

Fr., Cachou; Ger., Katechu; Ital., Catecu; Span., Catecú.

An extract of Leaves and young Shoots of *Uncaria Gambier*, Roxb.

It contains from 30 to 40 p.c. of Catechu-Tannic Acid, from 10 to 40 of Catechin, some mucilage, and mineral matter.

Prepared in Singapore and in other places in the Eastern Archipelago.

Terra Japonica is a trade term (now almost obsolete) applied both to Cutch and Gambier.

Solubility.—Almost entirely soluble in boiling Water. 70 to 75 p.c. is soluble in Alcohol (90 p.c.). 50 to 60 p.c. is soluble in cold Water, and the solution is bright.

Medicinal Properties.—A powerful astringent. Used in diarrhœa, dysentery, gastric and intestinal hæmorrhage and for other purposes for which Tannic Acid is used. Lozenges are the best medium for administering it in relaxed conditions of the throat and in ulcers of the mouth.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Incompatibles.—The Alkalis, metallic salts, and Gelatin.

Official Preparations.—Pulvis Catechu Compositus, Tinctura Catechu, and Trochiscus Catechu.

Not Official.—Mistura Catechu et Cretæ, Mistura Hæmatoxyli cum Catechu.

Foreign Pharmacopœias.—Official in Dutch, Ger., Jap. and Port. (Cato). Not in the others. *See* below, CATECHU NIGRUM.

Descriptive Notes.—Under the commercial name of Gambier, or more rarely Terra Japonica, several qualities of the drug may be met with. The inferior kinds are largely used for tanning, dyeing and calico printing. The form official in the *B.P.* consists of cubes about 1 in. (25 mm.) in diameter, reddish-brown externally, and pale cinnamon-brown and porous and friable internally. Smaller cubes are also met with in commerce and occasionally parallelograms and discs, or lozenges with fluted margins, but the last two are usually paler in colour and contain Starch. They are used in India for chewing with the Betel-pepper leaf, but are not admissible for pharmaceutical use, since official Catechu should not afford any characteristic reaction with the tests for Starch.

Tests.—Catechu is required officially to be almost completely soluble in boiling Water, and to be soluble to the extent of 70 p.c. in Alcohol (90 p.c.).

It should not yield a pronounced blue coloration on the addition of Iodine Solution to its boiled and cooled aqueous solution, and it is officially required to yield not more than 5 p.c. of Ash when incinerated. A sample examined in the author's laboratory left 4·0 p.c. of ash. The presence of Black Catechu may be detected by the marked green fluorescence produced in the Petroleum Ether solution, when 3 grammes of Catechu are mixed with 25 c.c. of Normal Volumetric Sodium Hydroxide Solution and shaken with 50 c.c. of Petroleum Ether.

The extract official in the *U.S.P.* is prepared from *Ourouparia Gambir*, Baillon, that of the *P.G.* from either *Ourouparia Gambir* or *Acacia Catechu*, Willd. The *P.G.* states the highly-diluted alcoholic solution gives a green coloration with Ferric Chloride T.S. The residue insoluble in Water, after washing with hot Water, should when dried at 100° C. (212° F.) not amount to more than 15 p.c. The *P.G.* ash limit is 6 p.c.; that of the *U.S.P.* not more than 5 p.c.

Preparations.

PULVIS CATECHU COMPOSITUS. COMPOUND POWDER OF CATECHU.

Catechu, 4; Kino, 2; Krameria Root, 2; Cinnamon Bark, 1; Nutmeg, 1. (1 in 2½)

Keep it in a stoppered bottle.

Dose.—10 to 40 grains = 0·65 to 2·6 grammes.

Not in the other Pharmacopœias; a powdered **Black Catechu** is official in Span.

TINCTURA CATECHU. TINCTURE OF CATECHU.

Catechu, in coarse powder, 4; Cinnamon Bark, bruised, 1; Alcohol (60 p.c.), 20; prepare by the maceration process.

Now 1 in 5 instead of 1 in 8.

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in U.S. (Tinct. Gambir Co.), 1 in 20; Belg., Fr. (Teinture de Cachou), Dutch, Ger., Ital., Jap., Port and Swiss, 1 in 5; Mex., 1 and 5; all by weight (except U.S.), and with the exception of the Dutch, with **Black Catechu.** Not in the others.

Tests.—Tincture of Catechu has a specific gravity of 0·978 to 0·983; should contain 15·5 to 18 p.c. w/v of total solids and about 52 p.c. of Absolute Alcohol. It yields a dirty green coloration with T.S. of Ferric Chloride.

TROCHISCUS CATECHU. Catechu Lozenge.

1 grain of Catechu in each, with Simple Basis.

Dose.—1 to 6 lozenges.

Foreign Pharmacopœias.—Official in U.S., 1 grain Gambir in each; Fr. and Dutch, about $1\frac{1}{2}$ grains in each. Not in the others.

Not Official.

MISTURA CATECHU ET CRETÆ.—Tincture of Catechu, 20 minims; Chalk Mixture, to 1 fl. oz.—*University.*

Tincture of Catechu, 4; Chalk Mixture, *q.s.* to produce 100.—*B.P.C. Supplement.*

MISTURA HÆMATOXYLI CUM CATECHU.—Tincture of Catechu, 40 minims; Diluted Sulphuric Acid, 15 minims; Decoction of Logwood, to 1 fl. oz.—*St. Thomas's.*

This formula has been incorporated in the *B.P.C.*, using Aromatic Sulphuric Acid.

Not Official.

CATECHU NIGRUM.

BLACK CATECHU.

A dried extract from the wood of *Acacia Catechu*, Willd. It is also known as **Pegu Catechu** and **Cutch**. It generally occurs in irregularly shaped blackish-brown masses, astringent, and bitter in taste. The *Ind.* and *Col. Add.* put the limit of ash at 6 p.c.

Solubility.—About 80 to 90 p.c. is dissolved by cold Water, the solution being very turbid. The *Ind.* and *Col. Add.* requires not less than 80 p.c. to be soluble in Alcohol (90 p.c.).

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Official in the *Ind.* and *Col. Add.* for India, Eastern Colonies and North American Colonies, within which it may be used in making the *B.P.* preparations for which Catechu is ordered.

Foreign Pharmacopœias.—Official in Austr., Belg., Fr. (Cachou de Pégu), Ger., Ital., Jap., Mex., Port. (Cato), Russ., Span. and Swiss, U.S. **Ourouparia Gambir.** Not in the others.

Tests.—The aqueous solution is acid in reaction towards blue Litmus paper, and yields a green coloration with Ferric Chloride Test-solution, the colour changing to purple on the addition of Sodium Hydroxide Solution. About 80 to 90 p.c. should be dissolved by cold Water, and in boiling Water it should be almost completely soluble. The matter insoluble in Alcohol (90 p.c.) should not amount to more than 20 p.c. The *P.G.* states that the residue insoluble in Water, after washing with hot Water, shall when dried at 100° C. (212° F.) not amount to more than 15 p.c. The ash should not amount to more than 6 p.c. Two samples examined in the author's laboratory left 4·2 p.c. and 5·0 p.c. of ash.

Not Official.

CAULOPHYLLUM.

BLUE COHOSH.

The Rhizome and Roots of *Caulophyllum thalictroides*, Mich.

Descriptive Notes.—The rhizome is of a greyish-brown colour, knotty, 3 to 4 inches (7·5 to 10 cm.) long and $\frac{1}{4}$ to $\frac{1}{3}$ inch (6 to 8 mm.) in diameter, with few branches, and broad concave stem scars at short intervals, the internodes being marked with transverse rings about $\frac{1}{16}$ to $\frac{1}{8}$ inch (1·5 to 3 mm.) apart, and is furnished with matted undulated rootlets about 4 inches (10 cm.) long and 1 mm. broad. The transverse section is whitish and often porous. The bark is thin, the woody wedges short, the medullary rays broad, and the pith large. The rootlets have a relatively thicker bark, and a tough woody centre. It contains starch. It is almost free from odour, and has a sweetish bitter and somewhat acrid taste. The distinctive microscopic characters are the small, spherical, simple starch granules, the large and small porous vessels and the tracheids.

Caulophyllum contains a body analogous to Saponin, and termed for distinction Leontin, and a colourless, odourless, and tasteless, non-crystalline alkaloid, Caulophylline, which is soluble in Water, Alcohol (90 p.c.), Ether and Chloroform, and which on treatment with Hydrochloric Acid is converted into a crystalline salt, **Caulophylline Hydrochloride.**

Caulophyllin, an eclectic remedy in the form of a brown powder, has been recommended as an emmenagogue, sedative and diuretic. Also employed with success as an anthelmintic. Given in the form of a 1 in 20 decoction or infusion, or as a 1 in 5 tincture. Best given in form of a pill.

Dose.—1 to 4 grains = 0·06 to 0·26 gramme. Of the decoction or infusion, 1 to 2 fl. oz. = 28·4 to 56·8 c.c. Of the tincture, 1 to 2 fl. drm. = 3·6 to 7·2 c.c.

A **fluid extract** (1 in 1) and a **compound fluid extract** are also given in doses of 30 to 60 minims.

FLUIDEXTRACTUM CAULOPHYLLI.—1000 grammes of Caulophyllum, in No. 60 powder, exhausted by percolation with Alcohol (70 p.c.) to produce 1000 c.c. of fluid extract.

This was incorporated in the *B.P.C.* employing Alcohol (60 p.c.), but was changed in the *B.P.C. Supplement* to Alcohol (70 p.c.).

LIQUOR CAULOPHYLLI ET PULSATILLÆ (*Ph. Form.*).—Caulophyllum root (Blue Cohosh), 10 oz.; Pulsatilla, 10 oz.; Rectified Spirit, a sufficiency; Water, a sufficiency. Macerate the coarsely-ground drugs in 60 oz. of Rectified Spirit for forty-eight hours and transfer to a percolator. Reserve the first 12 oz. of percolate and continue percolation with 60 oz. of Water. Recover the spirit from this percolate and evaporate to 8 oz. Mix this with the reserved portion, acidify with dilute Sulphuric Acid 30 minims ($\frac{1}{16}$ fl. oz.), set aside for a day, and filter.

This formula has been incorporated in the *B.P.C.*, but the formula has been altered in the *B.P.C. Supplement* to Liquid Extract of Caulophyllum, 25; Liquid Extract of Pulsatilla, 5; Glycerin, 15; Alcohol (60 p.c.), *q.s.* to make 100.

A formula is also inserted in the *Supplement* for Liquor Caulophylli et Pulsatillæ Compositus.

CERA FLAVA.

YELLOW BEESWAX.

Fr., Cire Jaune; Ger., Gelbes Wachs; Ital., Cera Gialla; Span., Cera Amarilla.

A hard, yellow, or yellowish-brown, waxy solid, formed by the Hive-Bee, *Apis mellifica*, L.

When quite fresh, is of a golden yellow, but on keeping gets darker.

Solubility.—Entirely in Oil of Turpentine, insoluble in Alcohol (90 p.c.); slightly, and not uniformly, soluble in (cold) Ether; about 1 in 100 of boiling Alcohol (90 p.c.); 1 in 10 of boiling Ether.

Medicinal Properties.—Chiefly used in medicine as an ingredient of plasters and ointments, and is preferable to white Beeswax as the ointments made with the yellow keep a longer time without becoming rancid.

Official Preparation.—Cera Alba. Used in the preparation of Emplastrum Calefaciens, Emplastrum Cantharidis, Unguentum Menthol, Emplastrum Picis, Unguentum Hydrargyri Compositum, Unguentum Picis Liquidæ, Unguentum Resinæ and Unguentum Staphisagriæ.

Not Official.—Aseptic Wax.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Cera Amarilla), Norw., Port. (Cera Amarella), Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Yellow Beeswax is imported from many parts of the world, and as it is not in all cases produced by *Apis mellifica*, but by other species in Africa and India, it might become a legal question whether any Beeswax except that of *Apis mellifica* is intended by the Pharmacopœial description. This difficulty might have been avoided by the addition of the words 'or other species.' The wax imported from East Africa often shows a minutely crystalline surface which appears to be characteristic of it.

The value of Beeswax depends on its purity. Owing to the use of artificial foundations for the honeycomb being supplied in the beehives, containing a certain percentage of Paraffin wax, Paraffin is often found in Beeswax as an impurity. Some Beeswax is very impure and dark in colour, due to imperfect straining, and it is also sometimes deficient in odour.

Tests.—The distinguishing tests for Beeswax are that it has a specific gravity of about 0·960; the *B.P.* gives 0·960 to 0·970; the *U.S.P.* 0·951 to 0·960 at 25° C. (77° F.); the *P.G.* 0·962 to 0·966; the method adopted by the latter Pharmacopœia for ascertaining the specific gravity being given in the small type below; a melting point of 61° to 64° C. (141·8° to 147·2° F.); the *U.S.P.* gives 62° to 64° C. (143·6° to 147·2° F.); the *P.G.* 63° to 64° C. (145·4° to 147·2° F.); the method adopted by the *B.P.* for the determination of the melting point being given in the small type below under that heading; and a solidifying point of 58° to 61° C. (136·4° to 141·8° F.). It is officially required to possess an Acid value of not less than 17·8, an Ester value of from 69·08 to 75·76, and a Saponification value of from 86·88 to 93·56. The *U.S.P.* gives no Acid or Ester value, but requires a Saponification value of from 90 to 96. The *P.G.* gives an Acid value of from 18·5 to 24·15, an Ester value of from 73·0 to 75·8, and a Saponification value of from 94·3 to 97·15. The inclusion of an Iodine absorption figure would have been an advantage, genuine Beeswax absorbing from 8 to 9 p.c. of Iodine. The methods adopted by the various Pharmacopœias for the determination of the Acid, Ester and Saponification values are given below in small type. Samples examined in the author's laboratory showed

Acid values ranging from 20·0 to 22, with an average of 21·2; Ester values from 68 to 77, with an average of 72·6; Saponification values of 88 to 99, with an average of 91·3; and a fairly constant Iodine value of 8·9 p.c.

The more generally occurring adulterants are Paraffin or Ceresin Wax; Fatty Acids and Tallow; Japan Wax and Resin; Soap; Starch; and insoluble matter. The solubility of the Wax in Water detects the presence of Soap, and the solubility in boiling Sodium Hydroxide Solution detects acids, *e.g.*, Stearic Acid, Tallow, Japan Wax, and Resin. The resulting solutions should neither be turbid nor when acidified with Hydrochloric Acid should they yield precipitates. Paraffin and Ceresin Wax are detected by heating the Wax with 5 times its weight of Sulphuric Acid for 15 minutes and diluting the mixture with Water. The *B.P.* says that no solid, wax-like body should separate; the *U.S.P.* says no notable amount of solid substance 'which cannot be decomposed by Sulphuric Acid on further treatment' should separate. The solubility of the Wax in Oil of Turpentine detects the presence of Starch and mineral matter. The washed residue when treated with boiling Water, cooled, and tested with Iodine solution shall yield no characteristic blue coloration. Stearic Acid and Resin increase the Acid value and decrease the Ester value, Paraffin and Ceresin Wax decrease both the Acid and Ester value, Carnauba Wax decreases the Acid value but has no effect upon the Ester value, Japan Wax has no influence upon the Acid value but increases the Ester value, whilst Tallow and vegetable Wax increase the Ester value. Stearic Acid, Paraffin and Ceresin Wax lower the Iodine absorption, whilst Resin and Tallow increase it.

Specific Gravity.—The *P.G.* gives the following directions for taking the specific gravity. Let 2 parts of Alcohol be mixed with 7 parts of Water and the mixture allowed to stand at 15° C. (59° F.), until all air bubbles have disappeared from it, then let a small ball of yellow wax be introduced into it. This wax should float on the liquid or at least be suspended when the specific gravity of the diluted Alcohol has been brought to from 0·962 to 0·966 by the addition of Water. The ball of Beeswax requisite for this should be prepared as follows: Let the wax be melted at as low a temperature as possible and allowed to fall drop by drop into a beaker containing Alcohol. Before the fully-rounded mass so obtained is used for the determination of the specific gravity it should remain in the air for twenty-four hours, *P.G.*

Melting Point.—The *B.P.* method is to draw up into a capillary tube of 1 mm. internal diameter some of the melted wax, and allow it to cool for three hours before taking the melting point. The tube is fitted to the bulb of a thermometer and both are immersed in Water contained in a glass vessel, which must be heated gradually until the wax liquefies.

Sodium Hydroxide.—The *U.S.P.* gives the following test: If 1 gramme of yellow wax be boiled for half an hour with 35 c.c. of an aqueous solution of Sodium Hydroxide (1 in 7), the volume being preserved by the occasional addition of Water, the wax should separate on cooling without rendering the liquid opaque, and no precipitate should be produced in the liquid after filtration through glass-wool or asbestos on the addition of Hydrochloric Acid (absence of fats, fatty acids, Japan Wax, and Resin). This test is also given in the *B.P.*, but no quantities are stated. In the *P.G.* test 1 gramme of Yellow Wax is boiled with 10 c.c. of Water and 3 grammes of Sodium Carbonate. The Wax should separate out over the saline solution on cooling, and the solution should be rendered not more than opalescent.

Hydrochloric Acid.—Hydrochloric Acid should not produce a precipitate in Water which has been boiled with a portion of Yellow Wax, *U.S.P.* and *B.P.*, but the latter does not specify boiling Water.

Litmus.—If 1 gramme of Yellow Wax be boiled for a few minutes with 20 c.c. of Alcohol and filtered after an hour, the cooled almost colourless liquid should neither redden blue Litmus paper nor after adding Water to it should it become strongly turbid, *P.G.*

Acid Value.—5 grammes of Beeswax require for neutralisation of the acids not less than 1·6 c.c. of Normal Volumetric Alcoholic Solution of Potassium Hydroxide, using Phenolphthalein Solution as an indicator, *B.P.*; the *P.G.* directs the use of 5 grammes of the Beeswax, 50 c.c. of Alcohol, and after the addition of 20 drops of Phenolphthalein Solution, titration with Semi-normal Volumetric Alcoholic Potassium Hydroxide Solution, of which from 3·3 to 4·3 c.c. should be necessary for neutralisation.

Ester Value.—To the residual mixture left after the *B.P.* determination of the Acid value, a measured quantity of 20 c.c. of Normal Volumetric Alcoholic Potassium Hydroxide Solution is added, and the mixture saponified under a reflux condenser for one hour, the excess being titrated with Normal Volumetric Sulphuric Acid Solution, for which from 13·2 to 13·8 c.c. should be necessary, indicating that not less than 6·2 nor more than 6·8 c.c. has been absorbed by the Beeswax. In the *P.G.* test, after the further addition of 20 c.c. of Semi-normal Potassium Hydroxide Solution to the residue from the Acid value determination the mixture is warmed for half an hour on a water-bath, and the excess alkali is then titrated with Semi-normal Volumetric Solution of Hydrochloric Acid, when from 6·5 to 7 c.c. of the acid should be necessary for the neutralisation of the uncombined alkali.

Sulphuric Acid.—If 5 grammes of Beeswax are heated with 25 c.c. of Sulphuric Acid for 15 minutes to 160° C. (320° F.), and the mixture diluted with Water, no solid wax-like body should separate, *U.S.P.*; *B.P.* uses 25 grammes.

Saponification Value.—Yellow Wax saponified by Alcoholic Potassium Hydroxide T.S. should show a Saponification value of 90 to 96, these figures representing the number of milligrammes of Potassium Hydroxide required to saponify one gramme of Wax, *U.S.P.*

Not Official.

ASEPTIC WAX.—Beeswax, 87; Almond Oil, 12; Salicylic Acid, 1. Melt the Beeswax and Oil, strain through muslin, add the Salicylic Acid, heat to 150° C. (300° F.) in an oil-bath; allow to cool slightly, pour into stoppered bottles, which have been sterilised, and when cold add to each bottle sufficient aqueous solution of Mercuric Chloride (1 in 500) to cover the Beeswax.

This Wax is made by us for Sir Victor Horsley, who uses it for arresting hæmorrhage from cranial bones, by smearing it over the bleeding surface. Put up in wide-mouthed stoppered bottles under aseptic conditions.

This formula has been incorporated in the *B.P.C.*

CERA ALBA.

WHITE BEESWAX.

FR., CIRE BLANCHE; GER., WEISSES WACHS; ITAL., CERA BIANCA; SPAN., CERA BLANCA.

A white, or almost white, waxy, somewhat translucent solid, or in thin circular white cakes, obtained by air-bleaching yellow Beeswax.

Official Preparations.—Contained in Pilula Phosphori, Suppositoria Acidi Carbolici, Unguentum Aquæ Rosæ, and Unguentum Cetacei.

Not Official.—Ceratum, Unguentum Simplex.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Norw., Port. (Cera Branca), Mex., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—The White Beeswax of the *B.P.* should consist of English, or at least of European Beeswax, since it is Yellow Beeswax made by the *Apis mellifica*, Linn., which has been bleached by exposure to moisture, air and light. The Beeswax sold in commerce in blocks under the name of Dentists' Wax is the purest obtainable, but usually has a faint yellowish tinge. That in flat circular cakes commonly contains 1 to 2 p.c. of Paraffin Wax, which is probably due to the fact that foundations made with Paraffin are laid down in hives for the bees to build upon.

Tests.—Officially it is required to correspond to the tests for Yellow Beeswax, but during the process of bleaching by chemical means changes occur in the composition of the Wax which cause an alteration in the physical constants. It has a specific gravity of 0·960 to 0·970; a melting point of 62° to 64° C. (143·6° to 147·2° F.); an Acid value from 19 to 23; an Ester value from 74 to 84; a Saponification value from 93 to 107; and an Iodine absorption 1 to 10 p.c.

Samples examined in the author's laboratory gave Acid values ranging from 11·8 to 24·6, with an average of 15·7; Ester values ranging from 71·7 to 100·8, with an average of 92; Saponification values ranging from 96 to 114·8, with an average of 107·7; the Iodine values ranged from 2·5 to 7·6, with an average of 5·5.

The more generally occurring adulterants are those mentioned under Cera Flava, and the same methods as there described may be employed for their detection.

Not Official.

CERATUM (U.S.).—White Wax, 6; White Petrolatum, 4; Benzoinated Lard, 10; melt until the mixture is liquefied, and stir it constantly until it congeals. For use in southern latitudes, and during the heated season in other localities 1 of Benzoinated Lard may be replaced by an equal quantity of White Wax.

UNGUENTUM SIMPLEX.—Formerly Official in *B.P.*, but now omitted.

Foreign Pharmacopœias.—Official in Austr. and Hung., Lard 8, White Wax 2; Belg., Lanolin 5, Vaseline 5; Dutch, yellow Wax 3, Sesame Oil 7; Mex., White Wax 1, Sesame Oil 3; Swiss, White Wax 30, Olive Oil 70, Ethereal Tincture of Benzoin 10; U.S. Benzoated Lard 8, Yellow Wax 2; Ger. (Unguentum Cereum), Olive Oil 7, Yellow Wax 3; Jap., Yellow Wax 1, Sesame Oil 2; Port. (Ceroto Simples), White Wax 3, Almond Oil 7; Span. (Cerato Simple), White Wax 1, Almond Oil 3; Swed. (Ceratum), White Wax 1, Spermaceti 1, Benzoated Lard 3; Norw. (Ung. Ceræ), and Russ. (Ung. Cereum), Olive Oil 3, Yellow Wax 1.

CERII OXALAS.

CERIUM OXALATE.

$Ce_2(C_2O_4)_3, 10H_2O$, eq. 719·22.

A white, or almost white, odourless and tasteless granular powder. Officially it is stated to be prepared by the decomposition of a soluble salt of Cerium with a soluble Oxalate. It has been prepared from the minerals Cerite and Thorite, but is now more generally obtained from Monazite. It consists principally of Cerium Oxalate. Commercial samples usually contain the Oxalates of Lanthanum and Didymium and of other rare earths of this group.

It has been pointed out (*C.D.* '00, i. 992) that the formula should show 10 molecules of Water of crystallisation, and not 9 as in the official formula, and that pure Cerium Oxalate free from Didymium yields a pure yellow, and not a brownish-red residue on ignition.

In spite of two references to this point in Pharmacopœia Committee Reports it is interesting to note that the *B.P.C.* still retains the $9H_2O$ formula.

Solubility.—Insoluble in Water, Alcohol (90 p.c.) and in Ether. Insoluble in cold, but decomposed by boiling Potassium or Sodium Hydroxide Solutions. Insoluble in cold, but soluble in hot, diluted Sulphuric or Hydrochloric Acid.

Medicinal Properties.—Gastric sedative. Given in chronic vomiting, and vomiting during pregnancy, and of phthisis; also in dyspepsia, gastrodynia, and pyrosis. It has been recommended in sea-sickness, in doses of 10 to 20 grains every three hours. Given with success in spasmodic cough of gastric origin.

Cerium Oxalate in the gastric crisis of Tabes.—*L.* '96, ii. 551.

Dose.—2 to 10 grains = 0·13 to 0·65 gramme.

Prescribing Notes.—*It is taken in* 5 *to* 15 *grain doses as a powder mixed with a little Water; also given in* **cachets.** *It is also supplied in effervescent granules, containing* 1, 2, 3 *and* 5 *grains in each drachm.*

Foreign Pharmacopœias.—Official in Jap., Mex. and Port. (Oxalato de Cerio); U.S. Not in the others.

Tests.—The distinguishing tests for Cerium Oxalate are that at a dull red heat it is decomposed, leaving a reddish-brown powder, which is completely soluble in boiling Hydrochloric Acid, the solution yielding on the addition of a saturated Potassium Sulphate solution a white crystalline precipitate; Potassium or Sodium Hydroxide Solution yields a white precipitate which gradually turns yellow on contact with the air, and which does not dissolve in an excess of the reagent; whilst Ammonium Carbonate Solution yields a white precipitate more or less soluble in an excess of the reagent. In carrying out the test with Potassium Sulphate Solution the *U.S.P.* uses the salt itself and not the residue left on ignition; dissolves in Sulphuric Acid instead of Hydrochloric Acid, and uses a 1 in 10 Potassium Sulphate Solution in the place of a saturated solution. The *B.P.* makes no mention of the precipitates produced by Potassium or Sodium Hydroxide Solution.

It is officially required to lose 53 p.c. in weight when incinerated, but no direct indication is given of the composition of the ash. According to the *U.S.P.* it should leave a reddish-brown residue of Ceric and other rare earth oxides, amounting to not less than 47 p.c. of the salt. *B.P.* omits to mention that it should yield the 'reactions characteristic of Oxalates.' Their presence may be detected on decomposing the salt by boiling with Potassium or Sodium Hydroxide

Solution, adding a slight excess of Acetic Acid to the filtrate and then Calcium Chloride Solution; a white precipitate insoluble in Acetic Acid but soluble in Hydrochloric Acid should be produced.

The more generally occurring impurities are Arsenic, Iron, Zinc, Calcium, Aluminium, Carbonates or Phosphates. These impurities are grouped collectively in the *B.P.* The more important are Arsenic, which may be detected by the modified Gutzeit's test, and Zinc, which may be detected by first boiling the salt with Potassium or Sodium Hydroxide Solution, cooling, filtering and adding Hydrogen Sulphide Solution to the filtrate. If this filtrate be previously divided into two portions, the second portion may be used in testing for Aluminium, which is precipitated on the addition of Ammonium Chloride Solution.

Iron may be detected by the addition of Potassium Ferrocyanide Solution to a solution of the salt in diluted Hydrochloric Acid. The *U.S.P.* regards the absence of effervescence when the salt is dissolved in diluted Hydrochloric Acid as indicative of the absence of Carbonates, a test preferable to that of the *B.P.*, which requires that the reddish-brown powder remaining after decomposition at a dull red heat shall dissolve without effervescence in 'boiling Hydrochloric Acid.' Calcium and Phosphates are unlikely impurities and are not included in the *U.S.P.* Cerium Oxalate is not official in the *P.G.*

Calcium Chloride.—If the filtrate from the residue obtained by boiling the salt with Potassium Hydroxide T.S. be supersaturated with Acetic Acid, the addition of Calcium Chloride T.S. will produce a white precipitate insoluble in Acetic Acid, but soluble in Hydrochloric Acid, *U.S.P.*

Ammonium Carbonate.—The solution in Hydrochloric or Sulphuric Acids yields with Ammonium Carbonate T.S. a white precipitate of Cerous and other rare earth carbonates, which are somewhat soluble in excess of the reagent, *U.S.P.*

Strychnine.—If the residue left after heating Cerium Oxalate be dissolved in concentrated Sulphuric Acid, and a small crystal of Strychnine added, a deep blue colour will appear which will rapidly change to purple and then to red, *U.S.P.*

Time-limit Test.—The Solution (1–20) in Diluted Hydrochloric Acid should not respond to the time-limit test for heavy metals, omitting the addition of Ammonia Water, *U.S.P.*

Gutzeit's Test.—Five c.c. of a solution of the salt (1–10) in Diluted Hydrochloric Acid should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Ammonium Chloride.—On boiling the salt with T.S. of Potassium Hydroxide, and filtering, no precipitate should be produced in the filtrate by the addition of T.S. of Ammonium Chloride, *U.S.P.*

Ammonium Sulphide.—The filtrate obtained on boiling the salt with T.S. of Potassium Hydroxide, and filtering, should not yield a precipitate with T.S. of Ammonium Sulphide, *U.S.P.*

CETACEUM.

SPERMACETI.

Fr., Blanc de Baleine; Ger., Walrat; Ital., Cetina;
Span., Esperma de Ballena.

White, odourless, somewhat translucent, crystalline, pearly masses, unctuous to the touch, and having a bland mild taste. It is a peculiar, concrete, fatty substance obtained from the Sperm Whale, *Physeter macrocephalus*, L., occurring chiefly in a cavity in the head, but also obtained from smaller cavities in the body.

The Sperm Whale inhabits the Pacific and Indian Oceans.

Cetin or Cetyl Palmitate when saponified yields Ethal (Cetyl Hydrate), and not Glycerin (Glyceryl Hydrate). Most Oils and Fats are Oleates, Palmitates, and Stearates of Glyceryl, which when saponified yield Glycerin and Oleates, Palmitates and Stearates of the metals.

Solubility.—Slightly in Alcohol (90 p.c.); 1 in 80 of boiling Alcohol (90 p.c.); 1 in 6 of Ether; 4 in 5 of Chloroform; and in the fixed and volatile Oils.

Medicinal Properties.—Emollient. It is much employed for **ointments** and **cerates.**

Spermaceti can be powdered quite readily with the addition of Alcohol (90 p.c.), but when Alcohol is contra-indicated it can also be powdered by the addition of 12 minims of fixed Oil of Almonds to each oz. of Spermaceti.

Official Preparations.—Unguentum Cetacei. Contained in Unguentum Aquæ Rosæ and Unguentum Capsici.

Not Official.—Mistura Cetacei, Cold Cream, Unguentum Cetacei sine Benzoino.

Foreign Pharmacopœias.—Official in all except Belg. Mex. (Esperma); Port. (Espermaceti).

Descriptive Notes.—Spermaceti is deposited from Sperm Oil, which is found in cavities of the head of the Sperm Whale, *Physeter macrocephalus*, L. The oil is cooled, the Spermaceti separated by straining, and pressed in bags to remove adhering oil, until hard and brittle. It is then melted in boiling Water to which a weak solution of Potash is added to remove impurities, washed and crystallised. The crystalline masses in which it occurs in commerce are quite characteristic in appearance. Chinese insect wax, which is but rarely imported, closely resembles it, but is much harder. It is a wax secreted by *Coccus Pela*, Westw., in China, on the twigs of Chinese species of Ash and Privet, and is used by the Chinese to form an outer layer on candles to prevent guttering. It has a much higher melting point than Spermaceti.

Tests.—The distinguishing tests for Cetaceum are the melting point, which should be about 48° C. (118·4° F.) and which is officially required to be from 46° to 50° C. (114·8° to 122° F.), but which is occasionally as low as 43° C. (109·4° F.), and the specific gravity, which should be from 0·942 to 0·946, and to which no reference is made in the *B.P.* The *U.S.P.* gives the melting point as 42° to 50° C. (107·6° to 122° F.); the *P.G.* 45° to 50° C. (113° to 122° F.). The *B.P.* adopts the same method for taking the melting point of Cetaceum as for Cera Flava. The *U.S.P.* gives the specific gravity as 0·935 to 0·944 at 25° C. (77° F.), 0·842 at 100° C. (212° F.); the *P.G.* gives an average specific gravity of 0·943. It should possess an Acid value of from 0·1 to 0·5, and a Saponification value of from 125 to 136. The *B.P.* places the limit of acidity at not more than 'one drop' of Normal Volumetric Sodium Hydroxide Solution for the neutralisation of the alcoholic solution of 0·2 gramme of Spermaceti, using Phenolphthalein Solution as indicator, but gives no figure for the Ester value. The quantity (0·2 gramme) used in the official method of determination is too small, and it is preferable to employ from 1 to 5 grammes. The limit of acidity indicates an Acid value of 13·9, and is altogether too high even for old samples. The Acid value increases greatly with age. A sample examined in the author's laboratory in November, 1896, showed the merest trace of free acid, but when re-examined in July, 1901, exhibited an Acid value of 4·5. The Iodine absorption of pure Spermaceti is practically nil.

The more generally occurring sophistications are Stearic and Palmitic Acids, Stearin, Tallow, and Paraffin Wax. Stearin and Palmitic Acid may be detected by the reaction of the alcoholic solution towards Litmus and by the precipitate produced on dilution of the solution with Water. The *U.S.P.* and *P.G.* boil with anhydrous Sodium Carbonate and Alcohol, subsequently acidifying the solution with Acetic Acid, and state that the solution may become turbid, but should not give a precipitate. The solubility in boiling Alcohol (90 p.c.) detects the presence of Stearin, Tallow, and Paraffin Wax. Tallow and Stearin increase and Paraffin Wax diminishes the saponification value. The presence of Tallow may also be recognised by the increased Iodine absorption. Paraffin Wax notably diminishes the specific gravity.

Alcohol.—If Spermaceti be boiled with Alcohol (90 p.c.), and the mixture cooled and filtered, the filtrate should not afford a flocculent precipitate on the addition of Water, *B.P.* (an equal quantity of Water), *P.G.* At ordinary temperatures Cetaceum gradually crystallises out from a solution in boiling Alcohol (90 p.c.), which is approximately 1 in 50, *P.G.*

Acetic Acid.—If 1 gramme of Cetaceum be boiled with 1 gramme of anhydrous Sodium Carbonate and 50 c.c. of Alcohol, and the mixture cooled and filtered, the filtrate on being supersaturated with Acetic Acid may become turbid, but it should not afford a precipitate, *P.G.* and *U.S.P.*

Preparations.

UNGUENTUM CETACEI. SPERMACETI OINTMENT.

Spermaceti, 5; White Beeswax, 2; Almond Oil (by weight), 18; Benzoin, in coarse powder, ½. Melt together the Spermaceti, Beeswax, and Almond Oil; add the Benzoin, and frequently stirring the mixture, continue the application of heat for two hours; remove from the source of heat; strain; and stir the Ointment constantly until cold.

It would be better to omit the Benzoin, which was first added in 1885; as pointed out in previous editions, the Benzoin converts this emollient preparation into one which is irritating: *see* below.

The following are called **Unguentum Cetacei**—(all by weight):—

Dan. Spermaceti 2, White Wax 1, Oil of Almonds 12, Rose Water 5.
Norw. Spermaceti 6, White Wax 6, Oil of Almonds 58, Rose Water 30.
Russ. Spermaceti 3, White Wax 3, Olive Oil 14, Rose Water 2.
Swed. Spermaceti 2, White Wax 1, Oil of Almonds 12, Rose Water 5.
Swiss. Spermaceti 2, White Wax 1, Arachis Oil 7, Ethereal Tincture of Benzoin, 1.

The following are called **Ceratum Cetacei**—(all by weight):—

Austr. Spermaceti, White Wax, Sesame Oil, equal parts.
Hung. Spermaceti 8, White Wax 8, Lard 9.
Port. Spermaceti 1, White Wax 1, Oil of Almonds 3.
Span. Spermaceti 4, White Wax 4, Oil of Almonds 47, Rose Water 45.
U.S. See **Unguentum Aquæ Rosæ.**

Cold Cream is a synonym for Unguentum Cetacei, *Dan.* and *Swed.*, and Unguentum Leniens, *Belg.* and *Ger.*

The following are called **Unguentum Leniens**—(all by weight):—

Austr. Spermaceti 15, White Wax 8, Sesame Oil 62, Water 15, Otto of Rose 2 drops.
Belg. White Wax 14, Almond Oil 56, Rose Water 30.
Dutch. Spermaceti 10, Yellow Wax 5, Adeps Lanæ 10, Sesame Oil 50, Rose Water 25.
Ger. Spermaceti 8, White Wax 7, Almond Oil 57, Water 28, Otto of Rose 0·1.

Unguentum Refrigerans—(all by weight):—
Swiss. Spermaceti 10, White Wax 8, Arachis Oil 57, Castor Oil 5, Otto of Rose 1 drop, Rose Water 20.

Pomata con Olio di Mandorle:—*Ital.* Spermaceti 1, White Wax 1, Oil of Almonds (by weight) 8.

Cerato de Galeno:—*Span.* Almond Oil 55, White Wax 15, Agua de Rosas 30.

Not Official.

UNGUENTUM CETACEI SINE BENZOINO.—Spermaceti 5, White Beeswax 2, Almond Oil 18.

The *B.P.* ointment made with Benzoin is unsuited for many purposes for which this ointment is useful, such as **eye** ointments, ointment for piles, etc.

Used as a cooling dressing. Applied on lint to broken blisters resulting from walking, it affords great relief, and frequently enables one to continue the exercise without serious discomfort. It is also recommended for smearing on the feet before starting for a long walk on rough ground.

MISTURA CETACEI.—Spermaceti 60 grains, Proof Spirit 15 minims, finely pulverise the Spermaceti by aid of the Spirit, and add by degrees half the yolk of an egg, at first only sufficient to make a stiff paste, which should be made very smooth by diligent trituration, then add the rest, and make up with Water to 4 oz.

[This formula was given in Squire's *Companion* 1864.]

COLD CREAM.—White Beeswax, 1; Spermaceti, 1; Oil of Almonds, 8; Rose Water, 11; Otto of Rose to perfume it. Melt together, by means of water-bath, the Oil, Spermaceti, and Beeswax, add the Otto, strain through muslin into the Rose Water; stir together whilst gently warming until Water globules are no longer visible, and the mixture is of proper consistence to pour into pots without separating. This form has been used by the author for several years, but Cold Cream is more easily and more generally made with less Rose Water. *See* also Unguentum Aquæ Rosæ under Rosæ Oleum.

Cold Cream.—Spermaceti, 60; White Wax, 30; Almond Oil, 215; Rose Water, 60; Tincture of Benzoin, 15; Otto of Rose, 10 drops.—*Fr.*

Not Official.

CETRARIA.

ICELAND MOSS.

The dried Lichen, *Cetraria Islandica*, L. A native of the north of Europe.

It contains a bitter principle, **Cetrarin** (Cetraric Acid), which has been used as a tonic.

Medicinal Properties.—Demulcent, nutritious, and slightly tonic.

Iceland Moss Jujubes are useful for coughs.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr. (Lichen d'Islande), Ger., Hung., Ital., Jap., Port., Span. (Liquen Islandico), and Swiss, *Lichen Islandicus*; Mex. (Liquen de Islandia). Not in Norw.

Descriptive Notes.—The frond of the lichen, *Cetraria islandica*, L., is more or less branched in a forked manner, of a brownish colour above, and greyish-white below, marked on the under surface with numerous minute scattered chalky-white pits. It is flat, channelled above, and has a crisp mode of growth. The wavy edges are furnished with a fringe of numerous minute short linear papillæ. The fructification, which consists of a flat, disc-like, dark brown expansion near the margin of the frond, is rarely met with, and then mostly on the broader varieties of the plant. The taste is mucilaginous and slightly bitter.

DECOCTUM CETRARIÆ.—Iceland Moss, 1; first wash with cold Water, then add Distilled Water, 20; boil ten minutes, strain with gentle pressure whilst hot and wash the marc to make 20. (1 in 20)

Dose.—1 to 4 fl. oz. = 28·4 to 113·6 grammes.

Official in Ital., 1 in 20; Fr. (Tisane), 1 in 100; Ital. has also **Infusion,** 1 in 20.

SACCHARUM CETRARIÆ.—Iceland Moss 1, Sugar 1, Water 100. Wash the Iceland Moss with Water to remove the bitterness, then boil with 100 of Water, strain and express lightly, and in the strained liquid dissolve the Sugar and evaporate on a water-bath. When sufficiently firm remove from the bath and dry in a cupboard to a powder or scale.

GELATINA CETRARIÆ (Iceland Moss Jelly).—Saccharated Cetraria 2, Sugar 1, Water 5. Mix, boil gently till scum collects on the surface, then withdraw the heat, remove the scum, and pour into pots to cool.

A similar preparation is given in Ital., Port. and Span.

Pâte de Lichen officinal containing 1 of Extract of Opium in 5000.—*Fr.*

Not Official.

CARRAGEEN.

IRISH MOSS. *Syn.*—CHONDRUS.

Fr., Carragaheen; Ger., Irlandisches Moos; Ital., Fuco Carageo;
Span., Carragaen.

The dried seaweed *Chondrus crispus*, Lyngb. It is used as an article of food on the west coast of Ireland, where it abounds. Has been proposed as a substitute for Acacia as an emulsifying agent and for the suspension of some powders.

One part of Chondrus boiled for ten minutes with 30 parts of Water yields a solution which gelatinises on cooling, and is not coloured blue by T.S. of Iodine. —*U.S.P.*

Foreign Pharmacopœias.—Official in Belg., Dan., Dutch, Fr., Ger., Hung., Ital. (Fuco Carageo), Jap., Mex. (Liquen Carragaen), Port. (Alga Perlada), Span. and Swiss. Fr. has a Tisane 1 in 200.

SACCHARUM CARRAGEEN.—Made like Saccharum Cetrariæ.

GELATINA CARRAGEEN (Irish Moss Jelly).—Made like Gelatina Cetrariæ.

Official in Port.

MUCILAGE OF MOSS.—Irish Moss, $\frac{1}{2}$ oz., is boiled with 40 oz. of Water for 15 minutes and made up to 34 oz.—*Armour's Formulary.*

Decoctum Chondri.—Irish Moss, 2·50; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

The *B.P.C. Supplement* gives the *syn.* Mucilage of Irish Moss.

Not Official.

CHALMOOGRA OIL. *See* Gynocardiæ Oleum.

Not Official.

CHELIDONIUM.

GREATER CELANDINE.

The entire Plant *Chelidonium majus*, L.

The juice has been used in opacities of the cornea, and is a popular application for the cure of warts.—*B.M.J.* '97, i. 25 and 354.

Has been recommended chiefly by Denisenko in the treatment of cancer. *B.M.J.* '97, i. 25, 354 and 637; ii. 123; *B.M.J.E.* '96, ii. 88; '97 ii. 47; *L.* '96, ii., 649 and 1778; *L.* '97, ii. 737; *P.J.* '97, i. 86. Unfavourably commented on *P.J.* '98, i. 61. In the treatment of inoperable cancer, Celandine is worthy of trial.—*L.* '01, ii. 967; *C.D.* '01, ii. 1048.

Chelidonine.—This alkaloid forms colourless crystals, melting at 135° C. (275° F.); soluble in Alcohol (90 p.c.), insoluble in Water, and but slightly soluble in Ether.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme.

The **Sulphate** is readily soluble in Water, the **Hydrochloride** less so, and the **Tannate** is insoluble in Water.

CHIRATA.

CHIRETTA.

FR., CHIRETTE; GER., OSTINDISCHER ENZIAN.

The entire dried Plant, *Swertia Chirata*, Ham., collected when in flower.

It is a native of, and is obtained from, Northern India.

Under the title of **Andrographis,** the dried plant, *Andrographis paniculata*, is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Medicinal Properties.—Bitter tonic and stomachic; without astringency; given in atonic dyspepsia. Containing no Tannin, it may be prescribed with Iron.

Official Preparations.—Infusum Chiratæ, Liquor Chiratæ Concentratus, and Tinctura Chiratæ.

Not Official.—Infusum Chiratæ Concentratum.

Foreign Pharmacopœias.—Official in Port. and U.S. Not in the others.

Descriptive Notes.—The Chirata official in the *B.P.* is distinguished by its very bitter taste, by the opposite, entire, glabrous, ovate leaves, and by the pith being continuous, solid, and easily separable. It is met with in commerce in compact flattened bundles about 3 ft. long and about 5 or 6 in. thick, and weighing 1½ to 2 lb., and bound round with a slip of bamboo. Other allied species are used in different provinces of India, and some of them are occasionally imported and sold as the genuine drug. Of these *Swertia angustifolia*, Buch-Ham., has a more woody, tougher and nearly hollow stem. *S. alata*, Royle, has pale angular stems, with a large pith. These give a much less bitter infusion than genuine Chirata. Sometimes Chirata is falsely packed, Madder roots or other plants, or even stones, being concealed in the centre of the bundle. *Andrographis paniculata*, Nees, has distinctly quadrangular stems and irregular flowers, and only

3 or 4 seeds in each capsule, and is not packed in loose bundles. It is rarely imported and not likely to be confounded with Chirata. It is official in the *Ind.* and *Col. Add.* Under the microscope the leaves may be distinguished from those of Chirata by the presence of cystoliths below the upper epidermis, which are shorter than in most other medicinal Acanthaceous plants, by the stomata being placed between a large and small cell, and by the quadricellular glandular hairs (*Planchon* and *Collin*).

Preparations.

INFUSUM CHIRATÆ.

Chiretta, cut small, 1; boiling Distilled Water, 20: infuse for fifteen minutes; strain. (1 in 20)

Now 1 in 20 instead of 1 in 40.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

A corresponding preparation, **Infusum Andrographidis,** is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

LIQUOR CHIRATÆ CONCENTRATUS. CONCENTRATED SOLUTION OF CHIRETTA.

1 of Chiretta, in No. 40 powder, percolated with Alcohol (20 p.c.) to yield 2. (1 in 2)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Concentrated solution of Chiretta has a specific gravity of 0·990 to 1·010; it contains about 5 p.c. w/v of total solids and 19 p.c. w/v of Absolute Alcohol.

A corresponding preparation, **Liquor Andrographidis Concentratus,** is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

U.S. has a **Fluid extract,** 1 in 1, using Alcohol 49 p.c.

TINCTURA CHIRATÆ.

1 of Chiretta, in No. 40 powder, percolated with Alcohol (60 p.c.) to yield 10. (1 in 10)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Prescribed in 5 minim doses, with Acids and Tincture of Orange to form an acid tonic mixture.

A corresponding preparation, **Tinctura Andrographidis,** is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Tests.—Tincture of Chiretta has a specific gravity of 0·920 to 0·925, it contains about 1·5 p.c. w/v of total solids and about 60 p.c. w/v of Absolute Alcohol.

Not Official

INFUSUM CHIRATÆ CONCENTRATUM.—Chiretta, in No. 40 powder, 40; Alcohol (90 p.c.), 25; Dilute Chloroform Water (1 in 1000), sufficient to make 100. Prepare by repercolation.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* 1907, 249.

This formula appears in the *B.P.C.*

CHLORAL HYDRAS.

CHLORAL HYDRATE.

$CCl_3.\,CH(OH)_2$, eq. 164·15.

Fr., Hydrate de Chloral; Ger., Chloralum Hydratum; Ital., Cloralio Idrato; Span., Hidrato de Cloral.

Transparent, colourless, rhomboidal crystals, having an aromatic penetrating odour, and an unpleasant, slightly bitter, acrid taste.

It should be kept in well-stoppered amber-tinted glass bottles in a cool and dark place.

Chemically it is Trichlorethylidene Glycol. Anhydrous Chloral is produced by the action of dry Chlorine gas on Ethyl Alcohol, the pure Chloral being subsequently converted into Hydrate by the addition of the necessary amount of Water and purified by recrystallisation from suitable solvents.

Solubility.—4 in 1 of Water, and measures 3¼; 5 in 1 of Alcohol (90 p.c.); 2 in 1 of Ether; 2 in 1 of Glycerin; 1 in 1 of Olive Oil; 1 in 3 of Chloroform; 1 in 10 of Oil of Turpentine (cold), 1 in 5 boiling; 1 in 68 of Carbon Bisulphide.

Medicinal Properties.—An excellent hypnotic, producing natural and placid sleep soon after its administration; in acute mania and delirium tremens it is given as a cerebral depressant. Given in asthma and whooping-cough, and extreme cases of chorea; efficacious in large doses in sea-sickness. Has been found useful as a spinal depressant and antispasmodic in tetanus, uræmic and puerperal convulsions, and by intravenous injection in Strychnine poisoning. Of great value in labour, as it relieves pain, assists to dilate the os and relax the rigid perinæum, especially in primiparæ, without lessening the expulsive power of the uterus. Given in nocturnal incontinence of urine. It should not be given in advanced cardiac disease, nor in fatty heart. Children stand it well.

It is not suitable for insomnia due to pain; as an analgesic it is inferior to opium.

In concentrated solution, applied locally, it acts as a vesicant.

As a pigmentum with Camphor and sometimes with Cocaine, it is useful for the relief of neuralgia, rheumatism, toothache and chilblains.

In tetanus in 20 grain doses every five hours (*B.M.J.* '04, ii. 1460), and along with injections of antitetanic serum (*B.M.J.* '04, ii. 1429); in sea-sickness teaspoonful doses every five minutes of a mixture of 2 drm. of the syrup with ½ drm. Ammonium Bromide made up to 1½ oz. with Water; where this fails relief often follows 1 minim doses of Tincture of Iodine.—*B.M.J.*, '04, ii. 1405.

The only satisfactory way of giving this drug in obstinate cases of sea-sickness is by the rectum in doses of from 20 to 30 grains.—*B.M.J.* '05, i. 1090.

The tendency to eclampsia may often be controlled (*B.M.J.* '05, ii. 718) by the administration of ½ drm. doses, combined with a drm. of Potassium Bromide and repeated if necessary every hour.

It is shown (*B.M.J.* '05, ii. 250) to be of special use in sleeplessness and pain of gouty people with high blood pressure. It seems a general law (*B.M.J.* '05, ii. 1005) that when a hypnotic contains Chlorine in its molecule its effects are not limited to the brain and central nervous system, but extend to the heart and the tissues in general.

In the treatment of convulsions in early infancy (*Pr.* lxxv. 514), 2 to 3 grains may be given hypodermically or introduced into the bowel through a rubber catheter. For rectal injection 5 grains may be given to a baby of six months and 10 grains to one a year old. One grain every two hours in the youngest babies (*Pr.* lxxv. 517), and in children of one or two months 1 to 2 grains, continued in these doses until the fits have ceased, for at least 24 or 36 hours, in the treatment of idiopathic convulsions.

Effects from an overdose or repeated overdoses are excitement, convulsions, and delirium, followed by deep coma and quiet sleep from which the patient may never stir; he may, however, pass to death without any previous convulsions. It lowers temperature, and causes contraction of the pupil.

A case of puerperal eclampsia treated by Chloral Hydrate, Potassium Bromide, and Chloroform inhalation.—*L.* '97, ii. 915.

As a pigment to the interior of the nostrils in acute coryza, 10 grains in 4 drm. Castor Oil.—*Pr.* lv. 517.

Applied spread over the surface of diachylon plaster, the skin having been previously rubbed over with Almond Oil or Vaseline, it acts as a vesicant, superior to Cantharides.—*P.J.* '02, i. 115.

Dose.—5 to 20 grains = 0·32 to 1·3 gramme.

Ph. Ger. maximum single dose, 3 grammes; maximum daily dose, 6 grammes.

Prescribing Notes.—*3 oz. will dissolve in 1 fl. oz. of Water, and measure 2 fl. oz. and $5\frac{1}{2}$ fl. drm.; if to this be added 23 minims of Water, every minim will contain a grain of Chloral. This* **solution** *is handy for dispensing.*

It is usually given in solution, but the objectionable taste is difficult to mask; Chloral Hydrate, 20 grains, Syrup of Orange, 1 fl. drm., Peppermint Water, to 1 fl. oz., make a good draught for those who do not object to Peppermint.

Chloral Hydrate, 4 grains, Liquorice Root, in powder, 1 grain, Gum Acacia, in powder, $\frac{1}{2}$ grain, make a good **pill,** *with a trace of 'Diluted Glucose.'*

The addition of 1 grain to the fl. oz. will keep hypodermic solutions otherwise liable to develop fungoid growths.

Incompatibles.—When prescribed with Alkalis, Chloroform will be liberated.

Official Preparation.—Syrupus Chloral.

Not Official.—Liquor Bromo-Chloral Compositus, Chloral Camphoratum, Chloral cum Camphora et Cocaina, Chloral et Phenol, Suppositoria Chloral, Dormiol, and Chloral Tannin.

Antidotes.—Stomach-tube or emetics; keep up the temperature by hot blankets, hot-water bottles, etc.; injection of a pint of hot strong coffee into rectum; electro-magnetism; inhalations of Amyl Nitrite; in bad cases hypodermic injection $\frac{1}{25}$ grain of Strychnine Nitrate: artificial respiration.—*Murrell.*

$\frac{1}{20}$ of a grain of Picrotoxin has been found enough for 30 grains of Chloral.—*B.M.J.* '75, i. 506.

Foreign Pharmacopœias.—Official in Austr., Belg., Ger., Hung., Jap., Russ., Swiss and U.S. (Chloralum Hydratum); Dutch (Hydras Chlorali); Dan., Norw. and Swed. (Hydras Chloralicus); Fr., Ital. (Cloralio Idrato); Mex. (Cloral Hidratado); Port. (Hydrato de Chloral); Span. (Hidrato de Cloral).

Tests.—The distinguishing tests for Chloral Hydrate are the melting point of the crystals, which, when dried, should be about 58° C. (136·4° F.); the temperature at which the melted liquid again becomes solid (the solidifying point), which is officially required to be about 48·9° C. (120° F.); and the boiling point (when heated in a test-tube with pieces of glass contained in it), which is officially required to be from 94·4° to 96·7° C. (202° to 206° F.). The *B.P.*

gives no figure for the melting point, but *P.G.* and *U.S.P.* state it to be about 58° C. (136·4° F.) when dry. The *U.S.P.* gives a range of from 35° to 50° C. (95° to 122° F.) for the solidifying point. The best adjusted solidifying point is considered by Squibb to be 50° C. (122° F.). If the sample is too much under-hydrated the solidifying point is higher and the boiling point is under 95° C. (203° F.), and the sample is prone to decompose and become acid on keeping. If over-hydrated the solidifying point is lower and the boiling point is above 98° C. (208·4° F.) and the sample is deliquescent, a slightly under-hydrated sample is the best for good-keeping qualities.

The aqueous solution should be neutral or but slightly acid to Litmus. The *U.S.P.* states that the aqueous solution gradually acquires an acid reaction, but that a neutral alcoholic solution remains permanently neutral.

An aqueous solution warmed with Potassium or Sodium Hydroxide Solution evolves immediately a powerful odour of Chloroform, the Chloral Hydrate being decomposed with formation of Chloroform and the corresponding Formate of the alkali Hydroxide. If to the cooled solution a few drops of Aniline Oil be added, and the liquid again warmed, the powerful, penetrating, and highly poisonous odour of Phenyl-isonitrile is evolved. When heated with an excess of Potassium or Sodium Hydroxide Solution the Chloroform at first formed is itself decomposed with the production of the corresponding Chloride of the alkali and a further quantity of Formate.

The *B.P.* process of quantitative determination is founded upon decomposition by an alkali Hydroxide Solution. It is officially required to indicate 98·5 p.c. of pure Chloral Hydrate as volumetrically determined from the quantity of Normal Volumetric Sodium Hydroxide Solution required to decompose 4 grammes. No requisite percentage or method of determination is given in the *P.G.* The *B.P.* test has been severely criticised. If as in the official method of procedure the Chloral Hydrate be 'heated' with the Normal Volumetric Sodium Hydroxide Solution, results greatly in excess of the truth are yielded, attributable to secondary decomposition of the Chloroform by the excess of alkali. The term 'heated' may be variously understood by different operators. It has been pointed out (*P.J.* '99, i. 236; '01, i. 387; '03, i. 531) that if the reaction be allowed to proceed at the ordinary temperature fairly concordant results may be obtained, but the range of temperature must be restricted within narrow limits. A correction may also be made (*P.J.* '07, ii. 4) by allowing the secondary reaction to commence and ascertaining the extent to which it has proceeded by titration of the resultant Chloride with Deci-normal Volumetric Silver Nitrate Solution.

The *Companion* (17th Edition) suggested determination, when in very dilute solution, by reduction by the Copper-Zinc couple and titration with Deci-normal Volumetric Silver Nitrate Solution. A process described (*P.J.* '07, ii. 6) depends upon the reduction of the Chloral Hydrate by means of Aluminium Powder or Zinc filings and Acetic Acid. A weighed quantity of 0·25 gramme is boiled with 1 gramme of Aluminium Powder, 15 c.c. of Acetic Acid *B.P.*, and

40 c.c. of Water under a reflux condenser for half an hour. The mixture is then filtered, the filter and flask washed with Water, 50 c.c. of Deci-normal Volumetric Silver Nitrate Solution is then added, the Silver Chloride filtered out, and the excess of Volumetric Silver Nitrate Solution determined with Deci-normal Volumetric Ammonium Sulphocyanide Solution, adding 10 c.c. of strong Nitric Acid and 5 c.c. of a saturated Iron Alum solution as indicator. Each c.c. of Deci-normal Volumetric Silver Nitrate Solution used is equivalent to 0·005472 gramme of pure Chloral Hydrate.

Chloral Hydrate may be extracted from its aqueous solution by shaking out with Ether or Acetic Ether.

A simple process for the approximate determination of the amount of Chloroform yielded on treatment with Potassium Hydroxide may be conveniently conducted in a graduated tube, thus: Place in a tube 250 grain-measures of a 20 p.c. Potassium Hydroxide Solution, and add to it gradually (keeping it cold) 50 grains of the Chloral Hydrate, cork securely, and shake; allow the liquid to separate, and the number of grain-measures of Chloroform (at the bottom), to which must be added 1 for every 200 grain-measures of supernatant liquid, multiplied by 1·5 gives the grains of Chloroform, which should be not less than 35.

The more generally occurring impurities are mineral matter, Chloral Alcoholate, certain organic impurities and Chlorides. Mineral residue is readily detected when the drug is volatilised on Platinum foil. The *B.P.* employs the Iodoform test as a means of detecting Chloral Alcoholate. No yellow crystalline precipitate of Iodoform should be produced within an hour, when Iodine Solution, in sufficient quantity to yield a brown coloration, is added to a filtered mixture of 1 gramme of the hydrate warmed with 6 c.c. of Water and 0·5 c.c. of Potassium Hydroxide Solution, *B.P.* Organic impurities may be detected by shaking the chloroformic solution with concentrated Sulphuric Acid, whilst Hydrochloric Acid and Chlorides may be detected by Silver Nitrate Solution, the *B.P.* requires that the aqueous solution should not afford any precipitate with Silver Nitrate Solution, the *U.S.P.* requires that the 1 in 20 aqueous solution, slightly acidulated with Nitric Acid, should remain unaffected by Silver Nitrate T.S.

Sulphuric Acid.—No colour should be imparted to Sulphuric Acid when it is shaken with a solution of Chloral Hydrate in Chloroform, *B.P.* The *P.G.* test directs 0·5 gramme of Chloral Hydrate to be vigorously shaken with 5 c.c. of Sulphuric Acid in a glass-stoppered test-glass of 3 cm. diameter, and which has been previously rinsed out with Sulphuric Acid. The Sulphuric Acid should not become coloured within one hour.

Silver Nitrate.—An alcoholic solution (1–10) of Chloral Hydrate should not be affected at once by T.S. of Silver Nitrate, *P.G.*; that an aqueous solution (1–20) slightly acidulated with Nitric Acid should remain unaffected, *U.S.P.*; an aqueous solution should not afford any precipitate with T.S. of Silver Nitrate, *B.P.*

Preparation.

SYRUPUS CHLORAL. Syrup of Chloral.

Dissolve 800 grains of Chloral Hydrate in 15 fl. drm. of Distilled Water, and add Syrup, *q.s.* to yield 10 fl. oz. (10 grains in 60 minims)

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.

Foreign Pharmacopœias.—Official in Belg. and Fr., 1 in 20, with Peppermint; Mex., 1 in 20; Port., 1 in 50; Span., 1 in 32·5. All by weight. Not in the others.

Not Official.

LIQUOR BROMO-CHLORAL COMPOSITUS.—Chloral Hydrate, 1600 grains; Tincture of Indian Hemp, 400 minims; Tincture of Orange, 400 minims; Henbane Juice, 1600 minims; Syrup, 3¾ fl. oz.; Fluid Extract of Liquorice, ½ fl. oz.; dissolve. Add 1600 grains of Potassium Bromide dissolved in 7 fl. oz. of Distilled Water; filter, wash with Distilled Water to produce 20 fl. oz. Each fl. drm. contains 10 grains of Chloral Hydrate and 10 grains of Potassium Bromide.

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.—*B.P.C. Formulary* 1901.

B.P.C. is practically the same strength, but calculated into parts per 100 fluid parts.

Bromidia is somewhat similar in composition.

It has been suggested that each fl. drm. should be made to contain 15 grains each of Chloral and Potassium Bromide, and that the filtration should be omitted, since it takes out the resins of the Indian Hemp. Suspension by mucilage recommended. Hyoscine Hydrobromate recommended to be substituted for Henbane.—*C.D.* '02, ii. 314.

SUPPOSITORIA CHLORAL.—Chloral Hydrate, 5 grains; White Wax, 5 grains; Oil of Theobroma, 7 grains. Melt together the Wax and Theobroma Oil, and when partially cooled, mix in the Chloral Hydrate and pour into a mould.

CHLORAL CAMPHORATUM.—Chloral Hydrate, 1; Camphor, 1; rub together in a warm mortar until completely liquefied, and filter if necessary. —*B.P.C. Formulary* 1901, now incorporated in the *B.P.C.*

As a **Pigmentum** this formula has appeared for many years in the Pharmacopœias of the London, Throat and Westminster Hospitals.

Useful application for the relief of neuralgia.

CHLORAL CAMPHORATUM CUM COCAINA.—Chloral Hydrate, 9; Camphor, 9; Cocaine, 2.

This has been incorporated in the *B.P.C.*

CHLORAL ET PHENOL.—Chloral Hydrate, 1; Carbolic Acid, 1.

Is soluble in Water, Alcohol (90 p.c.), and in Glycerin.

The **Chloral Carbolatum** of *B.P.C.*

So long as the proportion of Carbolic Acid to Chloral does not exceed 1·7 to 1, the product will mix with Water in all proportions; beyond this limit the excess of Carbolic Acid separates on the addition of Water. As it corresponds to 3 molecular weights to 1, there is probably a chemical combination in these proportions.—*P.J.* (3) xvi. 188.

DORMIOL (Amylene Chloral).—A colourless liquid possessing a camphoraceous odour; usually supplied commercially as a **50 p.c. solution** which mixes readily with Water. It is also supplied in capsules containing 0·5 gramme.

A good narcotic in mental diseases, and stated to produce no untoward effects.—*L.* '99, ii. 73; '02, i. 1712; *B.M.J.* '02, i. 1278; *P.J.* '03, i. 62.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Prescribing Notes.—*It can be given in capsules, or in mixtures, covering the unpleasant taste with Syrup of Tolu, using equal parts of the Syrup and Water.*

CHLORAL TANNIN (Captol).—A brown, resinous substance, soluble in Water and in Alcohol.

A solution has been introduced as a Hair Wash.

Not Official.

CHLORALAMIDUM.

CHLORALAMIDE. CHLORALFORMAMIDUM, U.S.; CHLORAL FORMAMIDE.

$C_3H_4Cl_3NO_2$, eq. 191·00.

Chloralamide is a compound of Chloral Anhydride and Formamide. Colourless lustrous, odourless crystals, possessing a somewhat bitter taste. Its aqueous solution should not be heated above 48·8° C. (120° F.), as above that temperature in undergoes hydrolysis, being reconverted into Anhydrous Chloral and Formamide. It is permanent in weakly acidulated solutions, but decomposed by alkalis.

It should be preserved in well-stoppered amber-tinted glass bottles.

Care should be taken not to confound Chloralamide with Chloralimide.

Solubility.—1 in 21 of Water; 1 in 2 of Alcohol (90 p.c.); it dissolves very slowly in Glycerin but if sufficient time is allowed, 1 in 12 solution can be obtained, in about 3 days at 60° F.

Published solubilities of it in Water have varied considerably. The *Companion* figure (1890) as above has been confirmed (*P.J.* (3) xxii. 805), with the additional note that below 60° F. the solubility decreases very rapidly.—*C.D.* '92, i. 445.

Medicinal Properties.—Hypnotic. It is stated to have much less influence on the heart than Chloral, and therefore may be used in cardiac disease, and that the dose need not be increased after continued use.

Given in all kinds of insomnia.—*L.* '89, ii. 849, 1192; '90, i. 339; *B.M.J.* '89, ii. 1326; '91, i. 1060; *M.P.* '89, ii. 571; *P.J.* (3) xxi. 104; *T.G.* '91, 634, 757; *Pr.* xlvii. 274; *B.M.J.* '05, ii., 1007. In insomnia with 'irregular' heart after influenza.—*B.M.J.* '94, ii. 1045.

The safest of the hypnotics for the insomnia of cardiac disease.—*B.M.J.* '97, ii. 857; '05, ii. 250. Chloralamide is safer but slower in action than Chloral Hydrate.—*L.* '99, ii. 143. 20 to 30 grains in a little spirit, useful as a sleeping draught for patients suffering from acute Bright's disease.—*Pr.* lxvii. 645, 658.

In the insomnia of enteric fever—30 to 40 grains, repeated in lesser amount in two hours.—*B.M.J.* '04, ii. 1452.

Prescribed with Potassium Bromide as a remedy for sea-sickness.—*Pr.* lvi. 145.

Dose.—20 to 50 grains = 1·3 to 3·24 grammes.

Ph. Ger. maximum single dose, 4 grammes; maximum daily dose, 8 grammes.

Prescribing Notes.—*It is prescribed in aqueous mixtures suspended with Tragacanth, or dissolved in weak Alcohol or Glycerin*; see *Haustus and Mistura given below.*

Foreign Pharmacopœias.—Official in Ger. (Chloralum formamidatum); Mex. (Cloralamido); U.S. (Chloralformamidum). Not in the others.

Tests.—Chloralamide has a melting point of 114° to 115° C. (237·2° to 239° F.). The aqueous solution of the salt should be neutral in reaction towards Litmus paper. It yields a turbid solution when warmed with Potassium or Sodium Hydroxide Solution, the solution clearing on the separation of the Chloroform produced by the decomposition, the evolved vapour possessing an alkaline reaction towards red Litmus paper.

The more generally occurring impurities are inorganic matter, Chloral Alcoholate, Ethyl Carbamate, free acids, *e.g.*, Formic and Hydrochloric Acids, and products of decomposition. Inorganic matter, Chloral Alcoholate, and Ethyl Carbamate are detected by the behaviour of the sample when carefully heated in an open dish no weighable residue should remain after ignition, and no inflammable vapours should be given off. Free acids are detected by the reaction of the alcoholic solution towards moistened blue Litmus paper, and products of decomposition by Silver Nitrate Solution; no immediate turbidity should be produced on the addition of a few drops of Silver Nitrate Solution to a 10 p.c. alcoholic solution.

Preparations.

HAUSTUS CHLORALAMIDI.—Chloralamide, 30 grains; Mucilage Mixture, to 1 oz.—*Guy's*.

If made with Mucilage of Tragacanth it diffuses more readily after standing.

Chloralamide, 30 grains; Alcohol (90 p.c.), 30 minims; Compound Tincture of Cardamoms, 30 minims; Chloroform Water to 1 oz.—*St. George's*.

MISTURA CHLORALAMIDI (*Squire*).—Chloralamide, 30 grains; Tincture of Orange, 1 fl. drm.; Spirit of Chloroform, 15 minims; Glycerin, ½ fl. oz.; Cinnamon Water, to 1 fl. oz.

Dose.—3 to 6 fl. drm. = 10·8 to 21·6 c.c., to be taken with Water.

MISTURA CHLORALAMIDI COMPOSITA (*Squire*).—Ammonium Bromide, 30 grains; Chloralamide Mixture (*Squire*), to 1 fl. oz.

Mistura Chloramidi Composita (*B.P.C.*).—Chloramide, 30 grains; Potassium Bromide, 30 grains; Alcohol, 72 minims; Distilled Water, to 1 fl. oz.

Dose.—½ to 1 fl. oz. Some quantity crystallises out on standing.

CHLOROBROM.—A preparation containing 30 grains of Chloralamide and 30 grains of Potassium Bromide in each fl. oz.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c. Has been recommended as a preventive in sea-sickness; also in persistent vomiting not arising from sea-sickness, and in gastric ulcer.—*L.* '92, i. 518; '93, ii. 88, 367, 1564; '94, i. 1001; '95, i. 91. In insomnia and delirium tremens.—*L.* '93, ii. 1486; '95, i. 1307.

Not Official.

CHLORALOSE.

ANHYDRO-GLUCO-CHLORAL.

$C_8H_{11}O_6Cl_3$, eq. 307·13.

Colourless acicular crystals or a white, crystalline powder, possessing a bitter, disagreeable taste.

Medicinal Properties.—Hypnotic and sedative, but dose requires to be watched. Best adapted to cases of simple insomnia. Condemned as a hypnotic for general use, as patients rapidly become habituated to the drug, which then ceases to be effective. Found useful in doses of from 4 to 8 grains in cases of epilepsy complicated by insomnia.—*B.M J.E.* '95, i. 104.

As small a dose as 4 grains has been found to produce alarming intoxication in a tuberculous patient.—*P.J.* (3) xxv. 1139.

In the insomnia and night sweats of phthisis.—*B.M.J.E.* '94, ii. 51; *T.G.* '95, 93; in the insomnia of asylum patients.—*B.M.J.E.* '93, ii. 75, 91; '94, i. 39; ii. 60.

Poisonous effects with large doses.—*Y.B.T.* '95, 83; *Pr.* lii. 98; *B.M.J.E.* '94, ii. 52.

2 to 10 grains in mental affections.—*B.M.J.E.* '01, ii. 87.

Its toxicity is greater than that of Chloral Hydrate.—*L.* '99, ii. 71.

Case of poisoning from 8 grains of Chloralose; loss of consciousness for six hours; recovery.—*L.* '00, ii. '03.

Dose.—3 to 10 grains = 0·2 to 0·65 gramme, given in **cachet.**

It is prepared by heating together equal parts of Anhydrous Chloral and Glucose, advantage being taken of the insolubility of Parachloralose to effect its separation from the Chloralose also produced during the reaction.

Solubility.—Insoluble in Water, soluble 1 in 31 of Alcohol (90 p.c.), 1 in 125 of Ether, readily soluble in Chloroform.

Tests.—Chloralose should possess a melting point of from 184° to 186° C. (363·2° to 366·8° F.). It possesses no well-defined chemical tests by which its presence can be identified.

Not Official.

CHLORETONE.

TRI-CHLOR-TERTIARY-BUTYL-ALCOHOL. CHLOR-BUTYL ALCOHOL.
ACETONE CHLOROFORM.

$C_4H_6Cl_3$ (OH) eq. 176·09.

Light, white, glistening crystals, having a strong camphoraceous odour and taste. It is volatile at the ordinary temperature of the air.

It may be obtained by the interaction of Chloroform, Acetone, and an alkali Hydroxide.

This must not be confused with Chloroform prepared from Acetone, which is also known as 'Acetone Chloroform.'

Solubility.—1 in 125 of Water; 6 in 4 of Alcohol (90 p.c.); also soluble in Chloroform and Ether; readily soluble in Glycerin and in Clove Oil.

Introduced as a hypnotic and local anæsthetic. It is also stated to possess slight analgesic and antiseptic properties.—*T.G.* xxiv. 18, 98; *L.* '00, i. 106.

In epilepsy.—*T.G.* '01, 757.

As a hypnotic in 25 cases of mental disease, 1 to 1½ gramme doses. In restless subjects, 2 grammes may be given.—*B.M.J.E.* '02, i. 31.

The therapeutic and the toxic doses (*B.M.J.E.* '05, ii. 4) are so near one another that this drug has been discarded as a hypnotic altogether.

To prevent post-operative vomiting.—*P.J.* '03, i. 340.

5-grain doses every three hours to prevent sea-sickness.—*L.* '03, i. 615, 687; *C.D.* '03, i. 424.

5 grains Chloretone 15 minutes before embarking will generally ensure complete immunity during the Channel passage even in rough weather, and for longer voyages in rough weather it should be taken 20 minutes before meals two or three times a day; an efficient remedy in chorea; has a remarkably soothing effect in painful and irritable stomach conditions; a hypnotic in 10 grain doses (*L.* '07, i. 880); skin eruption due to chloretone treatment of chorea.—*L.* '07, i. 883.

Dose.—5 to 20 grains=0·32 to 1·3 gramme.

Prescribing Notes.—*Conveniently given when dissolved in a mixture of Alcohol and Glycerin. It is suspended with difficulty by Mucilage of Gum Acacia or Tragacanth. Cachets and Powders should be enclosed in a bottle, but even under these circumstances there is considerable loss in a month or two.*

Tests.—Chloretone melts at 80° to 81° C. (176° to 177·8° F.), but when anhydrous the melting point is raised to 95° to 96° C. (203° to 204·8° F.). It should be readily and completely soluble in Alcohol (90 p.c.).

1 c.c. of an aqueous solution of the salt when warmed with 1 c.c. of Potassium or Sodium Hydroxide Solution and sufficient Iodine Solution to colour the liquid distinctly brown yields a pale yellow precipitate of Iodoform.

1 c.c. of a saturated aqueous solution warmed with 2 c.c. of Potassium or Sodium Hydroxide and one or two drops of Aniline evolves the powerful, penetrating and highly poisonous odour of Phenyl-isonitrile. It should volatilise completely when heated, and should leave no weighable residue upon ignition.

CHLORETONE ELIXIR.—Chloretone, 10 grains; Spirit of Peppermint, 10 minims; Compound Tincture of Cardamoms, 1 fl. drm.; Glycerin, *q.s.* to make 2 fl. drm.; dilute immediately before use with 1 fl. oz. of Water for a dose.

Not Official.

CHLORI LIQUOR.

SOLUTION OF CHLORINE.

Syn.—AQUA CHLORI.

A yellowish-green liquid, possessing a powerful characteristic odour of Chlorine.

It is not now included in the text of the *B.P.*, but is transferred to the Appendix.

Medicinal Properties.—Deodoriser, antiseptic, and disinfectant. When diluted it is used as a **gargle** in smallpox, scarlatina, diphtheria, and putrid sore throat, and as a **wash** for ulcers, cancerous sores, buboes, and large abscesses.

Strongly advocated by Burney Yeo in the treatment of enteric fever. The solution he uses is obtained by pouring strong Hydrochloric Acid over Potassium Chlorate, thus: into a 12 oz. bottle put 30 grains powdered Potassium Chlorate, and pour on it 1 fl. drm. strong Hydrochloric Acid, cork, shake, and allow gas to generate, then add Water little by little till bottle is filled. He says it gives much better results and is more pleasant to take than the Liquor Chlori of the *B.P.* '85. To 12 fl. oz. of this solution he adds 24 to 36 grains of Quinine and 1 fl. oz. of Syrup of Orange peel; he gives 1 fl. oz. of this mixture every two, three, or four hours, according to the severity of the case. It is prescribed as **Mistura Chlori c. Quinina** (*Burney Yeo*).

Further experiments on its use recorded in the Bradshaw Lecture on the treatment of enteric fever (*B.M.J.* '04, ii. 1450) have shown that the tendency to intestinal fermentation is lessened, and the strength of the circulation well sustained, with corresponding benefit to the general aspect of the case.

Dose.—10 to 20 minims = 0·6 to 1·2 c.c., in a wineglassful of Water.

Incompatibles.—Salts of Lead and Silver.

Antidotes.—In case of poisoning by Chlorine Water, the antidotes are White of Egg, Milk, Flour.

Foreign Pharmacopœias.—Official in Austr. (Aqua Chlori), not less than 0·4 p.c. of Chlorine; Hung., Russ. and U.S. (Liquor Chlori Co.), about 0·4 p.c.; Ger. (Aqua Chlorata), contains 0·4 to 0·5 p.c. of Gas; Dutch (Solutio Chlori), 0·4 to 0·425 p.c.; Swiss (Chlorum Solutum), 0·4 to 0·5 p.c.; Port. (Soluto de Chloro); Span. (Agua de Cloro). Not in Belg., Dan., Fr., Ital., Jap., Mex., Norw. or Swed.

Tests.—Solution of Chlorine should possess a specific gravity of 1·003, should first redden and then bleach blue Litmus paper, should immediately decolorise Indigo Sulphate Solution, should liberate Iodine from Potassium Iodide Solution. The latter reaction is utilised for the quantitative determination of the percentage of Chlorine. It should contain not less than 0·5 p.c. as determined by adding a measured quantity of 10 c.c. of the Liquor to a solution of 1 gramme of Potassium Iodide dissolved in 25 c.c. of Water; not less than 14·2 c.c. of Deci-normal Volumetric Sodium Thiosulphate Solution being required to decolorise the liquid, using Starch Solution as an indicator. It should leave no weighable residue upon evaporation.

LIQUOR CHLORI COMPOSITUS (*U.S.*).—Potassium Chlorate, granulated, 5 grammes; Hydrochloric Acid, 18 c.c.; Distilled Water, to 1000 c.c. Add the Hydrochloric Acid diluted with 20 c.c. of Distilled Water to the Potassium Chlorate contained in a flask of the capacity of about 2000 c.c. Insert in the flask a stopper perforated to admit a funnel of the capacity of about 100 c.c. containing about 10 grammes of purified Cotton well wetted with cold Water; place the flask on a water-bath containing boiling Water for a period of from 2 to 3 minutes; when the flask is completely filled with a greenish yellow gas remove it from the bath and add cold Distilled Water through the Cotton in the funnel in two separate portions of 500 c.c. each. After the addition of each separate portion of cold Distilled Water stopper the flask securely, invert, and thoroughly agitate the contents. This solution should be freshly made when wanted. Average dose:—4 c.c. (1 fl. drm.).

LIQUOR CHLORI.—Potassium Chlorate, 50 grains; Hydrochloric Acid, 100 minims; Water, to 1 pint. Add the Acid to the Chlorate in a large bottle; when the Chlorine given off has displaced the air, add the Water gradually, corking and shaking the bottle after each addition.—*St. Bartholomew's.*

The solution recommended (*B.M.J.* '93, i. 1004) for the preparation of **'Euchlorine'** solution for use as a gargle in diphtheria, contains an excess of

Potassium Chlorate. Place 20 to 30 grains of Potassium Chlorate in a dry 8 oz. bottle with 10 minims of strong Hydrochloric Acid; the fumes will fill the bottle, which on the addition of Water with shaking will make a good solution.

These ingredients in varying quantities are given in other Hospital Pharmacopœias.

A Chlorine solution strongly recommended for irrigation of the fauces in diphtheria is made by pouring 5 minims of strong Hydrochloric Acid on 9 grains of powdered Potassium Chlorate, and gradually adding an oz. of Water.—*L.* '03, ii. 1774.

Sodium Chlorate is a tasteless salt, and answers equally well for the formation of 'Euchlorine.'

GARGARISMA CHLORI.—Potassium Chlorate, 200 grains; Strong Hydrochloric Acid, 40 minims; Water, to 20 fl. oz. Place the Potassium Chlorate in a dry bottle, pour the Acid upon it, and set aside, loosely corked, for 10 minutes. Then add the Water in 4 or 5 successive portions, shaking between each addition, so that the gas may be absorbed as completely as possible.

Note.—This gargle is usually employed diluted with one or more parts of Water. It should be recently prepared as it deteriorates slowly on standing, and quickly if exposed to light.—*St. Thomas's.*

The quantities given in the *B.P.C.* are:—Potassium Chlorate, 2·25; Hydrochloric Acid, 0·50; Distilled Water, sufficient to make 100·00. Same directions as above.

VAPOR CHLORI (*B.P.* 1885).—Chlorinated Lime, 2 oz.; cold Water, a sufficiency. Put the powder into a suitable apparatus, moisten it with the Water and let the vapour that arises be inhaled.

CHLOROFORMUM.

CHLOROFORM.

TRICHLORO-METHANE, METHENYL TRICHLORIDE.

$CHCl_3$, eq. 118·48.

FR., CHLOROFORME; GER., CHLOROFORM; ITAL., CLOROFORMIO; SPAN., CLOROFORMO.

A clear, colourless, heavy, mobile liquid, possessing a distinctive ethereal odour, and a sweet burning taste.

It may be prepared by the action of Chlorinated Lime on Ethyl Alcohol or on Acetone. The product obtained by its action on Methylated Alcohol is known as Methylated Chloroform.

The *U.S.P.* defines Chloroform as a liquid consisting of from 99 to 99·4 p.c. by weight of absolute Chloroform, and 0·6 to 1·0 p.c. of Alcohol, but the quantity of Alcohol is not now defined in the *B.P.* except that the product is worked to a specific gravity 1·490 to 1·495.

It should be kept in well-stoppered amber-tinted glass bottles, in a cool place, and protected as far as possible from the light.

Solubility.—10 in 7 of Alcohol (90 p.c.); in all proportions of Ether and Alcohol; freely in Olive Oil and Oil of Turpentine. In Water at 32° F. 1 in 150, at 60° F. 1 in 185, at 86° F. 1 in 210, at 113° F. 1 in 200, at 130° F. 1 in 192. Will not dissolve in Glycerin.

Chloroform acts on Vulcanite, and dissolves Caoutchouc, Gutta-percha, Mastic, Elemi, Tolu, Benzoin and Copal. Amber, Sandarach, Lac and Beeswax are only partially soluble. It also dissolves Iodine, Bromine, most of the alkaloids, the fixed and volatile Oils, most Resins and Fats. It dissolves Sulphur and Phosphorus sparingly.

Medicinal Properties.—A general anæsthetic. Internally a sedative, carminative and antispasmodic. Its chief use is to produce general anæsthesia by **inhalation** during surgical operations, uræmic and puerperal convulsions, and in obstetric practice. Should be given with great caution in cases of fatty and dilated heart, in extensive lung disease and severe anæmia. Internally, useful to relieve flatulent distension of stomach and bowels, and the cough of fibroid phthisis; in delirium tremens, and in sea-sickness. Externally, with Camphor, relieves toothache and neuralgia. Applied immediately after the sting of a wasp, takes away the pain. A powerful auxiliary to the Liniments of Aconite and Belladonna.

Its vapour and aqueous solution are antiseptic, and the addition of 1 minim to 1 fl. oz. of animal or vegetable infusion will preserve it.

Vinegar after Chloroform inhalation to prevent sickness. (*See* p. 9.)

Chloroform should not be used as an anæsthetic in a room where gas is being burned; a mixture of Chloroform vapour and air being decomposed by a flame with the formation of irritating compounds.—*L.* '99, i. 1728; *T.G.* '99, 601; *P.J.* '02, i. 376.

The dosage of Chloroform for inhalation. A powerful and dangerous anæsthetic, not to be recommended in minor surgery. The notorious uncertainty and danger in Chloroform administration is the uncertainty in the quantity administered. 0·2 c.c. per minute recommended, in a mixture of Chloroform and air at an average percentage of 1·5 p.c.—*B.M.J.* '98, i. 1057–1062.

An apparatus for ensuring its admixture with air in certain proportions is described in *B.M.J.* '04, ii. 1462. The Report of the Chloroform Committee was presented at the Oxford meeting of the British Medical Association, the Vernon Harcourt inhaler was introduced, and the adoption of a maximum strength of 2 p.c. Chloroform vapour as an adequate and safe limit for general surgical purposes recommended (*B.M.J.* '03, ii. 141; '04, ii. 161; *L.* '04, ii. 1856); a further reference to the subject is made (*J.C.S. Abs.* 1904, ii. 756), showing all that was necessary in the air was 2 p.c., and that danger lay beyond. It has latterly been shown (*J.C.S.* 1904, *Trans.* 949; *L.* '05, i. 589) that Chloroform derived from Acetone is inferior in anæsthetic properties to Chloroform derived from Alcohol. The difference is stated to be due to the presence of 0·05 p.c. Æthyl Chloride. Acetone Chloroform to which this amount of Æthyl Chloride had been added, exhibited equally as good anæsthetic effects as Chloroform prepared from Æthyl Alcohol. This statement has, however, been challenged by Messrs. J. F. MacFarlan & Co. (*L.* '05, i. 747), who think that Chloroform prepared from Acetone is by no means generally accepted as inferior to Chloroform prepared from Alcohol, and that up to the present insufficient evidence has been adduced to establish these views.

Less Chloroform is required when preceded by Morphine Scopolamine injections. (*See* p. 650.)

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

Prescribing Notes.—*Chloroform Water and Spirit of Chloroform are used as sweetening agents, and to preserve solutions from decomposition. As a rule in 'mixtures' Chloroform is in such small quantities as to dissolve in the Water; in concentrated 'mixtures' Mucilage of Gum Acacia would be required to suspend it; it can be given in 'drops' dissolved in some strongly alcoholic menstruum.*

It mixes readily with Camphor Liniment, Soap Liniment, Olive Oil, or Oil of Turpentine.

Camphorated Chloroform, see *Camphor*.

Official Preparations.—Aqua Chloroformi, Linimentum Chloroformi, Spiritus Chloroformi, Tinctura Chloroformi et Morphinæ Composita.

Not Official.—Chloræthoform, Chlorodynum, Emulsio Chloroformi, Liquor

Chloroformi Compositus, Mistura Tussi Rubra Concentrata, Misturi Chloroformi Composita, Parogenum Chloroformi Camphoratum, Pommade de Chloroforme, Tinctura Chloroformi Composita, Chloroformum Camphoratum, Carbon Tetrachloride, A.C.E. Mixture, Vienna Mixture, 'Methylene,' Regnauld's Anæsthetic Mixture, Pental, Vapor Chloroformi Compositus, Vasolimentum Chloroformi Camphoratum.

Antidotes.—In case of overdose of Chloroform, the antidotes are, fresh pure air and artificial respiration (*M.T.* '74, ii. 219), and Amyl Nitrite.—*L.* '75, i. 644; *B.M.J.* '97, ii. 352. Hypodermic injection of Strychnine, altogether $\frac{1}{2}$ grain was used in divided doses of $\frac{1}{8}$ grain followed by $\frac{1}{12}$ grain.—*B.M.J.* '97, ii. 1498.

Foreign Pharmacopœias.—Official in Austr. and Belg., sp. gr. 1·485 to 1·490; Fr. sp. gr. 1·495 to 1·500; U.S., sp. gr. not below 1·476 at 25° C. (77° F.); Dan., Dutch, Ger., Hung., Norw., Swed. and Swiss, sp. gr. 1·485 to 1·489; Ital., sp. gr. 1·490 to 1·493; Jap., sp. gr. 1·485 to 1·495; Mex., Port. and Span., sp. gr. 1·480; Russ., sp. gr. 1·499 to 1·500.

The new Austr., Dutch and Swiss Pharmacopœias include Chloroform and Chloroform pro narcosi. The Austr. and Swiss Chloroform and Chloroform pro narcosi are required both to possess the same sp. gr., the Dutch Chloroform possesses the sp. gr. 1·485 to 1·489, that 'pro narcosi' a sp. gr. of 1·498 to 1·500, and is prepared by the decomposition of Chloral Hydrate by Sodium Hydroxide. Fr. has Chloroforme rectifié du commerce sp. gr. 1·495 to 1·500 which must not be used as an anæsthetic; also Chloroforme anæsthésique sp. gr. 1·498 which is prepared from the other.

Tests.—The distinguishing tests for Chloroform are the specific gravity, which is about 1·490, and the boiling point, which should be about 61° C. (141·8° F.). Pure Chloroform has a specific gravity of 1·5, and boils at 60·8° C. (141·44° F.). The *B.P.* gives the specific gravity as 1·490 to 1·495; the *U.S.P.* not below 1·476 at 25° C. (77° F.); the *P.G.* 1·485 to 1·489. The *B.P.* and the *P.G.* give a similar boiling point 60° to 62° C. (140° to 143·6° F.); the *U.S.P.* gives 60° to 61° C. (140° to 141·8° F.). When boiled with Potassium or Sodium Hydroxide Solution it is decomposed yielding a solution which gives with Silver Nitrate Solution, when acidified with Nitric Acid, a white curdy precipitate soluble in Ammonia Solution and which is rapidly blackened on heating. A few drops of Chloroform when warmed with 2 or 3 c.c. of an alcoholic Potassium or Sodium Hydroxide Solution and a drop or two of Aniline evolve the powerful, penetrating and highly poisonous odour of Phenyl-isocyanide. A few drops of Chloroform, when heated with Fehling's (Potassio-cupric Tartrate) Solution, yield a reddish deposit of Cuprous Oxide.

The more generally occurring impurities are pyrogenous oils, acid, free Chlorine, Chlorides, secondary products of decomposition and fixed matter. Acid, free Chlorine, and Chlorides are all extracted by means of Water, and if the sample be shaken for 5 minutes with twice its volume of Water, free Acid may be detected in the aqueous liquid by its reaction towards blue Litmus paper; Free Chlorine by any blue coloration produced on the addition of 1 c.c. of Cadmium Iodide Solution and 2 drops of Starch Mucilage; and Chlorides by the addition of Silver Nitrate Solution, when not more than a very slight opalescence should be produced. In testing for Free Chlorine the *B.P.* uses Cadmium Iodide Solution, the *U.S.P.* Potassium Iodide Test Solution, and the *P.G.* Zinc Iodide Solution. Pyrogenous oils may be detected by allowing a definite volume to evaporate from a large piece of filter paper placed on a warm plate, when no foreign odour should be perceptible. The *B.P.* employs 20 c.c. for this test, the *U.S.P.* 10 c.c., whilst the *P.G.* specifies no particular quantity. The *B.P.* requires that no odour should be perceptible at any stage of the evaporation, the *U.S.P.* that an odour should not be perceptible during the later stages of the evaporation and the filter paper should remain odourless; the *P.G.* that the filter paper shall not retain any foreign odour after the evaporation of the Chloroform. Secondary products of decomposition may be detected by the behaviour of the specimen with concentrated Sulphuric Acid. After shaking the acid with 10 times its volume of Chloroform for 20 minutes, and allowing the mixture to remain at rest for 15 minutes, both the acid and the chloroformic layers should be perfectly transparent and nearly colourless, a portion of the Sulphuric Acid layer diluted with Water should remain transparent, should be very nearly colourless and should possess no disagreeable odour; and if the liquid be further diluted and tested with Silver Nitrate Solution no more than a slightly diminished transparency should be caused. The *U.S.P.* divides this test into three separate headings indicating impurities decomposable by Sulphuric Acid, odorous decomposition products, and chlorinated decomposition compounds. Fixed matter may be detected by any residue remaining after the evaporation of the Chloroform.

Starch Solution and Cadmium, Potassium or Zinc Iodide.—The aqueous portion obtained by shaking Chloroform with twice its volume of Water for five minutes, should not afford any colour with 1 c.c. of Cadmium Iodide T.S. and 2 drops of Mucilage of Starch, *B.P.*; when Chloroform is shaken with Zinc Iodide and Starch Solution, the Starch Solution should not become blue, nor the Chloroform coloured, *P.G.* The *U.S.P.* requires that the aqueous solution should not become coloured with T.S. of Potassium Iodide.

Silver Nitrate.—The addition of 4 drops of Silver Nitrate Solution should not produce more than a very slight opalescence in the aqueous portion obtained by shaking Chloroform with twice its volume of Water for 5 minutes, *B.P.*; should not be affected by T.S. of Silver Nitrate, *U.S.P.* It should not yield any turbidity with T.S. of Silver Nitrate diluted with as much Water, *P.G.*

Sulphuric Acid.—Chloroform when shaken with one-tenth of its volume of Sulphuric Acid for 20 minutes and set aside for 15 minutes should acquire practically no colour in either the chloroformic or Sulphuric Acid layer, and both should be quite transparent, *B.P.*; the *U.S.P.* directs the use of 4 c.c. of Sulphuric Acid and 40 c.c. of Chloroform shaken in a 50 c.c. glass stoppered cylinder during 5 minutes, and that the liquids be allowed to separate completely so that both are transparent. The Chloroform should remain colourless and the acid should appear colourless or very nearly so when in a stratum of not less than 15 mm. in thickness. In the *P.G.* test 15 c.c. of acid are shaken with 20 c.c. of Chloroform in a stoppered glass cylinder of 3 cm. diameter previously rinsed out with Sulphuric Acid. The acid should not become coloured within 1 hour.

2 c.c. of the Sulphuric Acid liquid obtained on shaking the Chloroform as above described, when diluted 2½ times its volume of Water should remain clear, almost colourless, and should possess a pleasant odour, *B.P.*; should be colourless and clear and while hot from the mixing should be odourless or give but a faint vinous or ethereal odour, *U.S.P.* The liquid obtained in carrying out the *B.P.* test, immediately above, should still retain its transparency and freedom from colour, even when further diluted with 10 c.c. of Water and stirred with a glass rod, and the transparency should not be more than slightly diminished on the addition of 4 drops of Silver Nitrate Solution, *B.P.*; should remain clear and

should not be affected by T.S. of Silver Nitrate, *U.S.P.* The addition of Silver Nitrate Solution should not more than slightly diminish the transparency of the aqueous portion obtained by shaking the Sulphuric-Acid-treated Chloroform with twice its volume of Water, *B.P.*

Volumetric Determination.—Chloroform may be determined in the absence of other reducing substances by Fehling's Solution. A more accurate method is to pass the vapour through a red-hot tube containing Platinum wire-gauze, which decomposes the Chloroform with the formation of Hydrochloric Acid. The products are collected in a bulb-tube containing Water, and the acid produced is titrated with Volumetric Potassium or Sodium Hydroxide Solution. 108·57 parts by weight of Hydrochloric Acid are equivalent to 118·48 parts by weight of Chloroform. This method has been applied to the determination of Chloroform in animal tissues (*B.M.J.* '01, ii. 1859), but the Hydrochloric Acid is recommended to be determined with Volumetric Silver Nitrate Solution, the excess of Silver being determined with Volumetric Ammonium Thiocyanate Solution, using Ferrous Ammonium Sulphate Solution as an indicator. In using the combustion method of determination for Chloroform in blood, the blood should be mixed with an equal volume of a saturated aqueous solution of Urea, by which means (*B.M.J.* '03, ii. cxlii.) the blood remains fluid during the necessary heating and more than 90 per cent. of the Chloroform is accounted for.

Preparations.

AQUA CHLOROFORMI. Chloroform Water.

Chloroform, 30 minims; Distilled Water, *q.s.* to make 25 fl. oz. (1 in 400)

Half the strength of *B.P.* 1885.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.; but ordered in smaller quantities as a flavouring agent.

Foreign Pharmacopœias.—Official in Austr. (1 in 100); Belg., Dan., Fr., Norw. and Swiss (1 in 200); Dutch, Solutis Chloroformi Aquosa (1 in 250); Ital. (1 in 2000); Jap. (1 in 400); Span. (1 in 250); U.S., Saturated Aqueous Solution. Not in the others.

Tests.—Chloroform Water has a specific gravity of 1·001; should be neutral in reaction to Litmus paper, and when warmed with a little Alcoholic Potassium or Sodium Hydroxide Solution and a few drops of Aniline should evolve the powerful, penetrating, and highly-poisonous vapours of Phenyl-isocyanide.

LINIMENTUM CHLOROFORMI. Liniment of Chloroform.

Chloroform, 1; Liniment of Camphor, 1. (1 in 2)

The Oil in the Camphor Liniment prevents rapid evaporation of the Chloroform.

Foreign Pharmacopœias—Official in Ger. and Jap. (Oleum Chloroformi), Chloroform 1, Olive Oil 1; Austr. (Linimentum Chloroformiatum), Chloroform, Oleoso-balsamic Mixture, Spirit of Ether, Spirit of Camphor, Spirit of Potash Soap, equal parts of each; Fr. (Liniment au Chloroforme), Chloroform 1, Poppy Oil 9; Swed. (Linimentum Chloroformi Comp.), Chloroform 3, Camphor 3, Alcohol (90 p.c.) 5, Camphorated Soap Liniment 6, Tincture of Opium 3; Swiss (Oleum Chloroformi), Chloroform 1, Olive Oil 3. Jap. has also Linimentum Chloroformii, Chloroform 1, Camphor Oil 1. All by weight. U.S., Chloroform 3, Soap Liniment 7. Not in the others.

Tests.—It should possess a specific gravity of 1·212, and contains about 37 p.c. w/v of total solid residue.

SPIRITUS CHLOROFORMI. Spirit of Chloroform. *B.P.Syn.*—Chloric Ether; Spirit of Chloric Ether.

Chloroform, 1; Alcohol (90 p.c.), *q.s.* to make 20. (1 in 20)

Dose.—5 to 20 minims = 0·3 to 1·2 c.c., for repeated administration; for a single administration 30 to 40 minims = 1·8 to 2·4 c.c.

Frequently prescribed as a sweetening agent, and to cover nauseous flavours.

Foreign Pharmacopœias.—Official in Jap., 1 in 20; U.S., Chloroform 6, Alcohol 94. Not in the others.

Tests.—Spirit of Chloroform has a specific gravity of about 0·860; and should leave no weighable residue on evaporation.

TINCTURA CHLOROFORMI ET MORPHINÆ COMPOSITA. Compound Tincture of Chloroform and Morphine.

Chloroform, 1½ fl. oz.; Morphine Hydrochloride, 87½ grains; Diluted Hydrocyanic Acid, 1 fl. oz.; Tincture of Capsicum, ½ fl. oz.; Tincture of Indian Hemp, 2 fl. oz.; Oil of Peppermint, 14 minims; Glycerin, 5 fl. oz.; Alcohol (90 p.c.), *q.s.* to make 20 fl. oz. (about 1 in 13)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

10 minims contain Chloroform ¾ minim, Morphine Hydrochloride, $\frac{1}{11}$ grain, Diluted Hydrocyanic Acid ½ minim, Tincture of Indian Hemp 1 minim.

It is nearly 4½ times stronger in Morphine than *B.P.* 1885, and in other respects differs considerably.

The *B.P.* 1885 preparation was practically the same as Liquor Chloroformi Compositus (*Squire*), except that the former contained four times as much Morphine as the latter. In *B.P.* 1898 the formula was completely changed, therefore Liquor Chloroformi Compositus, previously omitted in *Companion*, is re-inserted.

The *B.P.C.* have also added a formula under the name 'Chlorodyne' (*see* below).

Foreign Pharmacopœias.—Official in Jap. Hung. has a 'Chlorodyne,' but it differs considerably from *B.P.* Not in the others.

Tests.—Compound Tincture of Chloroform and Morphine has a specific gravity of 1·010 to 1·015; it should contain from 28·0 to 30·0 p.c. w/v of total solids and from 52 to 54 p.c. w/v of Absolute Alcohol.

Not Official.

LIQUOR CHLOROFORMI COMPOSITUS (*Squire*).—Chloroform, 4 fl. oz.; Ether, 1 fl. oz.; Alcohol (90 p.c.), 4 fl. oz.; Treacle, 4 fl. oz.; Extract of Liquorice, 2¼ oz.; Morphine Hydrochloride, 8 grains; Oil of Peppermint, 16 minims; Syrup, 17½ fl. oz.; Prussic Acid (2 p.c.), 2 fl. oz. Mix the Oil of Peppermint, Alcohol and Prussic Acid together, and dissolve the Morphine Hydrochloride in the mixture; add the Chloroform and Ether; dissolve the Extract of Liquorice in the Syrup, add the Treacle, and mix in the other ingredients.

This formula first appeared in the *Companion* in 1864.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c.

10 minims contain Chloroform about 1 minim, Diluted Hydrocyanic Acid ½ minim, Morphine Hydrochloride $\frac{1}{200}$ grain.

CHLORODYNUM (*B.P.C.*).—Chloroform, 6·00; Morphine Hydrochloride, 0·50; Tincture of Indian Hemp, 3·00; Tincture of Capsicum, 1·50; Liquid

Extract of Liquorice, 12·00; Mucilage of Acacia, 12·00; Treacle, 25·00; Glycerin, 22·00; Oil of Peppermint, 0·10; Alcohol, sufficient to produce 100·00.

10 minims contain Chloroform about $\frac{1}{2}$ minim, and Morphine Hydrochloride about $\frac{1}{20}$ grain, and no Hydrocyanic Acid.

The *B.P.C.* Chlorodyne Lozenges contain about $\frac{1}{65}$ grain of Morphine Hydrochloride.

EMULSIO CHLOROFORMI.—Chloroform, 1 fl. oz.; Tincture of Quillaia, 1 fl. drm.; Water, to 20 fl. oz.—*London.*

Chloroform, 1 fl. oz.; Tincture of Quillaia, 3 fl. drm.; Water, to 20 fl. oz.—*St. Thomas's.*

The *B.P.C.* quantities are very similar: Chloroform, 5; Tincture of Quillaia, 2; Distilled Water, to make 100.

MISTURA TUSSI RUBRA CONCENTRATA.—Diluted Hydrobromic Acid, 15 minims; Compound Tincture of Chloroform, 10 minims; Compound Tincture of Cardamoms, 10 minims; Solution of Morphine Hydrochloride, 5 minims; Diluted Hydrocyanic Acid, 1 minim; Syrup of Wild Cherry, to 1 fl. drm.—*Australian Pharmaceutical Formulary.*

Mistura Chloroformi Composita. *Syn.* Mistura Tussi Rubra.—Morphine Hydrochloride, $\frac{1}{16}$ grain; Diluted Hydrobromic Acid, 30 minims; Chloroform, $\frac{1}{3}$ minim; Tincture of Cudbear, $7\frac{1}{2}$ minims; Syrup of Wild Cherry, 30 minims; Syrup, to 2 fl. drm.—*B.P.C.*

This formula has been changed very considerably in the *B.P.C. Supplement*, and as now amended reads:—Morphine Hydrochloride, 0·05; Diluted Hydrobromic Acid, 12·5; Cherry-laurel Water, 3; Chloroform, 0·25; Syrup of Tolu, 25; Tincture of Cudbear, 9; and sufficient Syrup to produce 100.

POMMADE DE CHLOROFORME.—Chloroforme rectifié 10, Yellow Wax 5, Lard 85.—*Fr.*

TINCTURA CHLOROFORMI COMPOSITA.—Chloroform, 2; Alcohol (90 p.c.), 8; Compound Tincture of Cardamoms, 10. (1 in 10)

It first appeared in *B.P.* 1885, but was omitted in 1898, and subsequently included in *B.P.C.*

Dose.—5 to 60 minims = 0·3 to 3·6 c.c.

The Chloroform will separate if this Tincture is prescribed in too little Water. Has been given successfully for the prevention of sea-sickness.

CHLOROFORMUM CAMPHORATUM.—Camphor, 2; Chloroform, 1; dissolve.—*B.P.C. Formulary* 1901, incorporated in *B.P.C.*

A remedy for toothache, and topically applied for rheumatism.

A.C.E. MIXTURE.—Alcohol (90 p.c.), 1; Chloroform, 2; Ether, 3; mix.

Used as an anæsthetic in place of Chloroform.—*Med. Chir. Trans.* vol. 47, '64, 341; *B.M.J.* '87, ii. 975, 1078, 1185, 1314, 1359. Advantages over Chloroform.—*B.M.J.* '97, ii. 160.

A.C.E. (*Martindale*).—Absolute Alcohol (sp. gr. 0·795), 1; Chloroform (sp. gr. 1·497), 2; Purified Ether (sp. gr. 0·720), 3.

VAPOR CHLOROFORMI COMPOSITUS (*B.P.C.*).—Alcohol (90 p.c.), 4; Chloroform, 8; Purified Ether, *q.s.* to make 25.

VASOLIMENTUM CHLOROFORMI CAMPHORATUM.—Camphor, 3; Chloroform, 3; Liquid Vasoliment (*see* p. 864), 3; all by weight.—*Hager.*

Parogenum Chloroformi Camphoratum. *Syn.* Camphorated Chloroform Vasoliment.—Camphor, 3; Chloroform, 2; Parogen (*see* p. 864), 3.—*B.P.C.*

VIENNA MIXTURE.—Ether, 3; Chloroform, 1; by weight.

'METHYLENE' (formerly called Methylene Bichloride).—Introduced by B. W. Richardson in November, 1867. It is a limpid, dense fluid, sp. gr. varies; when dropped into Water about one-fourth of it is dissolved, the remainder separates like Chloroform at the bottom of the vessel as a perfectly clear and distinct fluid, and the whole has a sweet, pleasant odour, without the least smell of Ether.

Recommended as an anæsthetic in place of Chloroform.

REGNAULD'S ANÆSTHETIC MIXTURE.—Chloroform, 4; Methylic Alcohol, 1; mix.

Used as an anæsthetic in place of Chloroform.

CHLORÆTHOFORM.—Chloroform (from Acetone), 100; Ethyl Chloride, 0·25.

CARBON TETRACHLORIDE.—A colourless, volatile, heavy liquid. It may be prepared by the action of dry Chlorine gas on Carbon Bisulphide vapour, or by replacing the Hydrogen ion of Chloroform with the Chlorine ion.

It should be kept in dark amber-tinted glass-stoppered bottles, and in a cool atmosphere.

Has been employed to produce anæsthesia; but its principal use is as an inhalation in hay fever, and as an application on Piline for neuralgia.

Danger attending its use as a hair-wash (*B.M.J.* '07, ii. 764, 776); or dry shampoo.—*L.* '07, i. 1709.

Tests.—Carbon Tetrachloride has a specific gravity of 1·599 to 1·600 and a boiling point of 77° to 78° C. (170·6° to 172·4° F.). When warmed with Potassium or Sodium Hydroxide Solution, it is decomposed with the formation of Potassium or Sodium Chloride and Carbonate, the liquid effervescing on the addition of dilute Nitric Acid, and the faintly acidified liquid yielding with Silver Nitrate Solution a white precipitate, insoluble in Nitric Acid, but soluble in Ammonia Solution. When warmed with an alcoholic Potassium or Sodium Hydroxide Solution and a few drops of Aniline it evolves the powerful, penetrating, and highly-poisonous vapours of Phenol-isocyanide.

It may be contaminated with other Chlorine compounds or with chlorinated decomposition products, *e.g.*, Hydrochloric Acid. The former may be detected by the darkening in colour produced when a portion of the specimen is mixed with an equal volume of concentrated Sulphuric Acid, the latter by shaking the sample with twice its volume of Water and noting the reaction of the aqueous liquid towards Litmus paper and Silver Nitrate Solution; it should neither redden blue Litmus paper nor should it produce a turbidity with Silver Nitrate Solution.

PENTAL (Trimethylethylene).—A colourless, mobile, inflammable liquid. Has been recommended as a general anæsthetic for short operations. Whitla states that several deaths have been attributed to it, and that it causes albuminuria.—*M.A.* '95, 40; *L.* '94, i. 1080; '96, i. 45, 710, 950; *T.G.* '93, 34; '94, 555; *B.M.J.E.* '93, ii. 28; *B.M.J.* '96, i. 730.

CHRYSAROBINUM.

CHRYSAROBIN.

FR., CHRYSAROBINE; GER, CHRYSAROBINUM; ITAL., CRISAROBINA; SPAN., CHRYSAROBINA.

An odourless and tasteless, yellow, crystalline powder, obtained from Araroba.

Purified Chrysarobin was introduced into medicine incorrectly as **Chrysophanic Acid**, and it is still known by this name, which, however, only correctly applies to the oxidised product.

Araroba yields from 55 to 80 p.c. (average 71 p.c.) of Chrysarobin.—*P.J.* (3) xxii. 544.

Medicinal Properties.—In form of **unguentum** or **pigmentum**, it has been found efficient in chronic psoriasis, and is a powerful parasiticide in ringworm and other parasitic skin diseases, but as it may cause erythema it requires watching; it should not be allowed to touch the healthy skin. The ointment stains the skin yellow, also the linen. Has been given internally for psoriasis, eczema and acne; but it is very irritating, producing purging, griping and vomiting even in very small doses.

To remove the stains from linen first remove all grease with Benzin and then apply a solution of Chlorinated Lime. In some cases a little Caustic Soda solution also may be necessary.—*C.D.* '99, i. 652.

Alopecia areata, treated almost exclusively with Chrysarobin stick—Chrysarobin, 30; Colophony Resin, 5; Yellow Wax, 35; Olive Oil (by weight), 30 (*B.M.J.E.* '95, ii. 103); and with excellent result by ointment 2 drm. to oz.—*B.M.J.* '07, ii. 491.

Chrysophanic Acid is not an efficient substitute for Chrysarobin in the treatment of psoriasis.—*B.M.J.E.* '96, ii. 96.

Used in the form of an ointment (*B.M.J.* '05, i. 699) either alone or combined, according to circumstances, with Tar or Salicylic Acid, it cures chronic psoriasis.

Dose.—$\frac{1}{10}$ to 1 grain = 0·006 to 0·06 gramme.

Official Preparation.—Unguentum Chrysarobini.

Not Official.—Unguentum Chrysarobini Compositum, Pigmentum Chrysarobini, Chrysarobin Plaster Mulls, Anthrarobin, Eurobin, Lenirobin.

Foreign Pharmacopœias.—Official in Austr. (Araroba Depurata); Belg., Dan., Dutch, Ger., Ital., Jap., Norw., Russ., Swed., Swiss and U.S. (Chrysarobinum); Mex. (Crisarobina), the purified product. Not in the others.

Tests.—Chrysarobin melts, according to the *U.S.P.*, at about 157° C. (314·6° F.). It varies in its behaviour towards different solvents; in Water it is only slightly soluble; in Petroleum Spirit it partly dissolves. It is almost completely soluble in hot Alcohol (90 p.c.) and completely soluble in Chloroform; the *B.P.* mentions that it partially dissolves in Potassium Hydroxide Solution, assuming a deep brownish-red colour; the *U.S.P.* that it is soluble in dilute or concentrated Potassium Hydroxide solutions, forming a red coloured liquid with green fluorescence; the *P.G.* states that when boiled with 2000 parts Water it does not completely dissolve and yields a filtrate which does not affect Litmus paper, and which is not affected by Ferric Chloride Test-solution. It dissolves to a reddish-yellow solution in concentrated Sulphuric Acid and is reprecipitated unchanged on dilution with Water. A carmine red colour should be assumed in the course of a day by Ammonia Solution which has been shaken with Chrysarobin. It may be distinguished from Chrysophanic Acid by mixing 1 mgm. with 2 drops of fuming Nitric Acid and adding Ammonia Solution, a violet coloration is produced, whereas Chrysophanic Acid produces a yellow coloured liquid; when Chrysarobin is shaken with Lime Water for a few minutes a violet coloration is imparted to the liquid. When heated in an open crucible it melts, and when ignited with free access of air it is officially required not to leave more than 1 p.c. of ash, the *P.G.* says 0·2 gramme should leave no weighable residue, the *U.S.P.* says it is entirely consumed.

Preparation.

UNGUENTUM CHRYSAROBINI. CHRYSAROBIN OINTMENT.

2 of Chrysarobin dissolved in 48 of Benzoated Lard by the aid of heat, and subsequently stirred till cold. (1 in 25)

Official in U.S., 1 in about 17.

Not Official.

UNGUENTUM CHRYSAROBINI COMPOSITUM (*Unna*).—Chrysarobin and Ichthyol, of each, 5; Salicylic Acid, 2; Yellow Vaseline, 88.

PIGMENTUM CHRYSAROBINI.—Chrysarobin, 1; Gutta Percha solution, 9.—*Guy's.*

Chrysarobin, 60 grains; Chloroform, 10 drm.; pure Gutta Percha, 60 grains; dissolve. Painted on with a stiff brush. Acts effectually, and does not stain the linen.—*B.M.J.* '87, ii. 1139.

A 5 to 10 p.c. solution of Chrysarobin in equal parts of Chloroform and Glycerin. Used in ringworm; applied till erythema and a slight œdema are produced.—*B.M.J.* '04, i. 16.

Chrysarobin, 1; solution of Gutta Percha, *q.s.* to make 10.—*B.P.C.*

CHRYSAROBIN PLASTER MULLS (*Unna*).—Contain $\frac{1}{10}$ grain to the square inch; also five times this strength.

ANTHRAROBIN ($C_{14}H_{10}O_3$, eq. 224·38).—A yellow, or light yellowish-brown, odourless, tasteless powder. A reduction product from Alizarin. Slightly soluble in Water, but readily in Alcohol (90 p.c.) and solution of Borax.

Tests.—The aqueous solution yields with Lead Acetate solution a reddish-brown precipitate; with Ferric Chloride Solution, a brownish-violet precipitate. It dissolves in Sodium Hydroxide Solution (15 p.c.) with the production of a brownish-yellow colour which changes to violet on absorption of Oxygen from the air. It should leave not more than 2 p.c. of residue on incineration.

A substitute for Chrysarobin. For an **ointment** it is rubbed with Olive Oil and diluted with Lard.

Its action is similar to Chrysarobin, but it is slower and does not produce the same irritation. The part should be previously washed with Potash Soap, and the alcoholic **tincture** is preferred to the ointment. The strength of the ointment used is 1 in 10.—*B.M.J.* '88, i. 1234; *L.M.R.* '88, 234, and '89, 243.

Eurobin and **Lenirobin** are Chrysarobin Acetates, soluble in Acetone and Chloroform; they have been used for the same purposes as Chrysarobin. It is stated that they do not stain the normal skin, or the linen, like Chrysarobin.

CIMICIFUGÆ RHIZOMA.

CIMICIFUGA.

B.P.Syn.—ACTÆÆ RACEMOSÆ RADIX.

FR., RACINE D'ACTÉE À GRAPPES; GER., SCHLANGENWURZEL.

The dried Rhizome and Roots of *Cimicifuga racemosa.*

The active principle is probably a resinous amorphous substance.

Medicinal Properties.—Bitter stomachic, analgesic. Given in neuralgia, myositis, rheumatism, lumbago, and sciatica. Relieves the pain of dysmenorrhœa and pleurodynia.

Official Preparations.—Extractum Cimicifugæ Liquidum, and Tinctura Cimicifugæ.

Not Official.—Cimicifugin.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

Descriptive Notes.—The size of the official rhizome of *Cimicifuga racemosa*, Ell., is about ½ to 1 inch (12 to 25 mm.) in diameter and 2 to 6 inches (5 to 15 cm.) long, with slightly curved branches marked with transverse leaf scars, and the remains of ascending stems. In transverse section the large horny pith is surrounded by a zone of narrow woody wedges and large medullary rays, and a relatively thin bark. The rootlets, which are usually more or less broken off, show in transverse fracture about four woody wedges arranged like a Maltese cross, set in a dark cortical portion. The taste is bitter and acrid. It is sometimes confused with *Helleborus niger*, L., but that rhizome is smaller, $\frac{2}{10}$ to $\frac{3}{10}$ inch (5 to 7·5 mm.), and has more erect branches, with short woody wedges 8 to 12 in number and a thick bark, and the woody wedges in the roots taper outwards so that the central column has a cylindrical and stellate appearance.

Tests.—Cimicifuga may be distinguished from Black Hellebore by Ferric Chloride Test-solution; the *B.P.* says that the Rhizome and Roots are blackened by the reagent, but the colour is really a greenish-black. No official limit of ash is given, but it generally leaves about 5 to 7 p.c. of ash and it should not amount to more than 10 p.c.

Preparations.

EXTRACTUM CIMICIFUGÆ LIQUIDUM. LIQUID EXTRACT OF CIMICIFUGA. *B.P.Syn.*—LIQUID EXTRACT OF ACTÆA RACEMOSA.

20 of Cimicifuga percolated with Alcohol (90 p.c.) until exhausted, reserving the first 15, and evaporation of the further portion to a soft extract which is dissolved in the 15, and the whole made up to 20 with Alcohol (90 p.c.). (1 in 1)

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

Foreign Pharmacopœias.—Official in U.S.; also a powdered extract prepared by evaporation of the fluid extract and admixture with powdered Liquorice root. Not in the others.

Tests.—Liquid Extract of Cimicifuga has a specific gravity of 0·875 to 0·890; it contains from 8 to 10 p.c. w/v of total solids and about 80 p.c. w/v of Absolute Alcohol.

TINCTURA CIMICIFUGÆ. TINCTURE OF CIMICIFUGA. *B.P.Syn.*—TINCTURE OF ACTÆA RACEMOSA.

2 of Cimicifuga, in No. 40 powder, percolated with Alcohol (60 p.c.), to yield 20. (1 in 10)

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

The Tincture formerly in the *Companion* as 'Not Official' was twice the strength of this, and is still ordered as **Tinctura Actææ Racemosæ** (*Squire*) to distinguish it from the Official Preparation.

Foreign Pharmacopœias.—Official in U.S., 1 in 5. Not in the others.

Tests.—The specific gravity of the tincture should be between 0·918 to 0·925; it contains from 1·0 to 2·8 p.c. w/v of total solids and about 58 p.c. w/v of Absolute Alcohol.

Not Official.

CIMICIFUGIN.—A brown powder, a large proportion of which is soluble in Alcohol (90 p.c.).

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

It is stated in *U.S.D.* that it is an impure Resin obtained by precipitating a saturated tincture of the root with Water.

Not Official.

CINCHONÆ CORTEX.

CINCHONA BARK.

The dried Bark of *Cinchona Calisaya*, *C. officinalis*, *C. lancifolia*, and other species of *Cinchona*, from which the various alkaloids of the bark may be obtained.

The official salts of Quinine, which are Quininæ Hydrochloridum, Quininæ Hydrochloridum Acidum, and Quininæ Sulphas, may be prepared from the Bark of various species of Cinchona and Remijia.

Only Red Cinchona Bark is official for the galenical preparations.

Foreign Pharmacopœias.—Official in Austr., Dan., Jap., Norw., Russ. and Swed., any species, especially Succirubra; Dutch, Ger. and Swiss (Cinchona Succirubra); Fr. (Quinquina Jaune and Quinquina Rouge); Mex., any species; Hung., (China Calisaya and Succirubra); Port. (Cinchona Flava, Fusca and Rubra); Span. (Cinchona Calisaya, Peruviana and Succirubra); Belg., Swiss and Ital. (Cinchona Succirubra, Ledgeriana and Calisaya); U.S., any species of Cinchona, especially Ledgeriana, Calisaya and Officinalis; the latter used for Compound Tincture only.

CINCHONÆ RUBRÆ CORTEX.

RED CINCHONA BARK.

FR., QUINQUINA ROUGE; GER., CHINARINDE; ITAL., CHINA ROSSA; SPAN., QUINA ROJA.

The dried Bark of the stem and branches of cultivated plants of *Cinchona succirubra*, Pav.

The dried Bark of *Cinchona Succirubra* only is official in the *B.P.* and *P.G.* It is official also in the *U.S.P.* under the heading Cinchona Rubra; under Cinchona is given the dried bark of *Cinchona Ledgeriana*, Howard, *Cinchona Calisaya*, Wedd., *Cinchona officinalis*, L., and of hybrids of these with other species of Cinchona. The *B.P.* Bark when used for preparing the official galenical preparations is required to yield from 5 to 6 p.c. of total alkaloids, not less than half of which should consist of Quinine and Cinchonidine, as assayed by the process outlined below. This is not considered an exacting standard, as almost the whole of these mixed alkaloids might consist of Cinchonidine with a mere trace of Quinine, and it affords no criterion of the amount of Quinine present. It has been pointed out (*P.J.* (3) xvi. 407) that a bark may contain the requisite total alkaloids and the official percentage of Quinine and Cinchonidine, and still contain only a trace of Quinine; what, therefore, is really wanted in the *Pharmacopœia* is a Quinine standard for the Bark. The *French Codex* (1908) requires the Bark to contain at least 5 p.c. of total alkaloids and to yield at least 1·5 grammes of crystallised basic Quinine Sulphate containing 8 molecules of Water of crystallisation, this quantity corresponding to 1·257 p.c. of basic Quinine Sulphate, dried at 100° C. (212° F.), or to 1·092 p.c. of anhydrous Quinine. This is the first instance in which a Quinine standard has been adopted by an important Pharmacopœia. An outline of the process adopted for the determination of the alkaloids is too lengthy for inclusion here, but the essential details are given at the end of the Materia Medica. The galenical preparations of the *B.P.* are standardised to contain a definite percentage w/v of total alkaloids. The *U.S.P.* Succirubra Bark or its hybrids is required to yield not less than 5 p.c. of anhydrous Cinchona alkaloids when assayed by the process indicated for the other varieties of the Bark. The other varieties of Cinchona bark official in the *U.S.P.* are required to yield not less than 5 p.c. of total anhydrous Cinchona alkaloids, of which at least four-fifths shall consist of anhydrous Ether-soluble alkaloids. The galenical preparations of the *U.S.P.* are standardised to contain a definite percentage of Ether-soluble alkaloids.

The *P.G.* gives no definite requirement, but if the result of the volumetric determination be expressed in terms of the mean combining weights of Quinine and Cinchonidine it should yield not less than 5·07 p.c. of alkaloids. The new *Swiss Ph.* adopts a minimum of 6·5 p.c. of alkaloids.

Medicinal Properties.—Tonic, bitter stomachic and astringent. It is valuable in neuralgia and in convalescence from acute diseases; in diarrhœa, excessive perspiration, chronic discharges from mucous membranes, and in dipsomania. (*See* also *Quinine.*)

Official Preparations.—Extractum Cinchonæ Liquidum, Infusum Cinchonæ Acidum, Tinctura Cinchonæ, Tinctura Cinchonæ Composita; and is a source of the Alkaloid Quinine.

Not Official.—Decoctum Cinchonæ, Elixir Cinchonæ, Mistura Cinchonæ, Mistura Cinchonæ Acida, Sirop de Quinquina, Tinctura Chinæ Composita, Vinum Chinæ, also Ferratum, Cinchonidinæ Hydrobromidum, Cinchonidinæ Sulphas, Cinchoninæ Iodo-Sulphas, Cinchoninæ Sulphas, and Acidum Chinicum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Red Cinchona bark is now chiefly imported from Ceylon and Java, although some is occasionally offered from the African Island of St. Thomé. The tree grows rapidly, and consequently the bark shrinks a good deal in drying, and presents, especially in the branch bark, a shrivelled or longitudinally wrinkled character; it has a reddish colour when broken, and a bitter and astringent taste. Its most marked feature is the presence of reddish warty lenticels. In the variety with leaves hairy beneath, formerly cultivated in Jamaica, these occur very sparingly. These two characters distinguish the red Cinchona from the other barks in use, since the warts are absent in that of *C. Calisaya*, Wedd., and in it the ridges or wrinkles are replaced by longitudinal fissures, which are at first shallow, but become deeper in older barks, and the epidermal layer often exfoliates, showing transverse cracks in the layer beneath. The variety *Ledgeriana*, Howard, is remarkable for its relatively greater thickness as compared with that of other species, but externally resembles Calisaya, except that the surface is usually rougher. In *Cinchona officinalis*, Hook., there are numerous transverse cracks with thickened edges, broken into points, so that the bark is rougher to the touch than other kinds. *Cinchona lancifolia*, Mutis., and its varieties are characterised by a whitish spongy epidermal layer and by a loose fibrous fracture. A hybrid of *C. officinalis*, L., and *C. succirubra*, Pav. (*Cinchona robusta*, Hort.), presenting the thick-edged cracks of the one and the warty character of the other, is remarkably rich in alkaloid, and is sometimes offered as 'Ledgeriana' bark. Small chips of red barks obtained by spoke-shaving do not present marked characters, and should only be purchased on analysis. The official bark is in quills or somewhat curved pieces coated with periderm; it may vary considerably in length, 2 to 12 in. (5 to 30 cm.) or more, and the thickness of the bark itself may vary from about $\frac{1}{10}$ to $\frac{1}{4}$ in. ($2\frac{1}{2}$ to 6 mm.); the fracture is shortly fibrous in the smaller, and finely fibrous in the larger pieces; the powder should be brownish or reddish-brown.

Tests.—Cinchona is one of the few instances in which the *B.P.* adopts a standard for the drug and indicates a method for the determination of its alkaloidal strength. The process official in the *B.P.* 1898 is an adaptation of that of the *B.P.* 1885, which is in turn based upon a process recommended by Squibb, it depends upon the liberation of the alkaloids from the combinations in which they exist in the bark by means of Calcium Hydroxide and their extraction by means of a mixture of 3 parts by volume of Benzol and 1 part by volume of Amyl Alcohol, the alkaloids in turn being shaken out from this solvent by a mixture of Diluted Hydrochloric Acid, and Water, which solution, after careful neutralisation with Ammonia Solution, is concentrated and the Quinine and Cinchonidine precipitated by Sodium Potassium Tartrate Solution; the Tartrates of the remaining alkaloids being precipitated from the filtrate from the Quinine and Cinchonidine by the addition of a slight excess of Ammonia Solution. The *B.P.* process may be briefly outlined as follows: A weighed quantity (20 grammes) of the finely powdered Bark is treated with 6 grammes of Calcium Hydroxide. The mixture after being moistened with 20 c.c. of Water is thoroughly incorporated, and allowed to stand for an interval of one or two hours. It is then transferred to a flask, mixed with 130 c.c. of a mixture of 3 parts by volume of Benzol and 1 part by volume of Amyl Alcohol and extracted by boiling under a reflux condenser for about 30 minutes. The Benzolated Amyl Alcohol is removed, passed through a filter, and the residue in the flask again boiled with a further quantity of the same mixture of Benzol and Amyl Alcohol, the liquid removed as before, and the process repeated a third time if necessary, the residue in the flask being finally transferred to the filter and washed by percolation with the mixture of Benzol and Amyl Alcohol until exhausted of alkaloids. This may be determined by evaporating a few drops of the Benzol-Amyl Alcohol Solution on a watch-glass, acidifying the residue with a drop or two of Diluted Sulphuric Acid, and adding a drop or two of Potassio-mercuric Iodide (Mayer's) Solution. The filtrates are mixed, transferred to a separator, and well shaken whilst warm with a mixture of 2 c.c. of Diluted Hydrochloric Acid and 12 c.c. of Water the liquids are allowed to separate, the acid aqueous solution of the alkaloidal Hydrochlorides is removed and the extraction of the alkaloids remaining in the Benzolated Amyl Alcohol solution accomplished by repeatedly shaking with Water made slightly acid with Hydrochloric Acid. The mixed acid liquids should, whilst warm, be exactly neutralised with Ammonia Solution concentrated to a volume of 16 c.c., and the Quinine and Cinchonidine precipitated as tartrates by the addition of a solution of about 1·5 grammes of Sodium Potassium Tartrate dissolved in 3 grammes of Water, the whole well stirred with a glass rod, and allowed to remain at rest for about an hour. The precipitated Quinine and Cinchonidine Tartrates are filtered, washed, dried at a temperature of the water-oven and weighed. They should contain four-fifths of their weight of alkaloids, and if this quantity be multiplied by 5 the product will be percentage by weight of Quinine and Cinchonidine.

The filtrate from the Quinine and Cinchonidine Tartrates is made slightly alkaline by the addition of Ammonia Solution, the precipitate collected on a filter, washed, dried, presumably also at a temperature of the water-bath, and weighed. This precipitate consists of the alkaloids other than Quinine and Cinchonidine, and if their weight be multiplied by 5 the product represents the percentage by weight present in the Bark, and when added to that of the Quinine and Cinchonidine obtained by the previous process yields the percentage by weight of total alkaloids.

The *B.P.* process is lengthy and tedious, it requires careful manipulation, and the closest attention to details is necessary to obtain accurate results. The exhaustion of Bark by the hot Benzolated Amyl Alcohol requires considerable time and patience. The exact neutralisation of the Hydrochloric Acid solution of the alkaloids requires great care, as does also the evaporation of the solution to the prescribed volume, and after evaporation the reaction of the liquid should again be ascertained and if necessary again exactly neutralised, unless exactly neutral there will be a liability to loss of alkaloid. It by no means follows that although the liquid has been neutralised before evaporation it will remain neutral during evaporation, and a further addition of Ammonia Solution is generally necessary.

The *U.S.P.* employs Ether-chloroform as a solvent for the alkaloids, and divides the process into two parts: (1) for anhydrous Cinchona alkaloids, and (2) for Ether-soluble alkaloids. The outlines of the process are essentially as follows:—A weighed quantity of 15 grammes of Cinchona Bark in No. 80 powder (or finer) is shaken vigorously in an Erlenmeyer flask with a mixture of 250 c.c. of Ether and 50 c.c. of Chloroform, and allowed to stand for 10 minutes. A measured quantity of 10 c.c. of Ammonia Solution is added, and, with frequent intervals of shaking, the mixture is allowed to stand for 5 hours. A measured quantity of 15 c.c. of Water is added, the mixture vigorously shaken and allowed to stand a few minutes. A measured quantity of 200 c.c. of the clear supernatant liquid is then transferred to a separator and the alkaloids extracted by vigorously shaking with 15 c.c. (or sufficient to make the liquid distinctly acid) of Normal Volumetric Sulphuric Acid Solution. The lower acid liquid is drawn off after the two layers have been separated, and the Ether-chloroform solution is again shaken vigorously, with a mixture of 5 c.c. of Normal Sulphuric Acid and 5 c.c. of Water; after separation, the acid liquid is again removed; the shaking is repeated a third time, using 5 c.c. of Water only, and the aqueous liquid is removed. The mixed acid liquids are filtered into a graduated cylinder, the containing vessel and filter are washed with sufficient Water to bring the volume of the contents of the cylinder to 50 c.c., and this measured quantity is then divided into two equal portions of 25 c.c. each. No. 1 quantity of 25 c.c. is placed in a separator, is rendered alkaline by a sufficiency of Ammonia Solution, and the alkaloids removed by shaking carefully for 1 minute with a mixture of 3 volumes of Chloroform and 1 volume of Ether. The lower layer, after separation of the liquids is complete, is drawn off into a tared flask. The contents of the separator are again shaken with 20 c.c. of a similar mixture of Chloroform and Ether for 1 minute, and this is followed by a third shaking with 10 c.c. of the Chloroform-ether mixture; the chloroformic liquids being in each case removed after the liquids have separated into two layers. The mixed Chloroform-ether solutions are evaporated to dryness on a water-bath, the dried residue is mixed with 3 c.c. of Ether, and again evaporated to dryness. It is then dried in an air-bath at a temperature of 110° C. (230° F.) until the weight remains constant. This weight multiplied by 20 indicates the percentage by weight of total Cinchona alkaloids. The second quantity of 25 c.c. is rendered alkaline with a sufficiency of Ammonia Solution, and shaken moderately for 2 minutes with 25 c.c. of Ether, the temperature of the liquid being maintained below 20° C. (68° F.), and the liquids allowed to stand for 10 minutes at 15° C. (59° F.). After separation of the two liquids the aqueous layer is removed and the ethereal solution is transferred to a tared flask. The separator is rinsed out with 5 c.c. of Ether and the washings added to the main quantity. The Ether is carefully evaporated on a water-bath, the flask and contents dried for 2 hours at a temperature of 110° C. (230° F.), cooled and weighed. The weight multiplied by 20 yields the percentage by weight of anhydrous Ether-soluble alkaloids. The *U.S.P.* adds a note to the effect that the Ether-soluble alkaloids include Quinine, Quinidine, and Cinchonidine.

The above process works well, is easily manipulated and yields the alkaloids in a very fair state of purity. Determinations carried out in the author's laboratory have shown an average of about 5·84 p.c. of total alkaloids and 4·32 p.c. of Ether-soluble alkaloids.

The *P.G.* describes a method for the determination of the percentage of total alkaloids, but gives no process by which the amount of Quinine and Cinchonidine may be judged. A qualitative test is introduced, which requires that 5 c.c. of the reserve portion remaining after the quantity for the volumetric determination has been removed, when mixed with 1 c.c. of Chlorine Water, shall, on the addition of Ammonia Water, yield a fine green coloration.

The process for the quantitative volumetric determination of the alkaloids is as follows:—A weighed quantity of 12 grammes of the finely powdered Bark dried at 100° C. (212° F.) is mixed in a well-stoppered flask or bottle with 90 grammes of Ether and 30 grammes of Chloroform, a measured quantity of 10 c.c. of Sodium Hydroxide solution (15 p.c.) is added, and with frequent intervals of vigorous shaking the mixture is allowed to stand for 3 hours. A measured quantity of 10 c.c. of Water, or sufficient to cause the powdered Bark to agglomerate on shaking, is added, and after the Chloroform-ether solution has separated as a clear supernatant liquid, a weighed quantity of 100 grammes is filtered through a dry well-covered filter into a flask, and half of the liquid distilled; the remainder is transferred to a separator, the flask is washed out with three successive quantities of 5 c.c. of a mixture of 3 parts by weight of Ether and 1 part by weight of Chloroform, and the alkaloids are extracted from the mixed Chloroform-ether liquids by agitation with 25 c.c. of Deci-normal Volumetric

Hydrochloric Acid Solution. The acid layer is drawn off after the liquids have completely separated and after sufficient Ether has been added to the mixture to cause the Chloroform-ether layer to float on the acid liquid, it is filtered through a small paper moistened with Water, into a flask of 100 c.c. capacity. The extraction of the Chloroform-ether solution is thrice repeated, using 10 c.c. of Water for each extraction, and the separated aqueous liquids are passed through the same filter paper; the latter is washed with Water, and the mixed filtrates and washings are diluted to 100 c.c. A measured quantity of 50 c.c. is removed, a freshly prepared solution of a small crystal of Hæmatoxylin in 1 c.c. of Alcohol (90 p.c.) added, and sufficient Deci-normal Volumetric Potassium Hydroxide Solution added to change the yellow colour to a bluish-violet, the mixture being shaken after each addition. Not more than 4·3 c.c. should be necessary. No factor is recorded by which the result of the above volumetric test may be calculated into its equivalent in alkaloids. Assuming that the mixture contains equal proportions of Quinine and Cinchonidine, a factor of 0·030931 may be employed, which indicates 5·07 p.c. of alkaloids. That the alkaloids are not always present in these proportions is evidenced by the observed discrepancies between the results of gravimetric and volumetric determinations. The new *Swiss Ph.* states that 1 c.c. of Deci-normal Volumetric Hydrochloric Acid is equivalent to 30·4 mg. of alkaloids.

The use of Hydrochloric Acid for the titration of Quinine instead of Sulphuric Acid eliminates the troublesome fluorescence which is produced when the alkaloid is taken into solution in the latter acid, and which may often seriously interfere with the end reaction. It must be borne in mind that the behaviour of Quinine towards certain indicators of neutrality is somewhat anomalous. With Hæmatoxylin or Cochineal the point of neutrality is reached with the formation of the Hydrochloride ($C_{20}H_{24}N_2O_2HCl$), but this salt is alkaline in reaction towards Methyl Orange, and the point of neutrality with this indicator is only reached with the formation of the Acid Hydrochloride ($C_{20}H_{24}N_2O_2, 2HCl$). Thus, using Hæmatoxylin Solution as an indicator, 1 c.c. of Deci-normal Volumetric Hydrochloric Acid Solution is equivalent to 0·03218 gramme of anhydrous Quinine, whilst using Methyl Orange Solution 1 c.c. of the Deci-normal Volumetric Solution is equivalent to 0·01609 gramme of anhydrous Quinine. The behaviour of Cinchonine and Cinchonidine towards these indicators is still more anomalous. It may therefore be doubted whether the application of a purely volumetric method of determination is advisable, and the volumetric result should always be controlled by a gravimetric determination.

The ash varies from 2 to 4 p.c.

Preparations.

EXTRACTUM CINCHONÆ LIQUIDUM. Liquid Extract of Cinchona.

A dark reddish-brown liquid prepared from Red Cinchona Bark by treatment with Distilled Water acidulated with Hydrochloric Acid and containing a small proportion of Glycerin; it is officially required to contain 5 p.c. w/v or 5 grains of Red Cinchona alkaloids in 110 minims; the *U.S.P.* Fluid Extract is required to contain 4 p.c. w/v or 4 grains of anhydrous Ether-soluble alkaloids in 110 minims. A fluid extract does not appear in the *P.G.*, which, however, has two solid extracts, an aqueous and an alcoholic.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

22 minims contain 1 grain of alkaloids.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Jap., Mex., Norw., Swed., Swiss and U.S., 1 in 1; Solid Extracts.—Austr. and Hung., Aqueous; Belg., Dutch, Ital., Jap., Mex., Russ., Span. and Swiss, Alcoholic; Fr., Ger., Mex. and Port., both Aqueous and Alcoholic. Belg. has also Chinæ Fluidextractum cum Kalio Iodati. Not in the others.

Tests.—The specific gravities of commercial fluid extracts of Red Cinchona Bark vary between 1·100 and 1·150; the percentage w/v of total solids from 33·4 to 53·0 p.c. and the percentage w/v of total alkaloids from 4·6 to 5·46 p.c. One commercial fluid extract, purchased as *B.P.*, assayed in the author's laboratory, possessed a specific gravity of 1·080, contained 27·5 p.c. w/v of total solids and only 2·6 p.c. of total alkaloids.

The *B.P.* adopts a standard of total alkaloids, the *U.S.P.* of anhydrous Ether-soluble alkaloids; the former Pharmacopœia employs a mixture of 3 parts by volume of Benzol and 1 part by volume of Amyl Alcohol for the initial extraction of the alkaloids, the latter a mixture of Ether and Chloroform.

The outlines of the official process are essentially as follows:—A measured quantity of 5 c.c. of the Liquid Extract is diluted with five times its volume of Water, introduced into a separator, rendered alkaline with 15 c.c of Potassium Hydroxide Solution, and the liberated alkaloids extracted by well shaking the mixture with 30 c.c. of a mixture of 3 parts by volume of Benzol and 1 part by volume of Amyl Alcohol; the Benzol-Amyl Alcohol solution is transferred to another separator and the agitation repeated with another 30 c.c. of a similar mixture, the Benzol-Amyl Alcohol layer being again drawn off into the second separator; the mixed Benzol-Amyl Alcohol liquids are washed with a little Water, the aqueous washings rejected, and the alkaloids extracted with 30 c.c. of a warm mixture of 1 volume of Diluted Hydrochloric Acid and 5 volumes of Water, the acid solution of the alkaloidal Hydrochlorides is separated, and the extraction repeated with a further 30 c.c. of a similar mixture of acid and Water. The mixed acid liquids are rendered strongly alkaline with Ammonia Solution, and the liberated alkaloids extracted by agitation with three successive quantities of 10 c.c. of Chloroform, the chloroformic layers are in each instance separated, mixed, transferred to a weighed dish, the Chloroform evaporated slowly, and the residue dried at 110° C. (230° F.). This weight multiplied by 10 gives the percentage by volume of total alkaloids present in the sample. The *B.P.* process is stated (*Y.B.P.* '05, 362) to give rise to obstinate emulsions, which may be overcome by using 10 c.c. alcoholic, in place of 15 c.c. of aqueous, Potassium Hydroxide solution. A suggestion is also made to weigh instead of to measure the quantity of Liquid Extract.

The *U.S.P.* process is carried out on the following lines:—A measured quantity of 10 c.c. of the Fluid Extract is introduced into an Erlenmayer flask, rendered alkaline by the addition of 10 c.c. of Ammonia Solution, and the alkaloids extracted by shaking vigorously for 10 minutes with a mixture of 100 c.c. of Ether and 25 c.c. of Chloroform. 66 c.c. of the clear supernatant liquid is transferred to a separator, the vessel in which the liquid is measured being washed out with 5 c.c. of Ether, which is in turn added to the contents of the separator. The alkaloids are then removed from the Ether-Chloroform solution by shaking it vigorously for several minutes with a sufficiency (10 c.c.) of Normal Volumetric Sulphuric Acid Solution, and the acid layer is transferred into another separator. The complete extraction of the alkaloids from the Chloroform-Ether solution is ensured by a further extraction with 5 c.c. of Normal Volumetric Sulphuric Solution and 5 c.c. of Water, which is in turn followed by an extraction with 5 c.c. of Water. The acid aqueous and the aqueous liquids are separated, mixed with the acid layer already contained in the second separator, the temperature of the mixed liquids being maintained below 25° C. (77° F.), 25 c.c. of Ether added and sufficient Ammonia Solution to yield an alkaline reaction to red Litmus paper; after vigorous agitation for 2 minutes the temperature is reduced to below 15° C. (59° F.), and the liquids allowed to stand for 10 minutes at that temperature. The ethereal layer is separated, transferred to a tared flask, the separator washed with 5 c.c. of Ether, the washings being added to the main quantity, and the Ether evaporated at a moderate heat on a water-bath, the residue being dried for half an hour in an air-bath at 110° C. (230° F.), cooled and weighed, the heating being repeated and the weight taken when constant. The weight of this residue multiplied by 20 gives the percentage w/v of anhydrous Ether-soluble alkaloids present in the Fluid Extract.

The process has been tried in the author's laboratory, and works well; the resulting alkaloids are fairly free from colour; the average percentage of anhydrous Ether-soluble alkaloids in commercial Fluid Extracts was found to be 4·5 p.c.

INFUSUM CINCHONÆ ACIDUM. Acid Infusion of Cinchona.

Red Cinchona Bark, 1; Aromatic Sulphuric Acid, ¼; Distilled Water, boiling, 20; infuse for one hour, and strain. (1 in 20)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official in Russ. (C. Rubra), 1 in 8, with Phosphoric Acid; Fr. (Tisane), 1 in 50; Span., 1 in 33⅓, with Acidum Sulphuricum Alcoholisatum. Not in the others.

TINCTURA CINCHONÆ. Tincture of Cinchona.

A clear reddish or brownish-red liquid, prepared by treating red Cinchona bark, in No. 40 powder, with sufficient Alcohol (70 p.c.) to form a tincture which shall contain not less than 0·95 nor more than

1·05 p.c. w/v of total alkaloids. The *U.S.P.* Tincture is required to contain 0·75 p.c. w/v anhydrous Ether-soluble alkaloids. The *P.G.* tincture is calculated to contain about 1 p.c. w/v of total alkaloids.

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

22 minims contain $\frac{1}{5}$ grain of alkaloids.

Foreign Pharmacopœias.—Official in Fr., Teinture de Quinquina Rouge; Dan., Norw., Russ. and Swed., Tintura Chinæ (from any species); Dutch and Ger., Tinctura Chinæ, and Hung., Tinctura Chinæ Simplex (from C. Succirubra); Ital., Tintura di China; Jap., Tinct. Chinæ; Mex., Tintura de Quina; Port., Tintura de Quina (from C. Flava); Span., Tintura Alcoholica de Quina (from C. Calisaya and C. Loja); Swiss, Tinctura Cinchonæ; U.S., Tinctura Cinchona (C. any species not Red); all 1 in 5, and all by weight, except U.S. Not in Austr. Belg. (C. various species, especially Succirubra), contains 1 p.c. w/w total Alkaloids, including at least 0·2 p.c. Quinine. U.S., Cinchona (*U.S.P.*), in No. 60 powder, 200; Glycerin, 75; and sufficient of a mixture of Alcohol (95 p.c.) 675, with Water 250, to produce 1000 by percolation, containing 0·75 p.c. w/v Ether-soluble Alkaloids.

Tests.—Tincture of Cinchona has a specific gravity of 0·915 to 0·920; contains from 3·5 to 8·5 p.c. w/v of total solids and from 62·5 to 66·5 p.c. w/v of Absolute Alcohol. The *B.P.* requires that 10 c.c. of Tincture, when assayed according to the process described in the large type under Extractum Cinchonæ Liquidum, shall yield not less than 0·095 gramme nor more than 0·105 gramme of alkaloids. The *U.S.P.* standardises the Tincture to a percentage w/v of anhydrous Ether-soluble alkaloids. A measured quantity (50 c.c.) of the Tincture is evaporated to about one-fifth its volume on a water-bath, the liquid transferred to a bottle of about 180 c.c. capacity, the dish rinsed with 10 c.c. of diluted Alcohol, and the determination completed as in the case of the fluid extract. The weight of anhydrous Ether-soluble alkaloids obtained, multiplied by 4, shows the percentage w/v present in the Tincture.

TINCTURA CINCHONÆ COMPOSITA. Compound Tincture Cinchona.

A brownish-red liquid possessing an aromatic odour and bitter taste, which is officially required to contain not less than 0·45 nor more than 0·55 p.c. w/v of the total alkaloids of Red Cinchona Bark, when assayed as described below. The Compound Tinctures official in the *U.S.P.* and *P.G.* are prepared from Red Cinchona Bark containing the official percentage of alkaloids required by each Pharmacopœia, but the alkaloidal content is not verified by a determination. *See* also below.

Tincture of Cinchona, 20 fl. oz.; Dried Bitter-Orange Peel, well bruised, 2 oz.; Serpentary Rhizome, in No. 40 powder, 1 oz.; Cochineal, in powder, 56 grains; Saffron, 110 grains; Alcohol (70 p.c.), *q.s.* to yield 40 fl. oz.

Made with standardised Tincture of Cinchona instead of the Red Cinchona Bark ordered in the previous edition of *B.P.*

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

22 minims contain $\frac{1}{10}$ grain of alkaloids.

Foreign Pharmacopœias.—Official in Austr., Ger., Hung., Jap. and Russ., Tinct. Chinæ Comp., also Swiss (Tinct. Cinch. Co.), with Cinchona, Gentian, Orange Peel and Cinnamon (various strengths); Belg. (Tinct. Whyttii or Tinct. Huxham), Cinchona, Orange Peel, Cinnamon and Saffron; Dan., Dutch, Norw. and Swed. (Tinct. Chinæ Comp.), similar to the above but without Cinnamon; Mex. (Tintura de Quina Compuesta), and Span. (Tinctura Alcoholica de Corteza de Naranja Compuesta, Tintura corroborante de Whytt.), Bitter-Orange Peel, Cinchona and Gentian; Port. (Tinct. de Quina Comp.), Cinchona, Orange Peel and Serpentary; U.S., Red Cinchona (*U.S.P.*), 100; Bitter-Orange Peel, 80; Serpentaria, 20; Glycerin, 75; and sufficient of a mixture of Alcohol (95 p.c.) 675, with Water 250, to produce 1000 by percolation. Not in Fr.

Huxham's Tincture of Bark (Original Formula in 1788).—Powdered Peruvian Bark, 4 oz.; Orange Peel, 8 oz.; Serpentary Root, 80 grains; Saffron, 160 grains; Cochineal, 80 grains; Brandy, 40 fl. oz.; digest 3 or 4 days.

Tests.—Compound Tincture of Cinchona possesses a specific gravity of 0·910 to 0·920; contains about 5 p.c. w/v of total solids and about 63·0 p.c. w/v of Absolute Alcohol. A measured quantity of 10 c.c., when assayed by the official process as outlined in the large type under Extractum Cinchonæ Liquidum, should yield an amount of alkaloids corresponding to not less than 0·45 nor more than 0·55 p.c. w/v of total alkaloids. Neither the *U.S.P.* nor the *P.G.* gives a process for the determination of the alkaloids, the presence of the soluble principles from the other constituents of the Tincture invalidating the results.

The residue obtained by the evaporation to dryness of 2 c.c. of the *B.P.* Compound Tincture should impart a yellow colour to Chloroform, and if the chloroformic solution be filtered and evaporated to dryness, the residue when moistened with a drop of concentrated Sulphuric Acid will acquire a beautiful indigo-blue tint, indicating the presence of Saffron. The *U.S.P.* and *P.G.* Compound Tinctures are made from Red Cinchona Bark, and do not contain Saffron.

Not Official.

DECOCTUM CINCHONÆ.—Red Cinchona Bark, in No. 20 powder, 1¼; Distilled Water, 20; boil 10 minutes; when cold, strain, and pour on the marc sufficient Water to make 20. (1 in 16)

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c.

Official in Belg., 1 of Fluid Extract in 10; Dan., 1 in 8 with Hydrochloric Acid; Dutch, 6 in 100; Ital., 1 in 20; Norw. and Swed., 1 in 10 with Hydrochloric Acid; Port., Cinchona Flava 1 in 10, also Fusca 1 in 10; Russ., Cinchona Rubra, 1 in 7·5, containing Sulphuric Acid; Span., Cocimento de Quina Calisaya and Cocimento de Quina de Loja, each about 1 in 66; also Cocimento de Quina y Valeriana and Cocimento Antiseptico; Dan. and Norw. have a Dec. Chinæ c. Senega.

ELIXIR CINCHONÆ (*U.S.N.F.* 1896).—Tincture of Cinchona, 12; Syrup, 10; Glycerin, 10; Aromatic Elixir, 48. Each fl. oz. represents about 14 grains of Yellow Cinchona. A similar preparation is made with Detannated Tincture of Cinchona for use in combination with preparations of Iron.

This has been adopted by the *B.P.C.*, but in the latest edition of *U.S.N.F.* (1906) the preparation is made with the alkaloids, and not with Tincture of Cinchona.

MISTURA CINCHONÆ (*for children*).—Diluted Nitric Acid, 30 minims; Tincture of Cinchona, 2 fl. drm.; Glycerin, 1 fl. drm.; Distilled Water, to 1½ fl. oz. —*Middlesex*.

Dose.—1 to 2 fl. drm.

MISTURA CINCHONÆ ACIDA.—Liquid Extract of Cinchona, 10 minims; Diluted Nitric Acid, 10 minims; Aromatic Syrup, 30 minims; Water, to 1 fl. oz.—*St. Thomas's.*

This formula has been incorporated in the *B.P.C.*

Liquid Extract of Cinchona, 10 minims; Diluted Nitric Acid, 10 minims; Aromatic Syrup, 60 minims; Water, to 1 fl. oz.—*Brompton.*

Other hospitals include Mistura Cinchonæ Acida, but they are made with Decoctum Cinchonæ.

SIROP DE QUINQUINA.—Percolate 1000 of Red Cinchona in No. 26 powder with 1000 of Alcohol (30 p.c.); displacing with Water to obtain 1000 of percolate; distil off 445 and dissolve in the residue when cold 1000 of Sugar.—*Fr.*

TINCTURA CHINÆ COMPOSITA.—Cinchona Bark, 6; Orange Peel, 2; Gentian Root, 2; Cinnamon Bark, 1; Diluted Spirit (60 p.c.), 50.—*Ger.*

VINUM CHINÆ (*Ger.* and *Jap.*).—Dissolve Gelatin, 1, in warm Water, 10; mix with Sherry, 1000; add powdered Cinchona Bark, 40; allow to stand for eight days at 15° to 20° C. Press, and to the expressed liquor add Sugar, 100; Tincture of Orange, 2; allow to stand in a cool place for fourteen days, and filter.

Austr., Vinum Chinæ.—Dissolve 1 of Gelatin in 20 of boiling Water, and mix with 780 of Malaga Wine; after 24 hours, add 50 of Fluid Extract of Cinchona, 50 of Tincture of Orange, and 100 of Clarified Honey.

Belg., Chinæ Vinum.—1 of Fluid Extract in 50 of stronger Wine.

Fr., Vin de Quinquina Officinal.—Cinchona, 25; Alcohol (60 p.c.), 75; Dilute Hydrochloric Acid, 2; Red Wine, 920.

Dutch, Vinum Chinæ.—1 Cinchona Succirubra percolated with a mixture of 1 of diluted Alcohol, 4 of Malaga Wine, and 3 of Water *q.s.* to produce 40, in which dissolve 10 of Sugar.

Hung., Vinum Chinæ.—Extract of Cinchona, 1; Malaga Wine, 80; Simple Tincture of Cinchona, 20.

Ital., Vino Chinato.—Cinchona, 1; Marsala Wine, 30.

Mex., Vino de Quina.—Cinchona, 3; Sherry Wine, 100.

Norw., Vinum Chinæ.—Cinchona, 50; Citric Acid, 1; Alcohol, 20; Malaga Wine, 1000.

Russ., Vinum Chinæ.—Tincture of Cinchona, 1; Sherry Wine, 4.

Port., Vino de Quina.—Cinchona flavum, 1; Port Wine, 20; Vinho de Quina Cinzenta, Cinchona fuscum, 1; Madeira Wine, 10; Vinho de Quina Composto, Cinchona flavum, 4; Gentian, 1; Bitter-Orange Peel, 1; Port Wine, 100; Vinho de Quina Ferruginoso, Iron and Potassium Tartrate, 1; Vinho de Quina Cinzenta, 200.

Span., Vino de Quina.—Loja Bark, 1; Sherry Wine, 16·6; Vino de Quina Ferruginoso, Crystallised Ferrous Sulphate and Citric Acid, of each, 1; Distilled Water, 10; Quinine Wine, 500.

Swiss, Vinum Cinchonæ.—30 of Fluid Extract, 20 of diluted Alcohol, 40 of Milk, 1 of Citric Acid, 910 of Malaga Wine.

B.P.C., Vinum Cinchonæ.—Elixir Cinchona, 1; Detannated Sherry, to make 8.

Dutch, Vinum Chinæ Ferratum.—1 of Ferri Pyrophosphate with Ammonium Citrate, dissolved in 4 of Water, and added to 95 of Cinchona Wine.

Austr., Vinum Chinæ Ferratum.—1 of Gelatin, dissolved in 20 of boiling Water, is added to 955 of Malaga Wine; after 24 hours, add 5 of Iron and Quinine Citrate dissolved in 20 of Water.

Norw., Vinum Chinæ Ferratum.—Iron and Ammonium Citrate, 1; Cinchona Wine, 100.

Swed., Vinum Chinæ Ferratum.—Iron and Quinine Citrate, 1; Syrup, 10; Marsala Wine, 89.

B.P.C., Vinum Cinchonæ Ferratum.—Iron and Ammonium Citrate, 1; Cinchona Wine, 200.

CINCHONIDINÆ HYDROBROMIDUM ($C_{19}H_{22}N_2O$, HBr, H_2O, eq. 390·28).—Long, light yellow, odourless prismatic crystals, possessing a very bitter taste. It contains 74·83 p.c. of Cinchonidine and 4·58 p.c. of Water. Soluble 1 in 40 of Water. Under the name of 'Blennostasine,' a combination similar to this has been introduced for the treatment of affections characterised by catarrhal hypersecretion.

Tests.—An aqueous solution of the salt yields with Potassium Sodium Tartrate solution a white precipitate soluble in diluted Hydrochloric Acid; with Ammonia Solution it yields a white precipitate soluble in Chloroform. The aqueous layer when separated from the Chloroform and rendered faintly acid with Nitric Acid yields with Silver Nitrate Solution a yellowish curdy precipitate soluble with difficulty in Ammonia Solution, insoluble in Nitric Acid.

When ignited with free access of air 0·5 gramme of the salt should leave no weighable residue.

An aqueous solution should yield no precipitate on the addition of a solution containing a soluble Sulphate.

CINCHONIDINÆ HYDROBROMIDUM ACIDUM ($C_{19}H_{22}N_2O$, 2HBr, $2H_2O$, eq. 488·51).—Light yellow prismatic crystals, readily soluble in Water. It should contain 59·78 p.c. of Cinchonidine and 7·32 p.c. of Water.

Tests.—An aqueous solution of the acid salt responds to tests described under Cinchonidine Hydrobromide.

The aqueous solution should yield no precipitate on the addition of a solution of a soluble Sulphate.

When ignited with free access of air 0·5 gramme of the salt should leave no weighable residue.

CINCHONIDINÆ SULPHAS ($(C_{19}H_{22}N_2O)_2$, H_2SO_4, $3H_2O$, eq. 735·08.—Colourless, odourless, silky, acicular crystals, having a very bitter taste. It contains 79·46 p.c. of Cinchonidine and 7·29 p.c. of Water.

In doses of one-and-a-half to twice those of Quinine, is stated to form a reliable substitute and frequently to be better tolerated.—*Pr.* lxxiii. 682.

Solubility.—1 in 100 of Water, 1 in 60 of Alcohol (90 p.c.); insoluble in Chloroform and Ether.

Dose.—1 to 10 grains = 0·06 to 0·65 gramme.

Foreign Pharmacopœias.—Official in Fr. and U.S. Not in the others.

The salt is capable of forming a number of Hydrates, according to the strength of solutions from which it is crystallised. From a moderately concentrated solution it crystallises with $6H_2O$, from a hot concentrated solution it crystallises with $3H_2O$. The formula for the salt official in the *French Codex* (1908) shows 6 molecules of Water of crystallisation, which is equivalent to 13·6 p.c. of Water. It contains 74·06 p.c. of Cinchonidine.

Tests.—Cinchonidine Sulphate loses its Water at 100° C. (212° F.), and the anhydrous salt reabsorbs moisture on exposure to moist air. It has a melting point of 205° to 206° C. (401° to 402·8° F.), slightly below which temperature it darkens in colour. An aqueous solution of the salt is neutral in reaction towards Litmus paper, and yields on the addition of Ammonia Solution a white precipitate, only slightly soluble in an excess of the reagent, but soluble in Ether, a portion of the salt subsequently crystallising out. Another portion of the aqueous solution, acidified with diluted Hydrochloric Acid, yields with Barium Chloride Solution a white precipitate insoluble in Hydrochloric or Nitric Acids.

The more generally occurring impurities are excess of Water, readily carbonisable organic impurities, Quinine or Quinidine Sulphates, Cinchonine Sulphate, and mineral matter. Excess of Water is readily detected by the loss of weight of the specimen at a temperature of 100° C. (212° F.). The theoretical percentage of Water in the $3H_2O$ salt is 7·29 p.c. The salt should not lose more than 8 p.c. when dried at this temperature. The $6H_2O$ salt of the *Fr. Codex* (1908) loses 13·6 p.c. Readily carbonisable organic impurities may be detected by the behaviour of the salt when treated with concentrated Sulphuric Acid, a pure specimen should not become more than faintly coloured; Quinine or Quinidine Sulphates may be detected by the marked fluorescence produced in a 1 in 1000 solution of the salt by diluted Sulphuric Acid, not more than a faint blue fluorescence should be noticed; Cinchonine Sulphate may be detected by precipitating the Cinchonidine as an insoluble Tartrate and testing the filtrate with a drop of Ammonia Solution. A weighed quantity of 0·5 gramme is macerated at 15° C. (59° F.), with 20 c.c. of Water; 0·5 gramme of Potassium Sodium Tartrate is added and the maceration continued with intervals of repeated agitation for 1 hour, the temperature being maintained at 15° C. (59° F.). A drop of Ammonia Solution added to the filtered liquid should not produce more than a slight turbidity. This test also serves to detect Quinidine Sulphate. Mineral matter may be detected by the residue left on ignition; the salt should leave no weighable residue when ignited with free access of air.

CINCHONINÆ IODO-SULPHAS (Antiseptol).—A brown, or reddish-brown, odourless powder, insoluble in Water, soluble in Alcohol (90 p.c.), and in Chloroform. It contains about 50 p.c. of Iodine. Introduced as a substitute for Iodoform. Used in the form of a 1 in 8 ointment for lupus. Has also been given internally in doses of 1 to 5 grains = 0·06 to 0·32 gramme.

CINCHONINÆ SULPHAS $(C_{19}H_{22}N_2O)_2, H_2SO_4, 2H_2O$, eq. 717·20.—Hard, white, shining, odourless, prismatic crystals, having a very bitter taste.

It is the Sulphate of an alkaloid obtained from various species of Cinchona Bark. *B.P.* 1885 said from Cinchona and Remijia Bark. It contains theoretically 81·44 p.c. of Cinchonine and 4·98 p.c. of Water.

Solubility.—1 in 70 of Water, 1 in 9 of Alcohol (90 p.c.), 1 in 60 of Chloroform, sparingly in Ether.

Dose.—1 to 10 grains = 0·06 to 0·65 gramme.

Foreign Pharmacopœias.—Official in Mex., Port. and U.S. Not in the others.

Tests.—Cinchonine Sulphate when heated to 100° C. (212° F.) readily loses its Water of crystallisation, and when rendered anhydrous at this temperature it melts at about 198·5° C. (389·5° F.). Its aqueous solution is neutral in reaction towards Litmus paper, and is dextrorotatory, and yields on the addition of Ammonia Solution a white precipitate. The aqueous solution when acidified with diluted Sulphuric Acid and Chlorine Water added yields no green coloration on the addition of an excess of Ammonia Solution. The addition of Barium Chloride solution to an aqueous solution of the salt yields a white precipitate insoluble in Hydrochloric Acid. One part of the powdered anhydrous Sulphate should dissolve in 80 parts by weight of Chloroform.

The more generally occurring impurities are excess of moisture, Quinine or Quinidine Sulphates, Cinchonidine Sulphate, readily carbonisable organic impurities and mineral matter. Excess of moisture is readily shown by the loss in weight of 1 gramme of the salt at 100° C. (212° F.) which should not amount to more than 5·0 p.c., the theoretical percentage as above indicated being 4·98 p.c.; Quinine and Quinidine Sulphates produce a marked blue fluorescence in a 1 in 1000 solution of the salt in diluted Sulphuric Acid. Cinchonidine Sulphate is detected, and additional confirmation of the presence of Quinine Sulphate is afforded when 1 part of the anhydrous salt is treated with 80 parts by weight of Chloroform, anhydrous Cinchonine Sulphate will dissolve, anhydrous Quinine and Cinchonidine Sulphates are insoluble in Chloroform; readily carbonisable organic impurities may be detected by concentrated Sulphuric Acid, the salt should not yield more than a pale yellow coloration, mineral matter may be detected by the residue left on ignition, the pure salt leaving no residue on incineration.

Cinchonidinæ Sulphas Acidus and **Cinchoninæ Sulphas Acidus** are also known. These salts are more readily soluble in Water.

Cinchonidinæ Salicylas and **Sulphocarbolas** have been used, the former as a tonic and antiperiodic, the latter as an antiseptic, and as a prophylactic against malaria.

ACIDUM CHINICUM. Chinic Acid, Kinic Acid, Quinic Acid, $C_7H_{12}O_6$, eq. 190·65.—Colourless, transparent, rhombic prisms or flat, crystalline masses, having a strongly acid but not a bitter taste.

Solubility.—1 in 2½ of Water, 1 in 42 of Alcohol (90 p.c.); insoluble in Ether.

Tests.—Quinic Acid possesses a melting point of 161° to 162° C. 321·8° to 323·6° F.). Its aqueous solution is lævogyrate. A little of the powder distilled with Manganese Dioxide and Sulphuric Acid yields Quinone, which condenses on the cool side of the tube in the form of deep yellow prisms. The acid may be titrated with Normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator, a weighed quantity of 1 gramme of the acid should require about 5·2 c.c. of the Volumetric Solution corresponding to about 99 p.c. of pure Chinic Acid. It should leave no residue when ignited with free access of air.

It has been introduced in the treatment of the Uric Acid diathesis and in gout. It is more generally employed in the form of a salt, *e.g.*, Lithium Quinate, *q.v.* p. 738.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

CINNAMOMI CORTEX.

CINNAMON BARK.

FR., CANNELLE DE CEYLAN; GER., CHINESISCHER ZIMMT (CASSIA); ITAL., CANNELLA DEL CEYLAN; SPAN., CANELA DE CEYLAN.

The dried inner Bark of shoots from the truncated stocks of *Cinnamomum Zeylanicum.* The bark from cultivated trees is alone official. Imported from Ceylon, and commercially known as Ceylon Cinnamon.

Medicinal Properties.—Carminative, astringent, aromatic stimulant, and antiseptic, chiefly used as an adjuvant to other medicines, and as a flavouring agent. Often employed with Chalk in diarrhœa. An essence has been used as a prophylactic against influenza.

60-grain doses for dysentery.—*B.M.J.* '95, i. 530; *L.* '95, i. 567. Has been lauded for cancer, but the majority of evidence is not in its favour.—*M.A.* '95, 163.

Inhalation of **Oil of Cinnamon** in the treatment of consumption.—*B.M.J.* '96, ii. 1374.

The vapour of the Oil of Cinnamon exerted no retarding or inhibitive influence on the growth of the tubercle bacillus.—*B.M.J.* '99, i. 203.

Dose.—10 to 20 grains = 0·65 to 1·3 gramme in powder.

Official Preparations.—Of the **Bark,** Aqua Cinnamomi, Oleum Cinnamomi, Pulvis Cinnamomi Compositus, and Tinctura Cinnamomi; used in the preparation of Decoctum Hæmatoxyli, Pulvis Catechu Compositus, Pulvis Cretæ Aromaticus, Pulvis Kino Compositus, Tinctura Cardamomi Composita, Tinctura Catechu, and Tinctura Lavandulæ Composita. Of the **Water,** Mistura Cretæ, Mistura Guaiaci, Mistura Olei Ricini, Mistura Spiritus Vini Gallici, Syrupus Aromaticus and Syrupus Cascaræ Aromaticus. Of the **Oil,** Spiritus Cinnamomi. Of the **Compound Powder,** Pilula Aloes et Ferri and Pilula Cambogiæ Composita. Of the **Spirit,** Acidum Sulphuricum Aromaticum.

Not Official.—Pulvis Aromaticus, Tinctura Cinnamomi Composita, Tinctura Aromatica.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr. (Cannelle), Ital. (Cannella), Mex. (Canela), Norw., Port. (Canella), and Swed. use Ceylon Cinnamon only. Ger., Hung., Jap. and Russ. use Chinese Cinnamon or Cassia only. Belg., Span., Swiss and U.S. use both kinds.

Descriptive Notes.—By the name of Cinnamon in this country the bark of *Cinnamomum Zeylanicum,* Breyn., imported from Ceylon, is understood. In Germany the Cortex Cinnamomi, official in the *P.G.*, is the bark known as Cassia in this country, but as Chinese

Cinnamon in Germany and in the United States. In the *U.S.P.* the Ceylon Cinnamon is official as *Cinnamomum Zeylanicum*, but instead of Cassia or Chinese Cinnamon there is also official a kind known as Saigon Cinnamon, which is the bark of an undetermined species of *Cinnamomum*. Of the Cinnamon tree about six varieties are cultivated in Ceylon, and the different grades are distinguished by being packed in rolls of quills of different sizes, the more slender the rolls the better the quality, therefore the limit of size given in the *B.P.* $\frac{3}{8}$ inch (9 mm.) in diameter indicates the quality intended. The scrapings of the tips of the shoots and the broken fragments of quills have been regularly imported into Europe since 1867 under the name of 'Cinnamon chips' and have been used for the distillation of the oil. The thick trunk bark is sometimes offered in commerce, but has very little aroma, and probably finds its way into the cheaper kinds of mixed spice. Cassia bark in powder is sometimes substituted for that of Cinnamon, but it may be detected by the different flavour, and under the microscope by the presence of cork cells, which are absent from Cinnamon, by the larger and broader bast fibres, and the larger starch grains. Cassia bark is known to drug brokers under the name of 'Cassia lignea' to distinguish it from 'Cassia vera,' which is a hard mucilaginous bark derived from *Cinnamomum Burmanni*, DC., with an allied but different odour, and apparently imported from Padang in Sumatra. Chinese Cassia occurs in small quills 2 to 3 inches (5 to 7·5 cm.) long made into packets of about 12 inches (30 cm.) long and 3 inches (7·5 cm.) in diameter; Cassia vera in quills 12 to 15 inches (30 to 37·5 cm.) or more in length; Saigon Cassia, which goes chiefly to the United States, occurs in quills 3 to 4 inches (7·5 to 10 cm.) long, and has a more intensely sweet taste and stronger flavour. The *P.G.* directs that Cassia should not have a mucilaginous taste and that the medullary rays are usually only 2 cells thick, thus excluding the Padang Cassia vera. Other species of Cassia imported into this country may be distinguished under the microscope even if used in powdered form, *see Museum Report, Pharm. Soc.* 1903, pp. 50, 51. Some commercial samples of powdered Cinnamon apparently contain a large proportion of Cinnamon bark that has been distilled.

Tests.—Cinnamon Bark leaves on incineration about 4 p.c. of ash, and 6 p.c. is seldom exceeded. Eight samples examined in the author's laboratory gave from 2·8 to 4·26 p.c., with an average of 3·5 p.c.; 6 samples of the powder gave from 4·32 to 5·2 p.c., with an average of 4·74 p.c. The *U.S.P.* gives not over 4 p.c. No limit of ash is given in the *B.P.*

Preparations.

AQUA CINNAMOMI. CINNAMON WATER.

Cinnamon Bark, bruised, 1; Water, 20; distil 10. (1 in 10)

The distilled 'Aqua' is very turbid from suspended Oil. There is no recognised rule in dispensing as to whether it should be filtered or not, but it is customary to do so.

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Ger., Jap., Russ., Swed. and Swiss, 1 in 10; Fr. (Eau de Cannelle), 1 in 5; Ital. (Acqua dist. di Cannella), Mex. (Agua destilada de Canela), 1 in 4; Hung., 1 in 5; also Aqua Cinnamomi Spirituosa, 3 in 10; Port., 1 in 8; Span. (Agua destilada de Canela) C. 270, Water 2000, Alcohol (90 p.c.) 100, distil 1200. Norw. and U.S., made with Oil 1 in 500.

Tests.—An approximate idea of the amount of oxidation of the Cinnamic Aldehyde which has occurred may be obtained by acidifying a measured quantity with 25 p.c. Sulphuric Acid Solution and adding Deci-normal Volumetric Potassium Permanganate Solution till the fluid acquires a pink coloration, remaining permanent for several seconds. The amount of Cinnamic Acid may be determined by titration with Deci-normal Volumetric Sodium Hydroxide Solution. 10 c.c. of a freshly Distilled Water will require from 12 to 14 c.c. of the Deci-normal Volumetric Potassium Permanganate Solution, and about 0·1 c.c. of the Deci-normal Volumetric Sodium Hydroxide Solution; a Water which has been distilled and stocked for some time may require only 4 c.c. of the Permanganate Solution and about 1·5 c.c. of the Deci-normal Volumetric Sodium Hydroxide Solution.

OLEUM CINNAMOMI. Oil of Cinnamon.

Fr., Essence de Cannelle de Ceylan; Ger., Zimmtol (Cassia); Ital., Essenza di Cannella; Span., Esencia de Canela.

A light yellow liquid, obtained by distillation from Cinnamon Bark, and possessing the agreeable, delicate, aromatic odour of the Ceylon Cinnamon, and a spicy, sweet, burning taste. It darkens in colour by exposure to light and air. It should be kept in dark amber-tinted, well-closed glass bottles, and protected as far as possible from the air and light.

It usually contains 65 to 75 p.c. of Cinnamic Aldehyde, from 4 to 8 p.c. of Eugenol, and some Phellandrene. Yield of oil is about 0·5 to 1 p.c.

Cinnamic Acid, an oxidised product of the oil, is described under Acidum Cinnamicum, p. 39.

Solubility.—10 in 3 of Alcohol (90 p.c.); 1 in 45 of Alcohol (60 p.c.).

Medicinal Properties.—Possesses the aromatic and antiseptic properties of Cinnamon Bark, without its astringency. It is a powerful local stimulant when administered internally.

Of late years the medicinal virtues of Cinnamon have received a good deal of attention. The Oil has already been used as an inhalation in phthisis. It has been shown in the Bradshaw Lecture on the treatment of enteric fever (*B.M.J.* '04, ii. 1451; '05, i. 414) that $2\frac{1}{2}$-minim doses given at the commencement, followed by increasing doses up to 5 minims, have given favourable results. An appreciable, though slight, inhibitory influence on the growth of typhoid bacillus begins to be exerted by the oil in a dilution of about 1 in 2600, and when the strength approaches 1 in 1000 its antiseptic effect is complete. The quality of the drug must be above reproach.

Dose.—$\frac{1}{2}$ to 3 minims = 0·03 to 0·18 c.c.

In pill or on Sugar.

Foreign Pharmacopœias.—Official in Dutch, Fr., Ital., Mex. (Aceite Volatil de Canela), Port. and Span. use Oil of Cinnamon; Dan., Ger., Hung., Jap., Norw., Swiss and U.S. use Oil of Cassia. Austr. and Swed., Cinnamalum (Cinnamic Aldehyde) in place of Oil of Cassia; U.S., Cinnaldehydum as well as Oil of Cassia; Belg., Oils of Cinnamon and of Cassia.

Tests.—Cinnamon Oil should possess a specific gravity of from 1·023 to 1·040, the official figures are from 1·025 to 1·038. Optically it is almost inactive, the rotation not varying more than 1° in a tube of 100 mm. It should dissolve to form a clear solution in 2 parts by weight of Alcohol (70 p.c.). It is officially required to show the absence of more than 50 p.c. of non-aldehydic constituents as determined by well shaking a measured quantity of 10 c.c. with 5 times its volume of a boiling Sodium Hydrogen Sulphite Solution (30 p.c.), the oily layer which separates being required to measure when cooled to 15·5° C. (60° F.), not more than 5 c.c. The official test is unsatisfactory, and the directions quite inadequate. The Sodium Hydrogen Sulphite Solution should be added in small portions at a time, and care should be taken to heat after each addition until the solid compound liquefies. The oil official in the *B.P.* is that derived from Ceylon Cinnamon, that of the *U.S.P.* and *P.G.* from Cassia Cinnamon. The *B.P.* oil should contain not more than 50 p.c. of non-aldehydic constituents; the *U.S.P.* not less than 75 p.c., and the *P.G.* not less than 70 p.c. of Cinnamic Aldehyde. A determination of the percentage of Cinnamic Aldehyde present in a specimen may be made by the process given under the tests for Oil of Cassia.

The chief adulterant of Cinnamon Oil is oil distilled from Cinnamon leaf. It may be qualitatively detected by dissolving a measured quantity of the oil in 5 times its volume of Alcohol (90 p.c.), and adding a few drops of Ferric Chloride Test-solution, no decided blue coloration should be produced. If present in quantity it would cause an increase in the specific gravity, the percentage of Cinnamic Aldehyde would be lowered, and the Eugenol content increased. The percentage of Eugenol may be determined approximately by treating the oil with a 5 p.c. Potassium Hydroxide solution and measuring the diminution in volume. If more accurate results are desired, the Eugenol may be determined by conversion into Benzoyl-eugenol as described in the tests under Oleum Caryophylli.

The tests of the *U.S.P.* and *P.G.* are compared under Oil of Cassia.

PULVIS CINNAMOMI COMPOSITUS.

Compound Powder of Cinnamon. *B.P.Syn.*—Pulvis Aromaticus.

Cinnamon Bark, 1; Cardamom Seeds, 1; Ginger, 1, all in powder. (1 in 3)

Dose.—10 to 40 grains = 0·65 to 2·6 grammes.

Foreign Pharmacopœias.—Official in Port (Pó de Canella Comp.), Cinnamon 7, Cardamoms 7, Ginger 6; Pulvis Aromaticus, Dutch same as Brit.; Swiss, Cinnamon 1, Cardamoms 1, Ginger 1, Sugar 7; U.S., Cinnamon 7, Ginger 7, Cardamoms 3, Nutmeg 3. Not in the others.

SPIRITUS CINNAMOMI. Spirit of Cinnamon.

Oil of Cinnamon, 1; Alcohol (90 p.c.), *q.s.* to yield 10.

B.P. 1885 was 1 in 50.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Foreign Pharmacopœias.—Official in Belg., 1 in 100; Jap., Cassia Oil 1 in 50; U.S., 1 in 10; Dutch, Ital., Mex. and Port. (distilled from the Bark). Not in the others.

Tests.—Spirit of Cinnamon has a specific gravity of from 0·850 to 0·855; it leaves about 0·24 p.c. w/v of residue on evaporation over a water-bath; this residue, when dissolved in Alcohol (90 p.c.) yields a green coloration on the addition of Ferric Chloride Test-solution.

TINCTURA CINNAMOMI. Tincture of Cinnamon.

1 of Cinnamon Bark, in No. 40 powder, percolated with Alcohol (70 p.c.), to yield 5.

B.P. 1885 was 1 in 8, with Rectified Spirit.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S., 1 in 5; all by weight except U.S.

Tests.—Tincture of Cinnamon has a specific gravity of from 0·898 to 0·906; contains from 1·8 to 3·0 p.c. w/v of total solids and from 65 to 69 p.c. w/v of Absolute Alcohol.

Not Official.

PULVIS AROMATICUS (*B.P.* 1864).—Cinnamon 4; Nutmeg 3; Saffron 3; Cloves 1½; Cardamoms 1; Refined Sugar 25.

This has been incorporated in the *B.P.C.* as follows:—

Pulvis Aromaticus Compositus.—Cinnamon Bark 10·66; Nutmeg 8; Saffron 8; Cloves 4; Cardamom Seeds 2·66; Refined Sugar 66·66.

TINCTURA CINNAMOMI COMPOSITA (*P.L.*).—Cinnamon, 1 oz.; Cardamoms, ½ oz.; Long Pepper, 2½ drm.; Ginger, 2½ drm.; Proof Spirit, 40 fl. oz.

This has been incorporated in the *B.P.C.* as follows:—Cinnamon Bark, bruised, 2·50; Cardamom Seeds, bruised, 1·25; Long Pepper, bruised, 1; Ginger, bruised, 1; Alcohol (60 p.c.), sufficient to produce 100.

Port. (Tinctura di Canella Composta), Cinnamon 10, Cardamoms 4, Cloves 4, Ginger 2, Alcohol (85 p.c.) 100.

TINCTURA AROMATICA (*Ger.*, *Russ.* and *Swiss*).—Cinnamon Root, in coarse powder, 5; Ginger, 2; Galangal Root, 1; Cloves, 1; Cardamoms, 1; Diluted Alcohol, 50.

Ger. use 60 p.c., *Russ.* 70 p.c., and *Swiss* 68 to 69 p.c. Alcohol.

Austr., same form but with Zedoary Root in place of Galangal Root.

Dan. and *Norw.*, Cinnamon, 4; Ginger, Galangal Root, Cloves and Cardamoms, of each 1; Alcohol (68 p.c.), 40.

Jap., Cloves 2, Cinnamon 10, Cardamoms 2, Ginger 5, Alcohol (68 p.c.) 100, extract in the cold for 7 days; press; filter; to the filtrate add Spirit of Lemon 5.

COCÆ FOLIA.

COCA LEAVES.

FR., FEUILLE DE COCA; GER., COCABLATTER; ITAL., FOGLIA DI COCA; SPAN., COCA DEL PERU (HOJADE).

The dried leaves of *Erythroxylum Coca*, and its varieties.

Coca leaves contain an amount of alkaloids varying from 0 to 1·5 p.c. The average amount is about 0·5 p.c. The leaves frequently contain very little alkaloid, owing to the alkaloids readily undergoing decomposition when the leaves are exposed to heat and moisture. The amount of Cocaine in a good sample of leaves is about 70 p.c. or even less of the total alkaloids. The leaves official in the *U.S.P.* are required to yield not less than 0·5 p.c. of the Ether-soluble alkaloids of Coca; those official in the new *Swiss Ph.* a minimum content of 0·7 p.c. of alkaloids.

Medicinal Properties.—A nervine and muscular tonic, stimulant and restorative. Useful during convalescence, in debility and nervous exhaustion, and to prevent fatigue. The leaves are chewed by the natives of Peru and Bolivia to sustain them during the day, that they may defer eating till the evening.

It has been recommended for the cure of the craving for Opium and for Alcohol, but the craving for Cocaine, which is acquired by the excessive use of Coca, is possibly worse than either.

Official Preparations.—Extractum Cocæ Liquidum. Used in the preparation of Cocaina and Cocainæ Hydrochloridum.

Not Official.—Elixir Cocæ, Extractum Cocæ, Tinctura Cocæ, and Vinum Cocæ.

Foreign Pharmacopœias.—Fr., Ital., Jap., Port. and U.S. (Coca); Mex. and Span. (Coca del Peru); Swiss (Folium Cocæ). Not in the others.

Descriptive Notes.—The Coca leaves of commerce are of three varieties. The Bolivian or Huanuco, the Peruvian or Truxillo, and the Coca leaves cultivated in Java. The first are derived from *Erythroxylon Coca*, Lamarck., and the second from a plant which has been named by Rusby, *Erythroxylon Truxillense*. The third is described by botanists as derived from *E. Spruceanum*, Burck. The Bolivian leaves are oval, dark olive green when fresh, with a dark mid-rib, and are usually not broken. The Peruvian are thinner, pale green, oblanceolate and narrower, and are generally much broken. The Java leaves are more lanceolate, darker green, and the mid-rib is reddish towards the base. The leaves as they arrive in commerce vary in size and quality. In the *B.P.* the size of the Bolivian is defined as 1½ to 3 inches (37 to 75 mm.) long and 1 to 1½ inches (25 to 37 mm.) in breadth, and oval; but the Peruvian leaves are only described as smaller, narrower, and more brittle than the Bolivian. They are, however, different in shape, being more or less oblanceolate and more tapering towards the base. The Java leaves are not described in the *B.P.* In the Bolivian Coca the midrib has a prominent ridge on its upper surface which is not present in the Peruvian. The lateral lines, formed of collenchyma, where the leaf is folded when young, are more prominent in the Bolivian than in the other varieties. Under the microscope the characteristic features are the papillose polygonal cells of the under surface, the papillæ presenting the appearance of a circle in the centre of each cell, the pericyclic fibres, the prismatic crystals, and the stomata between two narrow cells parallel with the guard cells. Coca leaves for use in pharmacy should not smell or taste mouldy, and should produce a slightly numbing effect on the tongue. They lose alkaloids if exposed to damp, or if not carefully dried.

Tests.—Coca Leaves of the *B.P.* are not required to yield any definite percentage of alkaloids, and no method of determination is given. The *U.S.P.* method is carried out on the following lines:—A weighed quantity of 10 grammes of the leaves in No. 60 powder is transferred to an Erlenmeyer flask and allowed to soak for 10 minutes in 50 c.c. of a mixture of 1 part by volume of Chloroform and 4 parts by volume of Ether. After the addition of a mixture of 2 c.c. of Ammonia Solution and 3 c.c. of Water, the flask is set aside for one hour, with intervals of frequent shaking. The contents of the flask are then transferred to a small percolator having a Cotton-Wool plug packed in the neck and connected with a separator containing a mixture of 6 c.c. of Normal Volumetric Sulphuric Acid Solution and 20 c.c. of Water. The leaves are packed into the percolator with a glass rod after the liquid has passed through; the flask is washed with 10 c.c. of the Chloroform-Ether mixture and the residue in the flask transferred to the percolator with several successive portions of 5 c.c. of the Chloroform-Ether mixture, and percolation continued with this menstruum, using in all 50 c.c. The alkaloids are now removed from the Chloroform-Ether solution by shaking the separator vigorously, and the acid layer removed after complete separation. The Chloroform-Ether is shaken a second and a third time with 10 c.c. of a similar mixture of Sulphuric Acid and Water, the mixed acid liquids are transferred to a second separator, rendered distinctly alkaline with Ammonia Solution, and the liberated alkaloids shaken out first with 25 c.c., then with 20 c.c., and finally with 15 c.c. of Ether. The mixed ethereal solutions are evaporated on a water-bath at a gentle heat, the residue dissolved in 3 c.c. of Ether and the Ether again evaporated. The residue is dissolved in 4 c.c. of Decinormal Volumetric Sulphuric Acid Solution, and the excess of acid is titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Cochineal or Iodeosin Test Solution as an indicator of neutrality. If the number of c.c. of Fiftieth-normal Solution required be divided by 5, the quotient subtracted from 4, and the remainder multiplied first by 0·03 and then by 10, the product will represent the p.c. of Ether-soluble alkaloids present in the leaves.

The ash of Coca Leaves amounts to from 6 to 8 p.c.

Preparation.

EXTRACTUM COCÆ LIQUIDUM. Liquid Extract of Coca. Percolate 20 of Coca Leaves in powder with Alcohol (60 p.c.)

until the drug is exhausted. Reserve the first 15 of percolate and evaporate remainder at a temperature below 80° C. (176° F.) to a soft extract, which dissolve in the reserved portion, and add Alcohol (60 p.c.), *q.s.* to yield 20. (1 in 1)

Note.—As the Coca Leaves would be but imperfectly exhausted by the first 15 parts of the Alcohol, and as the active constituents are damaged or destroyed by heat, a fluid extract prepared by repercolation is much to be preferred. When thus prepared from carefully dried green leaves it contains 25 p.c. of solid Extract (dried at 212° F.).

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Fr., Mex., Swiss and U.S. Not in the others.

A dark green fluid extract prepared from Coca leaves. The *B.P.* product is not standardised; the *U.S.P.* preparation is required to contain 0·5 p.c. w/v of the Ether-soluble alkaloids of Coca; the *P.G.* does not contain a Fluid Extract.

Tests.—Fluid Extract of Coca possesses a specific gravity of 0·990 to 1·030, yields about 19·0 p.c. w/v of total solids, and contains about 50 p.c. w/v of Absolute Alcohol. The *B.P.* does not include a process for the determination of the alkaloids; the *U.S.P.* gives a method of determining the Ether-soluble alkaloids, the essential features of which are as follows:—A measured quantity of 10 c.c. of the fluid is introduced into a separator, rendered alkaline by the addition of 2 c.c. of Ammonia Solution, and the alkaloids extracted by shaking for 1 minute with 25 c.c. of Ether. The separated aqueous liquid is shaken with a further quantity of 20 c.c. of Ether, the aqueous portion separated, the mixed ethereal solutions are shaken well for 1 minute with a mixture of 5 c.c. of Normal Volumetric Sulphuric Acid Solution and 5 c.c. of Distilled Water, the extraction being repeated with a mixture of 1 c.c. of Normal Volumetric Sulphuric Acid Solution and 9 c.c. of Water, the acid liquids in each case being separated and transferred to a second separator. Sufficient Ammonia Solution is now added to render the liquid distinctly alkaline, and the liberated alkaloids are shaken out with 20 c.c. of Ether, the extraction being completed with two further quantities each of 15 c.c. of Ether. The separated ethereal solutions are mixed, transferred to a tared flask, the Ether evaporated and the residue dried. It is then dissolved in 5 c.c. of Deci-normal Volumetric Sulphuric Acid Solution, and the excess of acid is titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, using Cochineal or Iodeosin Test Solution as an indicator of neutrality. If the number of c.c. of Fiftieth-normal Solution required be divided by 5, the quotient subtracted from 5, the difference multiplied first by 0·03 and then by 10, the product will represent the percentage w/v of the Ether-soluble alkaloids of Coca present in the sample. The average results of the examination by a special process, given in the reference, of 7 samples of Liquid Extract prepared by the official process and 7 'miscible' Liquid Extracts is recorded *C.D.* '02, i. 421. The average yield of the 'official' samples was 0·38 p.c., and they varied from 0·20 p.c. w/v to 0·816 p.c. w/v; the 'miscible' 0·091 p.c. of alkaloid, and they varied from 0·014 to 0·294 p.c. w/v. A specimen of commercial 'miscible' Liquid Extract examined in the author's laboratory by the *U.S.P.* process showed 0·465 p.c. of alkaloids.

Not Official.

EXTRACTUM COCÆ.—A solid alcoholic green extract, prepared from carefully dried leaves.

Dose.—2 to 10 grains = 0·13 to 0·65 gramme, in pills, pastils, or lozenges.

Foreign Pharmacopœias.—Official in Fr. Codex, Ital. and Span. Not in the others.

ELIXIR COCÆ.—Coca Leaves, 1; Simple Elixir, 6.—*Martindale.*

Miscible Liquid Extract of Coca, 16·5; Simple Elixir to make 100.—*B.P.C.*

The Miscible Liquid Extract of Coca is 100 of *B.P.* Liquid Extract evaporated to 50, decanted from the deposit, which is washed with 10 of Water, the washings mixed with the concentrated fluid, and finally made up with Alcohol (60 p.c.) to 100.

TINCTURA COCÆ.—Coca Leaves, 1; Alcohol (60 p.c.), 5.—*Fr.* and *Ital.*

Swiss, the same quantities, but with Alcohol (68 to 69 p.c.). All by weight.

This has been incorporated in the *B.P.C.* with Alcohol (60 p.c.) by measure.

VINUM COCÆ. *Syn.* VIN DE COCA (*Fr.*).—Dried Leaves of Coca, 6; Vin de Malaga, 100; macerate for 10 days, and filter.

Wine of Coca can also be made by adding an equivalent quantity of the Liquid Extract to Wine.

Coca Wine, if sufficiently weak to be used as a beverage, requires a wine licence. The Excise has drawn the line at Wines containing ½ grain of alkaloid to the oz., which would be at least twice as strong as the above.

Foreign Pharmacopœias.—Official in Fr., 6 in 100; Mex., 3 in 100; Span., 1 in 33½; Swiss, 1 of Fluid Extract in 20. U.S. about 1 in 15. Not in the others.

Elixir of Coca, 1; Detannated Sherry, to make 8.—*B.P.C.*

COCAINA.

COCAINE.

METHYL-BENZOYL-ECGONINE.

$C_{17}H_{21}NO_4$, eq. 300·93.

Large, colourless, odourless, monoclinic prisms, having a bitter taste, followed by anæsthesia of the mucous membrane. It is an alkaloid obtained from the leaves of *Erythroxylum Coca*, and its varieties.

Solubility.—About 1 in 1300 of Water (Paul); 1 in 10 of Alcohol (90 p.c.); 1 in 50 of Olive Oil; 1 in 4 of Oleic Acid; 2 in 1 of Chloroform; 1 in 4 of Ether; 1 in 14 of Oil of Turpentine. Insoluble in Glycerin.

These figures have been incorporated in the *B.P.C.*

Official Preparation.—Unguentum Cocainæ.

Not Official.—Guttæ Cocainæ Oleosæ, Nebula Cocainæ Composita, Nebula Cocainæ Oleosa, Oleatum Cocainæ, Unguentum Cocainæ, Unguentum Suprarenalin et Cocainæ.

Foreign Pharmacopœias.—Official in Fr., Mex., Span. and U.S. Not in the others.

Tests.—The distinguishing tests for Cocaine are the melting point, which should be 98° C. (208·4° F.)—*B.P.* says 96° to 98° C. (204·8° to 208·4° F.), *U.S.P.* 98° C. (208·4° F.), *Fr. Codex* (1908) 98° C. (208·4° F.)—the lævorotatory nature of its solutions, the alkaline reaction of its aqueous solution towards Litmus and Methyl Orange Solutions, the marked anæsthesia which it produces on the mucous membrane, and its mydriatic effect on the pupil of the eye. When exactly neutralised with Hydrochloric Acid the solution yields with Potassium Permanganate Solution a purple-violet precipitate, possessing a very characteristic microscopic appearance. This crystallisation takes place best in a solution of about 5 p.c. strength. When a crystal is moistened with one or two drops of fuming Nitric Acid, evaporated to dryness on a water-bath, and the residue moistened with a few drops of an alcoholic Potassium Hydroxide Solution, a peculiar characteristic fruity odour is produced. This test is characteristic of Cocaine, no other alkaloid extracted by Benzene from an ammoniacal solution behaving at all similarly. The salts of Cocaine are neutral to most indicators of neutrality, and the pure alkaloid may therefore be readily determined by titration with Normal or Deci-normal Volumetric Hydrochloric Acid Solution, 1 c.c. of Normal Acid representing 0·30093 gramme of the pure alkaloid. Iodeosin or Cochineal Solution is the most suitable indicator for the purpose.

The impurities likely to be present in the alkaloid are also those more generally examined for in the Hydrochloride, and the methods by which they may be detected will be found under Cocaine Hydrochloride. Cocaine readily undergoes hydrolysis, and aqueous solutions are decomposed even on boiling; the decomposition being greatly facilitated by the presence of acid. The *B.P.* states, 'its solution in water acidulated with Hydrochloric Acid and the dry salt obtained on evaporating this solution afford the reactions mentioned under Cocaine Hydrochloride'; the *B.P.C.* has construed this expression into 'when its solution in Hydrochloric Acid is evaporated to dryness, the residue should respond to the tests given under Cocaine Hydrochloride'; the *U.S.P.*, evidently with a view to minimising the amount of decomposition taking place, requires that if an alcoholic solution of Cocaine be carefully neutralised with Hydrochloric Acid and the solution evaporated to dryness, the residue should respond to the reactions and tests given under the Hydrochloride.

A solution of the alkaloid in water acidified with Nitric Acid should yield no opalescence or precipitate with either Silver Nitrate or Barium Chloride Solution. The alkaloid should yield no weighable residue on ignition. Only the Hydrochloride is official in the *P.G.*

Preparation.

UNGUENTUM COCAINÆ. COCAINE OINTMENT.

Dissolve 1 of Cocaine in 4 (by weight) of Oleic Acid at a gentle heat, and mix with 20 of Lard. (1 in 25)

Oleatum Cocainæ.—Cocaine, 5; Alcohol, 5; Oleic Acid, 50; Olive Oil, *q.s.* to produce 100.—*U.S.*

Guttæ Cocainæ Oleosæ.—Cocaine, 8 grains; Castor Oil, 1 oz.—*St. George's.*

Not Official.

NEBULA COCAINÆ COMPOSITA.—Cocaine, 2 grains; Menthol, 4 grains; Eucalyptus Oil, 6 minims; Camphor, 4 grains; Spray Oil, 1 fl. oz.—*Bournemouth Formulary.*

Nebula Eucalypti et Mentholis et Cocainæ, *B.P.C.*, closely resembles the above:—Cocaine, 0·5; Menthol, 1; Oil of Eucalyptus, 1·25; Camphor, 1; Liquid Paraffin, to produce 100.

A modification of the above appears in the *B.P.C. Supplement* as follows:—**Nebula Cocainæ Composita.**—Compound cocaine spray is prepared by dissolving 0·415 of Cocaine in sufficient compound Menthol and Thymol spray to produce 100.

NEBULA COCAINÆ OLEOSA.—Cocaine, 25 grains; Oil of Sweet Almonds, 1 fl. oz. Dissolve by heat.—*Central Throat.*

UNGUENTUM COCAINÆ.—Cocaine, 2 grains; Soft Paraffin, 100 grains. —*London Ophthalmic.*

The title for this in *St. Thomas's* and *B.P.C.* is **Unguentum Cocainæ Dilutum** (pro oculis). The Cocaine should be finely powdered and rubbed with a small quantity of the Soft Paraffin, the remainder added, and dissolved with the aid of a gentle heat.

Unguentum Cocainæ (Ophthalmic).—Cocaine Hydrochloride, 8 grains; Soft Paraffin, to 1 oz.—*London.*

UNGUENTUM ATROPINÆ ET COCAINÆ.—*See* Atropine.

UNGUENTUM SUPRARENALIN ET COCAINÆ.—Suprarenalin, ½ grain; Boric Acid, 1 grain; Cocaine Hydrochloride, 5 grains; Distilled Water, 15 minims; Hydrous Lanoline, 250 grains; Vaseline, 250 grains.—*Bournemouth Formulary.*

This has been incorporated in the *B.P.C.* under the title **Unguentum Adreninæ et Cocainæ,** employing Adrenine.

COCAINÆ HYDROCHLORIDUM.

COCAINE HYDROCHLORIDE.

HYDROCHLORATE OF COCAINE.—*B.P.* '85.

$C_{17}H_{21}NO_4HCl$, eq. 337·12.

FR. CHLORHYDRATE DE COCAÏNE; GER., COCAINHYDROCHLORID; ITAL., CLORIDRATO DI COCAINA; SPAN., CLORURO DE COCAINA.

Colourless, odourless, transparent, prismatic crystals, or acicular crystals, or a white glistening crystalline powder. Taste slightly bitter, producing upon the tongue a tingling sensation followed by numbness of some minutes' duration.

Solubility.—2 in 1 of Water; 1 in 2½ of Alcohol (90 p.c.); 1 in 2½ of Glycerin; about 1 in 20 of Chloroform; almost insoluble in Ether; insoluble in fixed Oils.

Medicinal Properties.—Local anæsthetic, mydriatic. Has been largely used for producing local anæsthesia in examinations of and operations on the eye and throat; and in dentistry (¼ to ½ grain being injected into the gum); 2 p.c. solutions being used for the eye and 20 p.c. for the throat. It is used locally in producing anæsthesia of other mucous membranes, as the urethra, vagina, nose and rectum; in the form of spray containing $\frac{1}{2}$ to 2 p.c., with or without other medicaments such as Adrenalin 1 in 5000, in aqueous solution; or $\frac{1}{2}$ p.c. of Cocaine with 1 p.c. of Menthol in Liquid Paraffin (*see* also p. 772); in the form of Bougies, Pessaries, or Suppositories containing $\frac{1}{2}$ grain of the salt in each with Oil of Theobroma. Anæsthesia of the deeper seated tissues for minor operations is produced by local infiltration of Cocaine, combined generally, with Adrenalin. Injected locally for sciatica and for neuralgia. It has been used successfully as a preventive of sea-sickness, in doses of $\frac{1}{4}$ to 1 grain in solution, and in doses of $\frac{1}{8}$ grain every half-hour in the vomiting of pregnancy. As an ointment it is used in painful skin diseases, as shingles; in facial neuralgia and in pruritus.

Pastilles are made of various strengths from $\frac{1}{20}$ to $\frac{1}{6}$ grain in each, usually $\frac{1}{20}$ or $\frac{1}{10}$ grain. It is also supplied in granular effervescent form containing Cocaine Hydrochloride $\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{5}$, $\frac{1}{2}$ grain in each teaspoonful.

Hypodermic Tablets are supplied containing $\frac{1}{10}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$ grain; also Cocaine Hydrochloride $\frac{1}{50}$ grain, Homatropine Hydrobromide $\frac{1}{50}$ grain, in each.

Hypodermic solutions are used containing 4 to 10 p.c. of the salt.

For external application in neuralgia, 10 or 20 p.c. solution of the *alkaloid* in Oil of Cloves, and a weaker solution 5 p.c. for toothache and earache.

10 p.c. solution applied on Lint or Cotton-Wool to a rigid os uteri is followed by rapid dilatation.—*B.M.J.* '98, ii. 1374; '00, i. 1340.

In pertussis, dose $\frac{1}{16}$ grain three times daily for infants, increasing it according to the age, $\frac{1}{3}$ grain being given to children of 5 or 6 years.—*L.* '95, i. 1429; *B.M.J.E.* '95, ii. 28.

Combined with Opium in the internal treatment of cancerous disease.—*B.M.J.* '96, ii. 718.

Four cases in which toxic symptoms have followed anæsthesia of the throat.—*B.M.J.E.* '96, ii. 95.

Used with a laryngeal syringe, shown (*B.M.J.* '04, ii. 1221) to be a satisfactory method of producing local anæsthesia during operation on the larynx.

Uncertain as a mydriatic, and cannot be relied upon to produce maximum dilatation of the pupil.—*B.M.J.* '99, ii. 775.

A useful modification of the usual method of using Cocaine in operation upon the eyeball is given (*B.M.J.* '04, ii. 1303); an ointment has been advocated in combating photophobia (*B.M.J.* '04, ii. 1301), being stated not to produce desiccation of the corneal epithelium.

In cocainisation of the spinal canal, 2 c.c. of a freshly prepared sterilised 2 p.c. solution ($\frac{1}{3}$ grain), and the quantity should not be exceeded or toxic symptoms may arise. Headache following operation is checked by Phenacetin in 10-grain doses or by Nitroglycerin or Hyoscine Hydrobromide.—*L.* '02, i. 912, 1051.

$\frac{1}{3}$-grain doses into spinal canal, preceded in some cases by hypodermic injection of 10 minims Liquor Strychninæ.—*L.* '02, ii. 864.

Injection of Cocaine into the nerve-trunks about their point of division before an operation, and the administration of Morphine before it, tend to prevent shock (*L.* '05, ii. 579). For the induction of spinal anæsthesia in the treatment of Strychnine poisoning and of tetanus, 1 or 2 c.c. of a 1 p.c. solution of Cocaine Hydrochloride is injected into the spinal subdural space. Not more than $\frac{1}{2}$ grain should be injected at once, and it is well to commence with a much smaller quantity.

1 or 2 c.c. of a 3 p.c. solution of Eucaine B Hydrochloride may also be used. The solution may be sterilised by boiling without decomposition, is less toxic than Cocaine, and unpleasant or dangerous effects practically never attend its use.—*L.* '05, ii. 887.

Several fresh communications on the useful combination of Cocaine and Adrenalin have been made. The combined use is shown (*B.M.J.E.* '04, ii. 60) to cause increase of the analgesic property and to lessen toxic effect. Solution recommended, 10 c.c. of a 1 in 200 Cocaine Hydrochloride Solution, 10 minims of a 1 in 1000 Adrenalin Solution. Their separate use has sometimes been advocated (*B.M.J.* '04, ii. 1227) in operation on the larynx, the Cocaine being used as a spray, a more diffuse effect being required. Adrenalin Solution has been used locally, its application being most desired where bleeding is taking place.

Suggested as probable that in the long run weaker solutions than 2 p.c., say 1 in 100 to 1 in 400, will be used for intraspinal injection of Cocaine. The use of Eucaine suggested instead of Cocaine on account of its lesser toxicity and greater stability during sterilisation by heat.—*L.* '01, i. 137.

Lumbar injections of 0·1 gramme (= $\frac{1}{6}$ grain) during labour.—*L.* '01, ii. 365, 645.

The physiological effects of cocainisation of the spinal canal.—*L.* '01, ii. 1280.

Dangers of anæsthesia by injection of Cocaine into the spinal canal.—*L.* '01, i. 975.

An objection to the lumbar method of producing anæsthesia being employed as a routine practice on a large scale is the poisonous and treacherous character of the drug hitherto used, viz., Cocaine.—*B.M.J.* '07, ii. 869.

For local anæsthesia in the extraction of teeth, the best results are obtained with 1 p.c. solution of Cocaine combined with 5 p.c. of Adrenalin Chloride: danger of syncope and other accidents from Cocaine, due in most cases to carelessness or ignorance in the method; the same amount of Cocaine is more dangerous in a concentrated than in a weaker solution.—*B.M.J.* '07, i. 895.

Use of 10 p.c. solution for extraction of teeth strongly deprecated; 1 p.c. solution perfectly effective; dose should never exceed 1 grain.—*B.M.J.* '07, i. 788, 848. Death from urethral injection of 3 grains.—*B.M.J.* '06, ii. 868.

Cocaine intoxication and its demoralising effects.—*B.M.J.* '02, i. 1020, 1041.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain = 0·01 to 0·03 gramme.

Ph. Ger. maximum single dose, 0·05 gramme; maximum daily dose, 0·15 gramme.

Prescribing Notes.—*Unless a preservative be used, solutions should be freshly prepared to prevent the development of a fungus. As solutions of Cocaine are damaged by heat, they must not be sterilised by boiling. Salicylic Acid is the best, if not the only effectual preservative for aqueous solutions of Cocaine, but it is very irritating to the eye. As Borax is incompatible with this salt, an equivalent quantity of Boric Acid should be prescribed.*

Incompatibles.—Alkalis and alkaline Carbonates, Borax, Carbolic Acid, Mercurous and Mercuric Chlorides, and the majority of soluble Silver salts.

Official Preparations.—Injectio Cocainæ Hypodermica, and Lamellæ Cocainæ. Used in the preparation of Trochiscus Krameriæ et Cocainæ.

Not Official.—Guttæ Cocainæ Hydrochloridi, Nebula Cocainæ, Pastillus Cocainæ, Pastillus Cocainæ et Morphinæ, Trochisci Cocainæ, Trochisci Cocainæ et Morphinæ, Cocainæ Citras, Cocainæ Hydrobromidum, Cocainæ Lactas, Cocainæ Nitras, Cocainæ Oleas, Cocainæ Phenylas, Cocainæ Salicylas, Cocainæ Sulphas, Eucaine, Eucaine Hydrochloride, Eucaine Lactate, Orthoform, Orthoform Hydrochloride, Benzoyl-Pseudotropeine, Holocaine, Holocaine Hydrochloride, Acoine Nirvanin, Nervocidine, Alypin, Novocaine, Stovaine.

Antidotes.—Inhalation of Nitrite of Amyl.—*B.M.J.* '87, i. 625, 695, 1401; 88, i. 757. Strychnine and Digitalin.—*L.* '98, i. 718.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—Cocaine Hydrochloride possesses a melting point according to the *B.P.* of from 180° to 186° C. (356° to 366·8° F.), the *U.S.P.* states 189° C. (372·2° F.), mentioning that the presence of minute quantities of impurities may reduce the melting point to

180° C. (356° F.), or even less; the *Fr. Codex* (1908) gives 186° C. (366·8° F.); the *P.G.* gives 183° C. (361·4° F.). It should be perfectly free from colour, should be readily and completely soluble 2 in 1 of Water, forming a perfectly colourless solution, which should be absolutely neutral to Litmus paper. Its solutions are lævogyrate. Its aqueous solution yields with Ammonium Carbonate Solution and with Potassium, Sodium, or Ammonium Hydroxide Solution a white precipitate, amorphous when precipitated from strong solutions, but rapidly becoming crystalline. If this precipitate be dissolved in Ether, the ethereal solution separated, and the Ether carefully evaporated, the residue should respond to the distinctive tests given in the large type under 'Cocaine.' The salt should dissolve without change of colour in pure concentrated Sulphuric Acid or in pure Nitric Acid. On warming its solution in the former acid, it chars, at the same time evolving an agreeable aromatic odour, and yielding a crystalline sublimate of Benzoic Acid. Its aqueous solution affords, with Potassio-mercuric Iodide (Mayer's) Solution, a white precipitate, precipitation occurring even in very dilute solution; with Auric Chloride Solution, a yellow precipitate; with Sodium Biborate Solution, a white precipitate; with Picric Acid Solution, a yellow precipitate, rapidly becoming crystalline; with Mercuric Chloride Test Solution, slightly acidulated with Hydrochloric Acid, a white precipitate soluble in hot Water; with Platinic Chloride Solution, a yellow crystalline precipitate; with Palladous Chloride Solution (5 p.c.), followed by the addition of Chlorine Water, a red precipitate; with Chromic Acid Solution or with Potassium Bichromate Solution, followed by the addition of Hydrochloric Acid, a yellow crystalline precipitate. An aqueous solution of the salt should yield with Silver Nitrate Solution a curdy white precipitate, insoluble in Nitric Acid, and which, when filtered and washed is readily soluble in Ammonia Solution or in Potassium Cyanide Solution.

A mixture of equal parts of the salt and Mercuric Chloride is blackened when moistened with diluted Alcohol.

Iodine or Iodo-potassium Iodide (Wagner's) Solution precipitates Cocaine from its aqueous solutions, in very dilute solution the precipitate appears of a rose colour, in stronger solutions, brown. Upon the reaction of Cocaine with Iodine solution has been founded (*P.J.* '01, i. 553; '01, ii. 222; *J.S.C.I.* '01, 1031; *J.C.S. Trans.*, '01, 675) a process for the determination of Cocaine. The Cocaine solution should contain about 1 gramme of the alkaloid in the form of a salt in 100 c.c. The Deci-normal Volumetric Iodine Solution should be added in excess, and the excess of Volumetric Iodine Solution titrated with Deci-normal Volumetric Sodium Thiosulphate Solution. Cocaine can be fairly accurately determined by this method, in the presence of Ecgonine, but not in the presence of Benzoyl Ecgonine. As, however, neither Ecgonine nor Benzoyl Ecgonine are extracted from aqueous alkaline solution by Petroleum Ether or Ether, a method of separation is available. Cocaine is readily extracted by these immiscible solvents. Assuming the production of Cocaine Di-iodo-hydriodide as a result of the reaction, one molecular quantity of Cocaine is necessary for each molecular quantity of Iodine used.

The more generally occurring impurities are Cinnamyl-Cocaine, Cocamine and other products derived from Cocaine, amorphous alkaloids, Sulphates, excess of moisture, and mineral matter. A great deal of controversy has raged round the tests adopted for the detection of these impurities. As a test for the presence of Cinnamyl-Cocaine, Cocamine and other products derived from Cocaine, the *B.P.* utilises the Permanganate Test. An excess of Potassium Permanganate Solution is added to a 1 p.c. solution of the Cocaine salt, when a copious red precipitate is produced, which is required not to undergo any alteration in colour within an hour. It is not clear how the *B.P.* proposes to observe the alteration in colour of the red crystalline precipitate in the presence of an excess of Potassium Permanganate Solution. The value of results yielded by the Potassium Permanganate Test depends entirely upon the method of carrying it out, and the conditions appear to have been completely misinterpreted; the test as officially described is therefore worthless. The Cocaine solution requires to be of such a dilution that Cocaine Permanganate is not precipitated, and the Potassium Permanganate Solution requires to be sufficiently weak to just colour the liquid. The test may be well applied as follows:—Dissolve 0·1 gramme of the salt in 5 c.c. of Water acidulated with 3 drops of Diluted Sulphuric Acid and add 0·5 c.c. of a 1 in 1000 Potassium Permanganate Solution. The colour should not disappear within an hour. The *U.S.P.* test is on similar lines to the above, but 3 drops of Deci-normal Volumetric Potassium Permanganate Solution are used, and the violet colour which is produced should not fade in half an hour. The *P.G.* uses 5 drops of Potassium Permanganate Solution (0·1 p.c. w/w), and states that when protected from dust no perceptible decolorisation should occur in half an hour.

According to Paul and Cownley, the most efficient test for ascertaining the purity of the salt for medicinal purposes is Maclagan's Test. 1 grain of the salt is dissolved in 2 fl. oz. of Water, 3 drops of Ammonia Solution (*B.P.*) added, and the mixture stirred briskly with a glass rod; within a few minutes a crystalline precipitate should be thrown down, leaving no turbidity in the supernatant liquid. The *B.P.* idea of the test is as follows:—A weighed quantity of 0·1 gramme of the salt is dissolved in 100 c.c. of Water and 0·25 c.c. of Ammonia Solution added. It should afford a clear solution from which a crystalline deposit should gradually separate on stirring. The quantities given in the *B.P.* translated into the terms of Maclagan's Test indicate 0·86 grain of the salt in 2 fl. oz. of Water and 5 drops of Ammonia Solution, or 1 grain of the salt in a little over 2¼ oz. of Water and 5 drops of Ammonia Solution; it will therefore be observed that the proportions are not strictly maintained. The *U.S.P.* maintains the same relative proportions of Cocaine salt to Water as in Maclagan's Test, but uses 4 instead of 3 drops of Ammonia Solution, and specifies 15 minutes as a limit of time for the appearance of the crystalline precipitate; the mixture should be vigorously stirred, and the sides of the beaker rubbed occasionally with the stirring rod. The *P.G.* adopts the same proportions of salt and Water as the *B.P.*, but after the addition of the Ammonia Solution allows the liquid to remain at rest for an hour, when no opalescence should be produced. The essential feature of the test is the strict maintenance of the original proportions.

Maclagan's Test has been subjected to a good deal of adverse criticism on the continent. Gunther (*C.D.* '99, i. 457) claimed to have discovered a new base (Ethyl-benzoyl-ecgonine), possessing a melting point of 110° to 111° C. (230° to 231·8° F.), and to have shown that the salts of Cocaine as generally found on the market, and as hitherto obtained, are not solely a compound of the alkaloid Cocaine with an individual acid, but that the Cocaine is associated with an isomeric alkaloid. The isomeric Hydrochloride gives the Maclagan's Ammonia reaction quickly and distinctly even in 1 in 2500 solution, whereas a 1 in 1000 Cocaine Hydrochloride solution does not give any crystallisation whatever on the addition of Ammonia Solution as prescribed by the test. He concludes, therefore, that the crystallisation is not due to the Cocaine at all, but to the isomeride. Although endeavours have been made (*P.J.* '99, i. 25) in various ways to obtain evidence of the existence of this high melting point base, no base having a melting point of 111° C. (231·8° F.) could be obtained, and only 0·00006 of a base melting at 104° to 108° C. (219·2° to 222·8° F.), which was quite insufficient to account for the crystalline precipitate in Maclagan's Test.

Notwithstanding the adverse criticism to which the Maclagan Test has been subjected, it has been conclusively shown (*P.J.* '98, i. 449, 473, 586; '99, i. 431, 523, 524; '99, ii. 25, 66; *C.D.* '98, i. 511; '99, i. 897; *Merck's Annual Report*, '99, 51) that it affords the best guarantee of the purity of Cocaine Hydrochloride, and that any sample which does not satisfy the test should not be regarded as sufficiently pure for pharmaceutical purposes.

Schaefer (*C.D.* '99, i. 591; *P.J.* '99, i. 336) formulates a new test depending upon the relative solubilities of Cocaine Chromate and the residual alkaloidal Chromates in Water and in Water acidulated with Hydrochloric Acid. A weighed quantity of 0·05 gramme of the specimen is dissolved in 20 c.c. of Water, mixed with 5 c.c. of a 3 p.c. Chromic Acid solution, and 5 c.c. of a 10 p.c. Hydrochloric Acid Solution is added, the temperature being maintained at 15° C. (59° F.). If more than traces of foreign Coca-bases be present, the solution becomes at once cloudy; if the Cocaine Hydrochloride be pure, a clear solution will result.

A new alkaloid isomeric with Cocaine, and called by Schaefer, Cocainidine, is stated (*C.D.* '99, i. 602; *P.J.* '99, i. 359) to have been found in Coca Leaves, and in commercial samples of Cocaine Hydrochloride. Schaefer's Chromic Acid Test has been critically examined in the author's laboratory (*C.D.* '99, i. 641, 702). Six specimens of pure Cocaine Hydrochloride obtained from manufacturers of the highest repute were subjected to the test. All gave distinct turbidity, either immediately or after a few seconds. A specimen of Cocainidine

Hydrochloride was also examined, and gave a distinct turbidity at once. Dr. Schaefer's Chromic Acid Test therefore produces a turbidity in solutions of the best commercial samples, and also of his Cocainidine Hydrochloride. The base obtained by treating an aqueous solution of Cocainidine Hydrochloride with Ammonia Solution, when washed, and dried over Sulphuric Acid, had the same melting point as the base obtained on similarly treating one of the best samples of Cocaine Hydrochloride, viz., 98° C. (208·4° F.).

It was subsequently mentioned (*C.D.* '99, i. 745) that the specimen of Cocainidine Hydrochloride submitted contained Isotropyl-Cocaine.

It has been demonstrated (*C.D.* '99, i. 897; *P.J.* '99, i. 523) that the concentration of the Hydrochloric Acid plays an important part in the test, as does also the age of the Chromic Acid solution. The same sample of Hydrochloride gave a precipitate on the addition of 10 p.c. acid, but with 7·5 p.c. the solution remained clear; whilst another sample was satisfactory with 10 p.c. of acid, but precipitated with 12·5 p.c. A freshly-prepared Chromic Acid solution, which remains quite clear when added to solution of the sample, after 24 to 48 hours' standing will produce a precipitate.

Schaefer endeavours (*P.J.* '99, i. 66) to meet the criticisms which have been levelled against the test by stating that the finest commercial brands of Cocaine Hydrochloride answer the test satisfactorily. The Chromates of the amorphous alkaloids are far less soluble in solutions containing the higher percentage of Hydrochloric Acid. An acid of 10 p.c. was decided upon, and if the reaction is carried out with a stronger acid it is necessary to do so side by side with a specimen of chemically pure Cocaine, as at a low temperature Cocaine Chromate causes a turbidity in the more acid solution. His own experience fails to confirm Merck's remarks *re* the age of the Chromic Acid solution. The all-important feature of the test is that a temperature of 15° C. (59° F.) should be maintained. Notwithstanding this the value of the Chromate Test is generally held to be questionable, and there is no doubt that the Maclagan Test is far preferable. Cownley (*P.J.* '99, i. 336; '99, ii. 66) is of opinion that probably the only salt that would pass the test would be one prepared from synthetic Cocaine.

Both *U.S.P.* and *P.G.* includes a test with Chromic Acid Solution. The *U.S.P.* employs 5 c.c. of a 2 p.c. solution of the Cocaine salt, the *P.G.* a solution of 0·5 gramme of the alkaloidal Hydrochloride in 5 c.c. of Water, and both add 5 drops of a 5 p.c. Chromium Trioxide Solution. A yellow precipitate is produced, which redissolves on shaking the mixture, but is reprecipitated as a permanent orange-coloured crystalline precipitate on the addition of 1 c.c. of Hydrochloric Acid.

Messrs. Zimmer and Co. point out (*P.J.* '99, ii. 315) that a salt which does not give a crystalline precipitate by Maclagan's Test within 5 minutes should be rejected as being too impure, since the time required to obtain a precipitate serves as an index of purity.

The aqueous solution of Cocaine Hydrochloride when acidified with Diluted Hydrochloric Acid shall yield no opalescence or precipitate with Barium Chloride Solution, indicating the absence of Sulphates.

The formula given in the *B.P.* represents the anhydrous salt. It is officially required to lose not more than 1·0 p.c. of moisture as determined by drying a weighed quantity for 20 minutes at a temperature of 95·6° to 100° C. (204° to 212° F.); the *P.G.* states that it suffers no loss of weight at 100° C. (212° F.). The Brussels Convention recommends only the anhydrous salt should be recognised. The presence of mineral matter is at once detected by the residue left on ignition; no weighable residue should remain when 0·5 to 1 gramme of the salt is heated to redness with free access of air.

Preparations.

INJECTIO COCAINÆ HYPODERMICA. HYPODERMIC INJECTION OF COCAINE.

Dissolve $\frac{1}{2}$ grain of Salicylic Acid in 6 fl. drm. of boiled Distilled Water; add 33 grains of Cocaine Hydrochloride, dissolve, and if necessary add Distilled Water (recently boiled and cooled), *q.s.* to produce 6 fl. drm. (1 in 10)

Dose.—By subcutaneous injection, 2 to 5 minims = 0·12 to 0·3 c.c.

11 minims contain 1 grain of Cocaine Hydrochloride.

Foreign Pharmacopœias.—Official in Mex. and Span. 1 in 100.

LAMELLÆ COCAINÆ. DISCS OF COCAINE.

Gelatin discs, containing $\frac{1}{50}$ grain of Cocaine Hydrochloride.

Four times the strength of *B.P.* '85, which contained $\frac{1}{200}$ grain.

Ophthalmic discs, each containing about 0·0005 gramme = $\frac{1}{120}$ grain Cocaine Hydrochloride, are official in Ital. Ph.

They are also supplied containing Cocaine $\frac{1}{200}$ grain with Atropine $\frac{1}{5000}$ grain; Cocaine $\frac{1}{200}$ grain with Physostigmine $\frac{1}{1000}$ grain; and Cocaine $\frac{1}{100}$ grain with Homatropine $\frac{1}{100}$ grain.

TROCHISCUS KRAMERIÆ ET COCAINÆ. *See* KRAMERIA.

Not Official.

GUTTÆ COCAINÆ HYDROCHLORIDI.—Cocaine Hydrochloride, 10 grains; Distilled Water, 1 fl. oz.—*London Ophthalmic.*

NEBULA COCAINÆ.—Cocaine Hydrochloride, 48 grains; saturated solution of Boracic Acid, 1 fl. oz.—*Central Throat.*

PASTILLUS COCAINÆ.—$\frac{1}{10}$ grain of Cocaine Hydrochloride in each (*Throat*); $\frac{1}{20}$ grain (*St. Thomas's*). *Fr.* has Tablettes de Chlorhydrate de Cocaïne, each containing $\frac{1}{64}$ grain of Cocaine Hydrochloride.

PASTILLUS COCAINÆ ET MORPHINÆ.—Cocaine Hydrochloride, $\frac{1}{15}$ grain; Morphine Hydrochloride, $\frac{1}{30}$ grain.—*Martindale;* incorporated in the *B.P.C.*

Useful for coughs.

TROCHISCI COCAINÆ.—$\frac{1}{10}$ grain.—*Central Throat* and *Throat.*

TROCHISCUS COCAINÆ ET MORPHINÆ.—Cocaine Hydrochloride, $\frac{1}{20}$ grain; Morphine Hydrochloride $\frac{1}{30}$ grain.—*St. George's.*

COCAINÆ CITRAS.—Colourless, hygroscopic crystals, readily soluble in Water. Used in dentistry.

COCAINÆ HYDROBROMIDUM.—Transparent prisms, soluble in Water.

COCAINÆ LACTAS.—A white semi-solid, readily soluble in Water. Used as an injection in tubercular cystitis.

COCAINÆ NITRAS.—Large, tabular crystals, readily soluble in Water and in Alcohol (90 p.c.). Used in ophthalmic practice and in urethral surgery in conjunction with Silver Nitrate.

Tests.—The aqueous solution yields the tests distinctive of Cocaine given under Cocaine and Cocaine Hydrochloride. The aqueous solution decolorises Indigo Sulphate Solution containing an excess of Sulphuric Acid. When a solution of Ferrous Sulphate is poured carefully upon a well-cooled mixture of equal parts of Sulphuric Acid and a solution of the salt, a brown or purple-brown coloration is formed at the junction of the two fluids. When warmed with Copper and Sulphuric Acid reddish-brown fumes are evolved. It should leave no weighable residue when ignited with free access of air.

COCAINÆ OLEAS.—A crystallisable salt, insoluble in Water, soluble in Oleic Acid and fixed Oils. Is useful when a salt of Cocaine is required in a fatty basis such as an ointment or suppository.

COCAINÆ PHENYLAS (Cocaine Carbolate).—A yellow, or yellowish-brown, semi-solid mass. Insoluble in Water, soluble in Alcohol (90 p.c.) and in Ether. Introduced as a local anæsthetic, analgesic and sedative. Combined with Acetanilide it is stated to have been found useful in gastralgia in doses of 1½ grains daily. 1 drop of a 10 p.c. alcoholic solution of the salt has been found useful in conjunctival catarrh. Has also been found useful in dentistry. Owing to its insolubility is not so rapidly absorbed, and the action is more prolonged.

Dose.—Internally, $\frac{1}{12}$ to ⅛ grain = 0·005 to 0·01 gramme.

COCAINÆ SALICYLAS.—Short, thick, somewhat deliquescent crystals, soluble 5 in 1 of Water, 2½ in 1 of Alcohol (90 p.c.).

Dose.—⅛ to ½ grain = 0·01 to 0·032 gramme.
Has been recommended hypodermically in asthma.

Tests.—Cocaine Salicylate dissolves readily in Water, the aqueous solution yields the reactions distinctive of Cocaine given under Cocaine and Cocaine Hydrochloride.

The diluted aqueous solution yields with Ferric Chloride Test-solution a violet coloration.

COCAINÆ SULPHAS.—In prisms, or as a white, granular powder, soluble in Water.

EUCAINE.—Under this name two basic principles have been introduced. **Eucaine (A)** (Methylester of Benzoyl-*n*-methyl-tetra-methyl-gamma-oxy-piperidine-carboxylic Acid). **Eucaine (B)** (Benzoyl-vinyl-di-aceton-alkamine). Synthetic products resembling Cocaine both in chemical and physiological action.

Eucaine (B) is the base in general use. It is insoluble in Water, but readily soluble in Alcohol (90 p.c.) and in Ether. Soluble 1 in 1½ of Aniline Oil.

EUCAINE HYDROCHLORIDE.—There are two salts bearing this name, marked A and B, and prepared from the corresponding bases Eucaine A and Eucaine B. The B salt is that generally used in medicine, and it is the practice to dispense it when Eucaine Hydrochloride is ordered unless the A is specified.

Eucaine B Hydrochloride ($C_{15}H_{21}NO_2HCl$, eq. 281·54).—A fine white odourless crystalline powder, possessing a bitter taste followed by a feeling of numbness of the tongue.

Solubility.—1 in 40 of Water, 1 in 12 of Alcohol (90 p.c.), 1 in 4 of Aniline Oil.

Medicinal Properties.—A powerful local anæsthetic. It is not so generally effective as Cocaine, but is less toxic. Solutions of Eucaine salts may be sterilised by boiling without undergoing decomposition.

The B salt is superior to Eucaine Hydrochloride (A) for use in ophthalmic work, as it is free from the irritating effects of the latter, and is an equally powerful local anæsthetic. Used in 2 p.c. aqueous solution. 2 drops applied every three minutes until 10 drops have been used.—*B.M.J.* '97, i. 134; '97, ii. 1560; *L.* '00, i. 1106.

A 2 p.c. solution recommended for hypodermic use, 40 minims in two doses of 20 minims each distributed over three or four places.—*L.* '99, ii. 552.

5 to 8 p.c. usual strength of solution necessary to produce anæsthesia for minor surgical operations. Usual dose 20 minims, and as much as 120 minims used without unfavourable results.—*L.* '99, i. 137; '99, ii. 318.

10 to 15 minims of an approximately 5 p.c. solution made with equal parts of Aniline Oil and Alcohol (90 p.c.) for the production of local anæsthesia of the ear.—*L.* '00, i. 1125.

Solution recommended by Barker:—Eucaine Hydrochloride B, 1; Sodium Chloride, 8; Sterilised Water, 1000; Injection of 10 c.c. As much as 10¼ oz. injected without any ill effects. Such an amount, however, rarely necessary. Powders containing sufficient of the two salts for two ordinary operations may be kept ready, and can be dissolved in the necessary quantity of water and boiled before use.—*L.* '99, i. 282; '00, i. 156.

Addition of 0·8 p.c. Sodium Chloride to solution of Eucaine improves its analgesic properties, and has also other desirable effects.

An improved solution (Barker's) for the production of local anæsthesia:—B Eucaine Hydrochloride, 0·2 gramme; Sodium Chloride, 0·8 gramme; Adrenalin Chloride, 0·001 gramme; Distilled Water, 100 grammes.—*L.* '03, ii. 204.

Herniotomy performed under local anæsthesia produced by the injection of 40 minims of a 1 p.c. solution, followed by 20 minims more of the same solution dropped into the wound during operation.—*L.* '03, ii. 530.

Hypodermic injection of 40 minims of a 7½ p.c. solution Eucaine Hydrochloride (equal to 2¾ grains of the drug) before operation of suprapubic cystotomy. —*L.* '00, i. 928.

The use of a solution of Cocaine Hydrochloride 10, B Eucaine 10, Aniline 50, Alcohol (90 p.c.) 50, for the production of local anæsthesia in the ear, nose and throat, in order to obviate the dangers of using strong Cocaine solutions. To avoid change of colour, the solutions are best kept separately; *e.g.*, as a 20 p.c. solution of Cocaine in Alcohol (90 p.c.), and a 15 to 20 p.c. solution of Eucaine (B) in Aniline Oil.—*L.* '01, i. 698.

30 minims of a 5 p.c. solution injected around bed of the finger-nail causes swelling and unhealthy blueness of the skin of finger tip.—*L.* '01, i. 1510. Pointed out in reference to above that Eucaine solutions should be boiled immediately before use, injected at body temperature, and the use of a syringe previously used for Morphia should be avoided.—*L.* '01, i. 1648.

Solutions recommended in ophthalmic work, 2 p.c.; in the urethra and bladder, 2 p.c.; for the nose and throat or as a paint or spray for mucous surfaces generally, 5 to 10 p.c.; and in dental work, 2 to 5 p.c.—*B.M.J.E.* '03, i. 36.

The relative toxicity of Cocaine and Eucaine.—*T.G.* '99, 689.

With reference to the use of strong solutions of these salts for hypodermic injections, it is pointed out they should not be used of greater strength than 3·0 p.c.; stronger solutions, being hypisotonic with the blood, are liable to produce sloughing of the tissues. Much useful information on the subject is to be found in a paper in the *B.M.J.* '04, ii. 1862, and the formula for a suitable solution is there given as Beta-Eucaine Hydrochloride, 0·2 gramme; Sodium Chloride, 0·8 gramme; Adrenalin Chloride solution (1 in 1000), 10 minims; Sterile Distilled Water, sufficient to make 100 c.c.

On the pharmaceutical side, the incompatibility of Salicylic Acid with Eucaine may be drawn attention to. This is a point of some importance, as the Pharmacopœia directs Salicylic Acid to be used as a preservative for Injectio Cocainæ Hypod.; but an attempt to carry this practice out with the Eucaine salt will result in precipitation, as the Salicylate is much less soluble.

Spinal anæsthesia induced by Eucaine B in the treatment of tetanus.—*L.* '05, ii. 888. The solution used consisted of Eucaine B Hydrochloride, 1½ grains; Morphine Sulphate, ⅓ grain; Sodium Chloride, 3 grains; Water, to

3½ oz. From 15 to 16 c.c. of cerebrospinal fluid were withdrawn, and injections of from 3 to 4 c.c. of the above fluid given at various intervals.

In sciatica (*B.M.J.E.* '05, i. 44), 72 to 100 c.c. of 10 p.c. solution of Eucaine in saline solution are injected into the nerve at its point of emergence.

It is by no means uncommon to be asked to make up solutions containing as much as 4 or 5 p.c. Although this can be accomplished easily by the aid of heat, the salt does not remain in solution, and even 3·2 p.c. solutions when prepared by the aid of heat do not remain bright long even when kept in hermetically-sealed capsules, but soon deposit tufts of crystals. On inquiry of the manufacturers, a letter resulted acknowledging the correctness of the *Companion* figures, and pointing out that as the solution has to be used at the body-temperature, any salt which crystallises out will again be taken into solution. The use of the stronger solutions of Eucaine has, however, lately been deprecated, and the valuable work recorded in the *B.M.J.* has shown that inasmuch as they are hypisotonic with the blood, they are liable to produce necrosis of the tissues if used for the purposes of hypodermic injection.

Foreign Pharmacopœias.—Official in Dan. and Swiss (Trimethylbenzoxypiperidinum-hydrochloricum).

Tests.—Eucaine (B) Hydrochloride possesses a melting point of 268° C. (514·4° F.). A weighed quantity of 0·1 gramme dissolved in 10 c.c. of Water yields on the addition of 1 drop of Ammonia Solution a crystalline precipitate, which redissolves, but is again thrown down on the further addition of Ammonia. The precipitate caused by 4 drops of Ammonia Solution completely dissolves on the further addition of 20 c.c. of Water. On again adding 4 c.c. of Ammonia Solution the precipitate forms again, and is again dissolved on the addition of 10 c.c. of Water, but no further precipitate is formed on the addition of Ammonia Solution, only a milky cloudiness, disappearing on the addition of Water.

A 1 p.c. aqueous solution yields with Potassium or Sodium Hydroxide Solution a precipitate of the free base, which dissolves readily in Ether. Mercuric Chloride Solution produces no precipitate. The aqueous solution yields a precipitate with Mayer's reagent and lemon yellow precipitate with Picric Acid Solution. If a crystal be moistened with Nitric Acid and evaporated to dryness, it leaves a colourless residue, which evolves a characteristic odour of Benzoic Acid Ethyl-Ester when moistened with an alcoholic Potassium Hydroxide Solution.

The aqueous solution acidified with diluted Nitric Acid yields on the addition of Silver Nitrate Solution a white curdy precipitate insoluble in Nitric Acid, readily soluble in Ammonia Solution.

It may be distinguished from Alpha-Eucaine by the 1 p.c. aqueous solution yielding no precipitate on the addition of a few drops of 10 p.c. Potassium Iodide Solution, Alpha-Eucaine Solution yielding under similar conditions a crystalline precipitate.

It may be distinguished from Cocaine by mixing a little of the salt with some Mercurous Chloride and moistening the mixture with Alcohol (90 p.c.), when no darkening in colour should be noticed. Cocaine under similar conditions immediately darkens in colour. Eucaine (B) Hydrochloride should dissolve without change of colour in concentrated Sulphuric or Nitric Acid.

It should leave no weighable residue upon ignition with free access of air.

Eucaine Lactate ($C_{15}H_{21}NO_2C_3H_6O_3$, eq. 334·72).—A white odourless crystalline powder possessing a bitter taste, and subsequently producing a feeling of numbness of the tongue. It has been introduced as a local anæsthetic, which is claimed to be more soluble than the Hydrochloride.

Solubility.—1 in 4 of Water; 1 in 8 of Alcohol (90 p.c.).

It is usually employed in the form of a 2 to 3 p.c. solution.

ORTHOFORM.—This base is Para-amido-meta-hydroxybenzoic Acid Methyl Ester, a synthetic product introduced as a substitute for Cocaine. A white, odourless, tasteless, crystalline powder, or in colourless crystals melting at 120° C. Soluble, 1 in 450 of Water; 1 in 6 of Alcohol (90 p.c.); 1 in 13½ of Ether.

Another base, Meta-amido-para-hydroxybenzoic Acid Methyl Ester, has been introduced under the name of '**Orthoform New.**' Solubility is practically the same as above.

Medicinal Properties.—Local anæsthetic employed in ulcerations of the upper air passages. Useful where nerve endings are exposed, but has no action on unbroken skin and but little on healthy mucous membrane. Best administered as a **spray,** using 10 p.c. solution made with Alcohol (45 p.c.), but the powder may be employed either alone or mixed with an equal quantity of Lycopodium for **insufflation,** or in the form of a 10 p.c. **ointment;** a saturated solution of Orthoform in **Collodion** is used as a varnish. Said to be of value as an anodyne in ulcer or cancer of the stomach in doses of 8 to 16 grains. An aqueous solution of the **Hydrochloride** is used as a **paint.**—*B.M.J.* '98, i. 362; *Pr.* lxi. 505.

Non-toxic and powerfully antiseptic. On account of its sparing solubility it is but slowly absorbed. Nearly 2 oz. have been employed in the course of a week for dusting wounded surfaces without injurious effect.—*B.M.J.E,* '97, ii. 55; *P.J.* '97, ii. 277; *B.M.J.* '98, i. 362.

As an ointment it is useful in burns; in ulcers of the leg and in syphilitic ulcers.—*L.* '98, i. 1024; *B.M.J.E.* '98, i. 76; *P.J.* '98, ii. 661.

Used (suspended in Glycerin) for intra-uterine medication.—*L.* '98, i. 1434.

Cotton-Wool plug steeped in an alcoholic solution introduced into the cavity of a tooth for the relief of toothache.—*T.G.* '99, 270; *P.J.* '99, i. 83.

In fissure of the nipple.—*T.G.* '99, 337.

As an insufflation in stomatitis in children.—*B.M.J.E.* '99, i. 75.

Insufflated, dusted on, or used as an ointment is most efficient (*B.M.J.* '05, ii. 1008) in allaying pain, in burns, ulcerative stomatitis, tuberculosis and malignant ulceration, whether of the larynx or other regions. Or it may be given internally up to 3 grains for gastric ulcer, carcinoma, or nervous dyspepsia.

As an emulsion, Orthoform, 25; Olive Oil, 100; as an insufflation, 10 to 20 centigrammes; or as a 10 p.c. aqueous solution of the Hydrochloride for laryngeal application.—*B.M.J.E.* '99, i. 20, 64.

ORTHOFORM HYDROCHLORIDE.—A white, crystalline powder, which is soluble, 1 in 8·4 of Water, 1 in 17 of Alcohol (90 p.c.). Insoluble in Ether. It may be employed for internal administration or for urethral injection, but is too acid for hypodermic injection or application to the eye.—*L.* '97, ii. 738; *B.M.J.E.* '97, ii. 55. Injection of a 10 p.c. solution in gleet.—*L.* '97, ii. 738.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

BENZOYL-PSEUDOTROPEINE (Tropacocaine, Tropain).—First obtained from Java Coca Leaves and afterwards made synthetically. The **Hydrochloride** has been used to produce anæsthesia of the eye during operations; it is much less toxic than Cocaine.—*B.M.J.* '92, ii. 406; '94, ii. 598; *L.* '94, ii. 598; *T.G.* '94, 653; *M.A.* '93, 52.

0·05 gramme (= $\frac{3}{4}$ grain) in 1 c.c. (16 minims) Water as an injection into the spinal canal to produce analgesia.—*B.M.J.E.* '02, i. 75.

0·05 gramme (= $\frac{3}{4}$ grain) dissolved in 5 c.c. (80 minims) of cerebrospinal fluid and reinjected to induce anæsthesia without undesirable concomitants.—*Merck's Report,* '02, 166.

Intraspinal injection of 1 c.c. of a 5 p.c. solution in puerperal eclampsia.—*B.M.J.E.* '02, ii. 6.

Intraspinal injection in doses of 0·07 gramme ($1\frac{1}{14}$ grain).—*L.* '05, ii. 561.

Of the drugs that now hold the field in lumbar anæsthesia, Stovaine, Novocaine, Alypin, and Tropacocaine, the most recent publications indicate a growing preference for the last named as the most reliable and the least dangerous.—*B.M.J.* '07, ii. 1002, and 873.

Dose for this purpose 1 c.c. of a 5 p.c. solution; addition of Adrenalin wholly unnecessary.—*B.M.J.* '07, ii. 873.

HOLOCAINE (Para-diethoxy-ethenyl-diphenyl-amidine).—A synthetic product introduced as a substitute for Cocaine. In colourless crystals which melt at 121° C. (249·8° F.). Insoluble in Water, readily soluble in Alcohol (90 p.c.) and Ether.

A powerful base, forming sparingly soluble salts with acids.

HOLOCAINE HYDROCHLORIDE.—The Hydrochloride of the above base. Occurs in colourless, needle-shaped crystals.

Solubility.—1 in 50 of Water; 1 in 6 of Alcohol (90 p.c.).

Medicinal Properties.—Used in the form of 1 p.c. solution in ophthalmic surgery. Produces complete and rapid anæsthesia without pain, and neither dilates the pupil nor affects the blood-vessels. On account of its toxicity, it cannot be used hypodermically. Its instillation into the eye causes a slight feeling of burning which rapidly passes off.—*L.* '97, i. 1466; *B.M.J.* '98, ii. 619; *B.M.J.E.* '97, i. 55, 75, 87, 92; '98, i. 99; *Pr.* lxi. 503.

A 1 p.c. solution did not show the slightest cloudiness when allowed to stand in an open vessel for two months.—*P.J.* '97, i. 368.

It is stated to possess the following advantages: (1) it does not cause mydriasis; (2) does not affect accommodation; (3) causes deeper anæsthesia of the iris; (4) often proves efficient in cases of painful inflammation where Cocaine fails; (5) produces no toxic effects unless injected subcutaneously or swallowed; (6) has no effect on the corneal epithelium; (7) is strongly bactericidal in action. The solutions should be preserved in porcelain and not in glass vessels.—*T.G.* '99, 322, 612; *B.M.J.E.* '99, ii. 20; *Pr.* lxiv. 476; *M.A.* '00, 28.

As a local anæsthetic in ophthalmic practice should not be used in stronger doses than 1 p.c., as it is poisonous.—*L.* '05, ii. 835.

It is stated (*L.* '06, ii. 15) to be a most valuable addition to Cocaine in all operations in which it is necessary to cut the iris. The favourite combination recommended is Cocaine Hydrochloride, 2 p.c.; Holocaine Hydrochloride, 1 p.c.; dissolved in solution of Adrenalin Hydrochloride, 1 in 1000, and freshly prepared immediately before being used.

ACOINE (Di-para-anisyl-mono-phenetyl-guanidine hydrochloride).—A white, crystalline powder, soluble 1 in 50 of Water. Introduced as a substitute for Cocaine as being less toxic.

A useful solution for producing anæsthesia is Acoine, 1; Sodium Chloride, 8; Distilled Water, 1000. Concentrated solutions should not be employed, as they give rise to irritation. The solutions, moreover, should not be exposed to the light.—*L.* '99, i. 1372; *B.M.J.* '99, i. 1340; *P.J.* '99, i. 538; *C.D.* '99, i. 701.

In subconjunctival injections as a local anæsthetic; no pain was produced when a mixture of equal parts of a 1 in 1000 solution of Mercury Cyanide and a 1 in 100 Acoine solution was injected.—*L.* '99, ii. 1082.

Solutions of 1 in 100 and 1 in 300 produce satisfactory anæsthesia in an unirritated eye; when there was much congestion it failed.—*T.G.* '99, 697; *B.M.J.E.* '99, ii. 76.

NIRVANIN (Hydrochloride of Diethyl-glycocoll-para-amido-ortho-hydroxy-benzoic Methyl Ester).—Small white prisms, readily soluble in Water. Introduced as a local anæsthetic in surgical and dental operations. As a substitute for Cocaine and Orthoform, generally used in the form of a 2 p.c. solution. A 5 p.c. solution causes irritation when dropped into the eye. As much as 7 grains may be injected hypodermically without injury. A 1 p.c. solution has a marked bactericidal action.—*P.J.* '99, i. 95, 481; *C.D.* '99, i. 701.

NERVOCIDINE.—A yellow, hygroscopic, amorphous powder, readily soluble in Water, slightly soluble in Alcohol (90 p.c.) and in Ether. It is obtained from an Indian plant 'Gasu-Basu.' Introduced as a local anæsthetic. The irritation which it produces, the length of time required to produce anæsthesia, and its liability to produce toxic symptoms, however, preclude its general use. At present its employment is restricted to dental work.—*L.* '02, i. 127; *P.J.* '02, ii. 211.

ALYPIN. Primary Benzoyl - tetramethyldiamino - ethyldimethylcarbinol Monohydrochloride. $C_{16}H_{26}N_2O_2 \cdot HCl$, eq. 312·39.

A non-hygroscopic odourless crystalline powder.

Solubility.—1 in 1 of Water; 1 in $1\frac{1}{2}$ of Alcohol (90 p.c.); insoluble in Ether.

Dose.—$\frac{1}{10}$ to $\frac{1}{2}$ grain = 0·0064 to 0·032 grain.

It was introduced as a local anæsthetic. It is stated (*L.* '05, ii. 321) to be easily absorbed by the mucous membranes and the subcutaneous tissue. It has a similar anæsthetic action to Cocaine. Solutions should always be freshly prepared; they may be sterilised by boiling without impairing their anæsthetic action.

Enthusiastic account of it as a local anæsthetic. A 1 p.c. solution was used; it can be sterilised by boiling without spoiling, and it produces no bad effects, either general or local. Severe operations of considerable duration were performed with complete anæsthesia. The anæsthesia was given locally and never by lumbar puncture.—*B.M.J.E.* '07, ii. 84.

Nearly the equal of Cocaine in anæsthetic action; complete anæsthesia of the eye can be produced by a 1 or 2 p.c. solution in a minute.—*B.M.J.E.* '07, i. 52.

Tests.—Alypin loses a small quantity of moisture when dried at a temperature of 100° C. (212° F.), the loss being equivalent to about 4·5 p.c. The dried salt melts at about 170° C. (338° F.). It dissolves readily in Water, yielding a solution which is neutral in reaction towards Litmus paper. The aqueous solution yields a precipitate with the usual alkaloidal precipitants, *e.g.*, Potassio-mercuric Iodide (Mayer's) Solution, Iodo-potassium Iodide (Wagner's) Solution, Picric Acid Solution, etc. It also yields precipitates with Potassium or Sodium Hydroxide Solution and with Ammonia Solution, but is not precipitated by dilute Sodium Bicarbonate Solution. The aqueous solution acidified with diluted Nitric Acid yields on the addition of Silver Nitrate Solution a white curdy precipitate insoluble in Nitric Acid, and if the precipitate be separated and washed, it is soluble in Ammonia Solution and Potassium Cyanide Solution. If a minute quantity of the salt be placed on the tongue it produces a characteristic sense of numbness resembling that produced by Cocaine. When ignited with free access of air the salt should leave no weighable residue.

NOVOCAINE. — Para-aminobenzoyl-diethylamino-ethanol Hydrochloride. $C_{13}H_{20}N_2O_2HCl$, eq. 270·66.

A white odourless crystalline powder which is readily soluble in cold Water. The aqueous solutions are neutral in reaction towards Litmus paper, and can be boiled without decomposition. It is introduced as a local anæsthetic, and is stated to be free from irritant action on living tissues. It is used chiefly in the form of solution, or as tablets, the powder having been withdrawn from the market. For hypodermic use the solutions vary in strength from a ¼ to 2 p.c. For infiltration anæsthesia and for anæsthesia of thick layers of tissue ¼ to ½ p.c. isotonic solutions are used; for anæsthesia of the nerve-centres and larger nerve-trunks 1 to 2 p.c. isotonic solutions are employed; for medullary anæsthesia a 5 p.c. isotonic solution has proved most useful. In ophthalmic practice 5 and 10 p.c. solutions are chiefly employed and produce no dilatation of the pupil or irritation; solutions of similar strength are employed in operations or explorations of the throat and nose; 10 to 20 p.c. solutions for anæsthesia of the larynx and pharynx, and in dental practice 1 to 2 p.c. isotonic solutions.

The dose for internal administration is ½ to 1 grain.

Spinal and local anæsthetic. Advantages over Stovaine.—*B.M.J.* '07, ii. 876.

85 cases, results uniformly good; should always be combined with Adrenalin. —*L.* '07, ii. 1686.

160 cases, writer very well satisfied.—*F.T.* '07, 90.

A satisfactory local and spinal anæsthetic.—*B.M.J.E.* '08, i. 23.

The safest and most perfect of known local anæsthetics in teeth extraction.—*B.M.J.* '07, i. 1172.

STOVAINE.—The Hydrochloride of Alphadimethyl-aminopropanol Benzoate. $C_{14}H_{21}NO_2HCl$, eq. 269·63.

Small, white, odourless, glistening, lamellar crystals, or a white, inodorous, crystalline powder.

Solubility.—1 in 1¼ of Water; 1 in 4 of Alcohol (90 p.c.); insoluble in Ether.

Dose.—⅙ to ½ grain = 0·01 to 0·3 gramme.

It is a spinal anæsthetic and said to be only half as toxic as Cocaine.

20 grains have been frequently given hypodermically without any toxic effects. In ordinary surgical use 0·5 p.c. solution in Distilled Water or physiological solution is the most useful; if 1 minim of a 1 in 1000 Adrenalin solution be added to every 3 c.c., a still better result is obtained. Maximum dose of Stovaine is 40 to 50 grains, and of Adrenalin 0·001 gramme.—*B.M.J.E.* '05, i. 92.

In work upon the nose, throat and ear, a 5 p.c. solution was found (*B.M.J.E.* '05, ii. 43) to be equal in its effects to a 10 p.c. solution of Cocaine. As a local anæsthetic for the larynx Stovaine gave fair results. No appearances of poisoning have been observed after its application. ½ to 1 p.c. aqueous solutions have been used by infiltration for the production of local anæsthesia. ½ to ¾ p.c. solutions of Stovaine act as powerfully as 1 p.c. solutions of Cocaine.—*B.M.J.E.* '05, ii. 95.

The chief physiological difference from Cocaine is that it is a vaso-dilator, not a vaso-constrictor, and further, it seems to have a tonic effect upon the heart. Hence the vascular system seems to escape all the harmful effects of Cocaine. Of great value for the production of anæsthesia by intraspinal injection in acute general peritonitis. The minimum dose that can be given without fear of respiratory paralysis is 0·5 c.c. of a 10 p.c. solution. If the anæsthesia is required low down in the leg, quite a small dose, often as little as 0·3 c.c. of a 10 p.c. solution, is sufficient. In acute cases the method of gradual injection is imperative. A commencing dose of 0·6 c.c. may be given as a minimum, and if at the end of 7 minutes it is obvious that the dose is too small, an extra 0·3 c.c. should be given until the extent of the anæsthesia required is obtained.—*B.M.J.* '06, i. 1089.

Notes on 100 cases; an excellent anæsthetic though a little uncertain in its action.—*B.M.J.* '07, ii. 14.

In 78 p.c. of the cases injected nephritis followed, and lasted from 6½ to 30 days. The kidneys were previously healthy. Kidney mischief is therefore an absolute contra-indication.—*B.M.J.* '07, ii. 1003.

For heavy men a dose of 7 to 8 cg. is necessary; 5 to 6 for a person of medium weight. In most cases anæsthesia is obtained after five minutes, and lasts from three-quarters to one hour. For operations on the abdominal wall it is advisable to make the puncture in the third lumbar space.—*B.M.J.E.* '07, ii. 56.

The minimal dose that can be given without fear of respiratory paralysis is 0·05 gramme. As quite a small amount of Sodium Carbonate renders Stovaine inactive, the Water in which the syringe is boiled ought not to contain any. Has a distinct influence in protecting from surgical shock. Method of administering, dosage, etc., fully considered.—*B.M.J.* '07, ii. 869.

Barker finds a 5 p.c. solution in Distilled Water freezes at about −0·58° C., Blood Serum freezing at −0·56° C. If this were the only test, the solution should be isosmotic with the blood. If, however, a drop of blood is added to a little of a 4 or 5 p.c. solution of Stovaine, in five minutes the red blood corpuscles swell and become pale, and in ten minutes are almost invisible. In a really isotonic fluid, such as normal Saline (0·91 p.c. Sodium Chloride) or normal Glucose Solution (5 p.c. Glucose) the salts are seen unchanged in 24 or 48 hours. The formula suggested by Barker (*B.M.J.* '07, i. 670) is Stovaine, 10 grammes; Glucose, 5 grammes; Sterilised Distilled Water, to produce 100 c.c.

A second series of 100 cases of spinal analgesia in which this drug was employed is recorded by Barker.—*B.M.J.* '08, i. 248. The solution used contained 5 p.c. of Stovaine, and 5 p.c. of Glucose, in Water. It had a specific gravity of 1·023 as against 1·007 of the cerebrospinal fluid. The average amount of the solution usually injected was 1 c.c. = 0·05 gramme of Stovaine.

A report of 50 cases of analgesia produced by the intraspinal injection of Stovaine.—*L.* '08, i. 1058.

Suspicion expressed that some of the ill-effects reported abroad after spinal analgesia were due to the Adrenalin principle added, and not to the anæsthetic drug at all.—*B.M.J.* '07, i. 665; '08, 244.

Disadvantages: the analgesia is not reliable and of short duration, the bowels are frequently opened on the operating table, may cause respiratory paralysis, many deaths and several cases of permanent paralysis have followed the spinal injection of Stovaine.—*B.M.J.* '07, ii. 876.

Favourable results in 100 cases.—*B.M.J.* '07, ii. 12.

Fatal paralysis in a man after injection of 0·06 gramme.—*L.* '07, i. 45.

Tests.—Stovaine melts at 175° C. (347° F.). It dissolves readily in Water, forming a solution which is neutral in reaction towards Litmus paper. A weighed quantity of 0·5 gramme of Stovaine, evaporated with 1 c.c. of a mixture of equal parts of Hydrochloric and Nitric Acid on a water-bath, yields a colourless residue which has a pungent odour, and if to the residue 1 c.c. of Potassium Hydroxide

Solution be added and the mixture evaporated, the residue has a fruity odour and oily drops separate on the addition of Water. Its aqueous solution is precipitated by the chief alkaloid precipitants, *e.g.*, Potassio-mercuric Iodide (Mayer's) Solution, Iodo-potassium Iodide (Wagner's) Solution, Picric Acid Solution, etc. It also yields precipitates on the addition of Potassium or Sodium Hydroxide Solution, and on the addition of Ammonia Solution. The aqueous solution, when acidified with Nitric Acid, yields on the addition of Silver Nitrate Solution a white curdy precipitate insoluble in Nitric Acid, and which when separated and washed dissolves readily and completely in Ammonia Solution or in Potassium Cyanide Solution. 0·5 gramme of the salt when ignited with free access of air should leave no weighable residue.

COCCUS.

COCHINEAL.

FR., COCHENILLE; GER., COCHENILLE; ITAL., COCCINIGLIA; SPAN., COCHINILLA.

The dried fecundated female insect, *Coccus Cacti;* reared on *Nopalea coccinellifera,* and on other species of *Nopalea.*

When dried in the sun the insects are of an ash-grey colour with a silvery surface, but when killed by immersion in boiling Water they have a reddish appearance, and if dried by artificial heat they are black.

Used as a colouring agent.

Official Preparation.—Tinctura Cocci. Used in the preparation of Tinctura Cardamomi Composita and Tinctura Cinchonæ Composita.

Not Official.—Carmine, Glycerinum Carmini, Liquor Carmini, Liquor Coccineus, Glycerinum Cocci, Liquor Cocci, and Syrupus Coccionellæ.

Foreign Pharmacopœias.—Official in U.S. (Coccus), Jap. and Swiss (Coccionella), Fr. (Cochenille), Port. (Cochonilha), Mex. and Span. (Cochinilla). Not in the others.

Descriptive Notes.—The dried insect forming this drug is named *Coccus Cacti*, Linn., in the *B.P.*, and *Pseudococcus Cacti*, Burmeister, in the *U.S.P.* The dried insect is imported chiefly from Teneriffe, and is met with in commerce in four principal forms, known as silver grain, black grain, madres or zacatille, and granilla or siftings. The black grain consists of the insect dried by artificial heat, the silver grain is dried in the sun. The 'madres' consist of the female insect collected in March after the young are hatched, and the granilla consists chiefly of young insects sifted out. For the manufacture of Carmine the madres are preferred as, weight for weight, they yield more colour than before the young have left the mother. They are black and very concave on the under surface, not flat or slightly convex as in the ordinary silver and black grain. The silver grain is sometimes adulterated with Sulphate of Barium or Carbonate of Lead and other mineral matter to increase its weight or improve its appearance, and fetches a lower price than the black variety which is more rarely adulterated, and then only with Iron Sand, which is visible under a good lens. The size is given both in *B.P.* and *U.S.P.* as 5 mm. ($\frac{1}{5}$ in.) long. *B.P.* states that it is somewhat oval in outline, flat or concave beneath, convex above, transversely wrinkled, purplish-black or purplish-grey, easily reduced to powder, which is dark-red or puce-coloured. *U.S.P.* describes it as somewhat oblong and angular in outline, flat and concave beneath, convex above, externally purplish-grey or purplish-black, transversely wrinkled, easily pulverisable, yielding a dark-red powder.

Tests.—The *B.P.* requires that no insoluble powder should separate when the specimen is macerated in Water, and that the ash should not amount to more than 6 p.c. The *U.S.P.* limit of ash is also 6 p.c. The ash of Cochineal varies very much. Out of 44 samples examined in the author's laboratory 17 came within the *B.P.* limits, 3 yielded between 6 and 8 p.c. of ash, 23 exceeded 8 p.c., and 1 sample contained as much as 37·4 p.c. of ash.

A comparison of the colouring power of the Cochineal may be made by powdering the sample with some broken glass, macerating for 24 hours in Water, with intervals of frequent stirring, and filtering through paper. The clear filtered liquid may be compared with a similar product prepared from a standard specimen.

Preparation.

TINCTURA COCCI. Tincture of Cochineal.

1 of Cochineal in powder, macerated with 10 of Alcohol (45 p.c.). (1 in 10)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

Foreign Pharmacopœias.—Official in Dan., 1 in 5; Fr. and Mex., 1 in 10. By weight. Not in the others.

Tests.—Tincture of Cochineal has a specific gravity of about 0·950; contains about 2·5 p.c. w/v of total solids and about 45 p.c. w/v of Absolute Alcohol.

Not Official.

CARMINE.—Prepared from Cochineal, an excellent colouring agent for powders and ointments. It is also used as a staining agent in microscopy.

GLYCERINUM CARMINI.—Carmine, 3; Distilled Water, 3; Solution of Ammonia, *B.P.*, 4; dissolve and add gradually Glycerin, 18; heat in a water-bath till free from ammoniacal odour. When cold add solution of Ammonia, 1, to prevent gelatinisation, and Distilled Water, *q.s.* to 24.—*Martindale.*

B.P.C. is almost identical with this.

LIQUOR CARMINI.—Carmine, 6; Water of Ammonia (10 p.c.), 35; Glycerin, 35; Water, *q.s.* to yield 100.—*U.S.N.F.* 1896.

This has been incorporated in the *B.P.C.*, but in the *B.P.C. Supplement* it may be made in a similar way to Liquor Cocci, replacing the Cochineal by 6 of Carmine.

U.S.N.F. 1906 has altered the figures to 6·5, 36·5, 36·5 in 100.

LIQUOR COCCINEUS.—Cochineal, in No. 50 powder, 6; Potassium Carbonate, 3; Alum 3; Potassium Bitartrate, 6; Glycerin, 50; Alcohol (90 p.c.), 3; Distilled Water, *q.s.* to yield 100.—*U.S.N.F.* 1896.

GLYCERINUM COCCI.—Cochineal, unbruised, 20; Potassium Carbonate, 1; Potassium Citrate, 10; Glycerin, 20; Distilled Water, sufficient to produce 100.—*B.P.C.*

LIQUOR COCCI.—Cochineal, 20; Potassium Carbonate, 1; Potassium Citrate, 10; Alcohol, 20; Distilled Water, to produce 100. Dissolve the Potassium Carbonate in 60 of the Distilled Water and digest the unbruised Cochineal in the solution on a water-bath for 6 hours or until exhausted; then strain, cool, add the Alcohol and Potassium Citrate, and make up the required volume with Distilled Water.—*B.P.C.*

This is not an economical preparation, half the quantity of Cochineal will produce a solution of practically the same depth of colour. It is also an advantage to just bruise the Cochineal to a very coarse powder, but when not bruised it is necessary to assist the straining by gentle pressure, otherwise a considerable proportion of the liquid will be left in the marc. The process may be modified with advantage as follows:—Cochineal (in coarse powder), 10; Potassium Carbonate, 1; Potassium Citrate, 10; Alcohol, 20; Distilled Water, *q.s.* to make 100. Dissolve the Potassium Carbonate in 60 of Distilled Water, and digest the Cochineal in the solution on a water-bath for 3 hours, replace the Water lost by evaporation, then strain and cool, add the Alcohol and Potassium Citrate; pass more Distilled Water through the strainer to make the total volume 100. Filter. This modification applies also to the Glycerinum Cocci, adding the Glycerin and Potassium Citrate to the strained fluid.

SYRUPUS COCCIONELLÆ.—Cochineal, 10; Potassium Carbonate, 1; Rose Water, 150; Cinnamon Water, 150; digest for 4 hours, then filter; in each 100 parts of the filtrate dissolve Sugar, 160, and Alum, 0·1; boil and strain; all by weight.—*Austrian Elenchus.*

CODEINA.

CODEINE.

$C_{18}H_{21}NO_3,H_2O$, eq. 314·84.

A crystalline alkaloid (Methyl Morphine) obtained from Opium or synthetically from Morphine.

Solubility.—1 in 80 of Water; 1 in 24 of boiling Water; 1 in 2 of Alcohol (90 p.c.); 1 in 2 of Chloroform; 1 in 30 of Ether; 1 in 12 of Benzol; 1 in 85 of Liquor Ammoniæ; 1 in 58 of Ether, sp. gr. 0·720.

Medicinal Properties.—It stops or lessens the glycosuria in diabetes (an entire abstinence from starchy food being strictly observed) in doses of 1 grain 3 times a day, gradually raised to 2 grains. Useful in relieving the hacking cough of phthisis, in ovarian pain, and as a mild hypnotic.

It has a powerful action in allaying abdominal pain, and it can be pushed to a much greater extent than Morphine without causing drowsiness or interfering with the respiration or with the action of the bowels.—*B.M.J.* '88, i. 1214.

In $\frac{1}{4}$ to $\frac{1}{2}$ grain doses combined with Phenacetin has been stated to give relief from the severe headache and general paroxysms in malaria.—*Pr.* lxxiii. 682.

Dose.—$\frac{1}{4}$ to 2 grains = 0·016 to 0·13 gramme.

Swiss, maximum single dose, 0·1 gramme; maximum daily dose, 0·4 gramme.

Prescribing Notes.—*For coughs it is usually given in the form of syrup, linctus or pastils, or as a pill, using Powder of Gum Acacia and 'Diluted Glucose' as excipients. For diabetes it is sometimes combined with Extract of Cascara. Codeine Phosphate in solution is used for hypodermic injection.*

Official Preparations.—Syrupus Codeinæ from Codeinæ Phosphas.

Not Official.—Codeine Pastils, Linctus Codeinæ, Pilula Codeinæ Composita, Codeinæ Iodas, Apocodeinæ Hydrochloridum.

Foreign Pharmacopœias.—Official in Dan., Dutch, Fr., Hung., Ital., Mex., Port., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—Codeine possesses a melting point of 156° C. (312·8° F.); the *B.P.* does not give a melting point; the *U.S.P.* gives 154·9° C. (310·8° F.); *Fr. Codex* (1908) 155° C. (311° F.) The aqueous solution of the alkaloid is alkaline towards Litmus paper and is lævogyrate. Pure Sulphuric Acid yields no coloration with Codeine in the cold, but on warming a blue coloration is slowly produced; the blue coloration is immediately produced if a trace of Ferric Chloride, Ammonium Molybdate Solution, or Potassium Ferricyanide is present. The *B.P.* adds that on the addition of a minute trace of Diluted Nitric Acid the colour changes to a bright scarlet, becoming orange. Codeine is distinguished from Morphine by the following tests:—When moistened with Nitric Acid the liquid becomes yellow, but not red. A 1 in 50 solution of Codeine in Water, acidulated with Hydrochloric Acid, yields with Potassium Hydroxide Solution a whitish precipitate, but is not precipitated by the addition of Ammonia Solution. A saturated aqueous solution acidulated with Hydrochloric Acid should yield on the addition of Ferric Chloride Test-solution and a very dilute Potassium Ferricyanide solution only gradually a dirty green, but no blue coloration. The *B.P.* wording of the latter test has been subjected to criticism (*P.J.* '00, ii. 149). As the text reads a neutral solution of Codeine Hydrochloride would be used in making this test, which would obviously be quite different in its character from the solution employed if a comma were placed after the word Water, so as to read: 'A saturated solution of Codeine in Water, acidulated with Hydrochloric Acid.' Exception is taken in the same reference to the *B.P.* statement that the test shows the absence of Morphine and other impurities. This is considered too broad as it will by no means detect all other impurities nor even any considerable proportion of possible impurities.

0·1 gramme when heated to redness with free access of air leaves no weighable residue.

Codeine is not official in the *P.G.*

Colour Reactions.—The following colour reactions are given in the *B.P.* and *U.S.P.*: Sulphuric Acid dissolves the alkaloid without coloration, *B.P.*, either without coloration or producing a slight pinkish tint which disappears within two minutes, but on heating a violet colour is developed. (The presence of nitrous compounds causes a pink colour in the cold), *U.S.P.* The solution of Codeine in Sulphuric Acid gives a blue or bluish-black colour with (*a*) 2 drops of T.S. of Ammonium Molybdate, (*b*) a trace of Ferric Chloride, (*c*) or Potassium Ferricyanide; the addition of a minute trace of Diluted Nitric Acid changes this colour to a bright scarlet, becoming orange, *B.P.* Codeine yields with Sulphuric Acid and (*a*) a trace of Ferric Chloride, a violet-blue coloration; (*b*) a drop of Nitric Acid, a blood-red coloration; (*c*) a trace of Selenious Acid, a green coloration; (*d*) a drop of T.S. of Formaldehyde (added to the Codeine and Sulphuric Acid previously mixed), a violet-blue coloration, *U.S.P.* A mixture of Codeine and Nitric Acid yields a yellow coloration, but should not be red, *B.P.*; the *U.S.P.* states that if 0·05 gramme of Codeine be sprinkled upon 2 c.c. of Nitric Acid (sp. gr. 1·200) the crystals will turn red, but the acid will only acquire a yellow colour (difference from and absence of Morphine). A solution of 0·03 gramme of Codeine in 2 c.c. of Sulphuric Acid yields with 1 drop of a diluted Nitric Acid Solution (1 drop of Acid in 200 c.c. of Water), a bluish-red tint, gradually changing to blue, *U.S.P.* There should not be any blue colour developed, but only slowly a dull green on the addition of T.S. of Ferric Chloride and a very dilute solution of Potassium Ferricyanide to a saturated solution of Codeine in Water acidulated with Hydrochloric Acid, *B.P.* In the *U.S.P.* test quantities are given: a small crystal of Potassium Ferricyanide is dissolved in 10 c.c. of Water, and to this is added 1 drop of T.S. of Ferric Chloride and 1 c.c. of a 1 p.c. solution of Codeine, when no blue colour should be developed at once.

CODEINÆ PHOSPHAS. CODEINE PHOSPHATE.

This crystalline product $(\mathbf{C_{18}H_{21}NO_3,\ H_3PO_4})_2,\ 3\mathbf{H_2O}$, eq. 842·20, is the most soluble salt of Codeine.

Fine white acicular crystals, or as a white odourless crystalline powder possessing a bitter taste and feebly acid reaction.

Solubility.—1 in 4 of Water; 1 in 200 of Alcohol (90 p.c.).

Dose.—¼ to 2 grains = 0·016 to 0·13 gramme.

Ph. Ger. maximum single dose, 0·1 gramme; maximum daily dose, 0·3 gramme.

Foreign Pharmacopœias.—Official in Belg., Dan., Fr., Ger., Jap., Norw., Russ., Swed., Swiss and U.S.

Tests.—Codeine Phosphate should answer the tests distinctive of Codeine given in the large type under the heading of Codeina. It melts at a temperature of about 235° C. (455° F.). The aqueous solution yields on the addition of Silver Ammonio-nitrate Solution a light yellow precipitate readily soluble in Ammonia Solution and in cold dilute Nitric Acid; with Magnesium Ammonio-sulphate Solution it affords a white crystalline precipitate; with Ammonium Molybdate containing Nitric Acid, it yields on warming a yellow precipitate, which is soluble in Ammonia and which is reprecipitated as a white crystalline precipitate on the addition of Magnesium Ammonio-sulphate. The reaction of a 5 p.c. aqueous solution towards Litmus paper is slightly acid. This solution yields with Potassium Hydroxide Solution a whitish precipitate, but no precipitate on the addition of Ammonia Solution.

Codeine Phosphate of the *B.P.* contains theoretically 70·52 p.c. of Codeine, that of the *U.S.P.* 69·05 p.c. The *B.P.* gives no process for quantitatively determining the amount of alkaloid present; the *U.S.P.* requires that a weighed quantity of 0·2 gramme of the salt when precipitated with Potassium Hydroxide Solution and shaken out with Chloroform should yield not less than 0·13 gramme of Codeine, corresponding to not less than 65·0 p.c. of alkaloid.

The more generally occurring impurities are excess of moisture, Chlorides, Sulphates, Morphine and mineral matter. The formula given for the salt in the *B.P.* shows 1½H_2O, whilst that of the *U.S.P.* and the *Fr. Codex* (1908), indicates $2H_2O$. All three Pharmacopœias state that at 100° C. (212° F.) it loses all of its Water of crystallisation. The *B.P.* formula 1½H_2O would indicate a loss of 6·36 p.c. of Water; the *U.S.P.* and *Fr. Codex* a loss of 8·31 p.c.; the *P.G.* mentions that at 100° C. (212° F.) the salt loses 8 p.c. in weight. The aqueous solution when acidified with diluted Nitric Acid should yield no opalescence or precipitate with Silver Nitrate Solution or with Barium Chloride Solution, indicating the absence of Chlorides and Sulphates. The presence of Morphine is indicated by Ferric

Chloride Test-solution which would yield a blue coloration. The *U.S.P.* and *Fr. Codex* employ a mixture of Potassium Ferricyanide Solution and Ferric Chloride Test-solution as a test for Morphine.

0·1 gramme of the salt leaves no weighable residue when ignited with free access of air.

Colour Reactions.—0·01 gramme of Codeine Phosphate gives with 10 c.c. of Sulphuric Acid a colourless solution, *B.P.*; the *U.S.P.* states that the acid produces either no colour or a slight pinkish tint which disappears in 2 minutes. Codeine Phosphate gives with Sulphuric Acid containing (*a*) a trace of Ferric Chloride (1 drop of T.S. of Ferric Chloride in 10 c.c., *P.G.*) a violet-blue colour, *P.G.* and *U.S.P.*; (*b*) a trace of Selenious Acid, a green colour changing rapidly to blue and then slowly back to grass-green (Morphine gives a blue colour changing to green and then to brown), *U.S.P.*; (*c*) a drop of T.S. of Formaldehyde, a violet-blue colour (Morphine gives an intense purple), *U.S.P.* The solution of a small crystal of Potassium Ferricyanide in 10 c.c. of Water with the addition of a drop of T.S. of Ferric Chloride should not immediately assume a blue colour when mixed with 1 c.c. of a 1 p.c. Solution of Codeine Phosphate, *P.G.* and *U.S.P.* No blue colour should be developed with Codeine Phosphate and T.S. of Ferric Chloride, *B.P.*

Codeinæ Hydrochloridum is official in Austr., Dutch and Mex. It is crystalline and soluble in Water. **Codeinæ Salicylas** is also crystalline, and readily soluble in Alcohol and Ether, but only slightly soluble in Water. **Codeinæ Sulphas** is official in U.S. Doses same as Phosphate.

Preparation.

SYRUPUS CODEINÆ. SYRUP OF CODEINE.

Codeine Phosphate, 40 grains; Distilled Water, ¼ fl. oz.; Syrup, 19¾ fl. oz. (1 grain in 240 minims)

B.P. directs the Codeine Phosphate to be dissolved in the Distilled Water, but 40 grains of Codeine Phosphate will not dissolve in ¼ fl. oz. Distilled Water: it is better to use 180 minims.

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c., containing ⅛ to ½ grain Codeine Phosphate.

It is 50 p.c. stronger than the Syrup described in previous editions of the *Companion.*

Foreign Pharmacopœias.—Official in Belg., 3 in 1000; Fr., Ital., Mex. and Swiss, 1 in 500; Span., 1 in 600. Made with the Alkaloid. Dutch, 1 of Hydrochloride in 400.

Not Official.

CODEINE PASTILS.—Contain ⅛ grain = 0·008 gramme of Codeine in each. One for a dose when the cough is troublesome.

An improvement on Codeine Jelly.

Official in Ital., 1/13 grain = 0·005 gramme in each.

LINCTUS CODEINÆ.—Syrup of Codeine, 20 minims; Glycerin, 20 minims; Lemon Juice, 18 minims; Chloric Ether, 2 minims.—*Brompton.*

Syrup of Codeine, 30 minims; Citric Acid, 1 grain; Emulsion of Chloroform, 8 minims; Glycerin, 10 minims; Mucilage of Tragacanth, to 1 fl. drm.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

Syrup of Codeine, ½ fl. drm.; Syrup of Virginian Prune, ½ fl. drm.—*Guy's.*

PILULA CODEINÆ COMPOSITA.—Codeine, ½ grain; Kaolin, ½ grain; Extract of Cascara, 2 grains; Hard Soap, to 4 grains.—*Guy's.*

CODEINÆ IODAS.—A combination of Iodic Acid with the alkaloid. Has been introduced as an analgesic.

Dose.—½ grain = 0·032 gramme by hypodermic injection.

Apocodeina.—Produced by heating Codeine with Zinc Chloride; it forms brown amorphous resinous masses.

Apocodeinæ Hydrochloridum is supplied as a brown, amorphous powder, soluble in Water. Dott doubts the existence of Apocodeine, and states that the commercial products sold under this name are not of a very definite nature.

It has been used by subcutaneous injection in 30-minim doses of a 1 p.c. solution to produce increased peristalsis of the bowel, and has also been used internally as an expectorant in bronchial affections and as a sedative in mental disturbance, in doses of 0·02 to 0·06 gramme (⅓ to 1 grain).

A suitable combination for the internal administration is Apocodeine Hydrochloride, 0·5 gramme; Syrup of Raspberry, 25 grammes; Distilled Water, 100 grammes; in doses of ½ to 1 fl. drm. = 1·8 to 3·6 c.c.

This salt, which has been frequently referred to in medical literature, is again mentioned (*L.* '06, i. 1191) as a laxative. It may be administered in doses of 2 c.c. of a 3 p.c. solution.

COLCHICUM.

Fr., Colchique; Ger., Zeitlosenknollen; Ital., Bulbo de Colchico;
Span., Bulbo de Colquico.

The fresh Corm of *Colchicum autumnale*, as well as the dried, ripe Seeds, are official.

The use of Colchicum Seeds only, was agreed by the Brussels International Congress.

Medicinal Properties.—It is a specific in gout, especially the acute form, controlling the pain and inflammation, and cutting short the attack. Useful in the headache, dyspepsia, eczema, conjunctivitis, and other conditions which occur in gouty subjects. May be combined with other cholagogues, or given with saline purgatives in cases of hepatic congestion in gouty patients. It may produce gastric or intestinal irritation, even in ordinary doses, and should then be discontinued for a time. The Extract is frequently prescribed with Dover's Powder to relieve painful gout.

Dose.—Of the dried Corm, 2 to 5 grains = 0·13 to 0·32 gramme, but usually given in the form of Extract or Wine.

Incompatibles.—Tincture of Iodine, Guaiacum, and vegetable astringents.

Official Preparations.—Extractum Colchici and Vinum Colchici from the **Corm,** Tinctura Colchici Seminum from the **Seeds.**

Not Official.—Extractum Colchici Aceticum, Extractum Colchici Cormi, Fluidextractum Colchici Seminis, Mistura Colchici, Pilulæ Colchici et Hydrargyri, Tinctura Colchici Composita, Tinctura Colchici Florum, Vinum Colchici Seminum, Colchicina, and Colchicinæ Salicylas.

Antidotes.—In case of poisoning with Colchicum, emetics, Tannic Acid, demulcent drinks, and, if coma be present, Brandy, Ammonia, Coffee, and other powerful stimulants may be given. Hypodermic injection of ½ grain of Morphine.

COLCHICI CORMUS. Colchicum Corm.

The fresh Corm of *Colchicum autumnale*, collected in early summer; also the Corm, dried at a temperature not exceeding 65·5° C. (150° F.), after being stripped of its coats and transversely sliced.

Colchicum Corms contain about 0·5 p.c. of Colchicine, but the *B.P.* makes no requirement that they shall contain a definite percentage of alkaloid; the *U.S.P.* requires that they shall yield not less than 0·35 p.c. of Colchicine, and indicates a method of determination.

Foreign Pharmacopœias.—Official in Mex., Port. and U.S. Not in the others.

Larger equivalent doses of the corm than of the wine or tincture can be given without undesirable effects, and the powdered corm is stated to give better results in acute gout.—*B.M.J.* '04, ii. 1460.

Descriptive Notes.—It should be noted that the extract is prepared from the fresh corm collected in early summer. *Colchicum autumnale,* L., is a very local plant in this country, and there is therefore some difficulty in obtaining the fresh corm. The best period is in July when the leaves have turned yellow or in August when the plant is in flower, as the corm is then in mature condition. According to Schroff's experiments the corms are best dried entire in sun and air, and preserved; they lose none of their activity even if kept several years (*Pharmacographia*). Although the fresh corm is, according to the *B.P.* an inch broad (25 mm.) and an inch and a half long (35 mm.) it is often larger if obtained from full grown plants, and even the dried corm in slices may exceed an inch in diameter and $\frac{1}{10}$ to $\frac{1}{8}$ in thickness (2 or 3 mm.). The reniform shape is characteristic, for although the corms of some Fritillaries and the Hermodactyls of the East have the same shape they are not met with in Western commerce. Under the microscope the compound starch grains (0·1 to 0·15 mm., *Planchon* and *Collin*), usually three or four, each with a stellate hilum, and without striæ, and the irregular epidermal cells with pitted walls, are sufficiently characteristic. According to Vogl the cambium tissue contains a yellowish amorphous substance which, when a section of the corm is treated with concentrated Sulphuric Acid, colours the cellulose tissue gamboge yellow and the vessels orange red. The dried corm if long kept and especially if allowed to become damp loses its medicinal effect to a certain extent.

Tests.—The *U.S.P.* process of determination is essentially as follows:—A weighed quantity of 10 grammes is macerated for twelve hours, with frequent intervals of shaking (or for four hours if a mechanical shaker be employed), in an Erlenmeyer flask with 100 c.c. of a mixture of 77 c.c. of Ether, 25 c.c. of Chloroform, 8 c.c. of Alcohol (94·9 p.c.), and 3 c.c. of Ammonia Water. The liquid is filtered, and 50 c.c. of the filtrate is evaporated to dryness at a gentle heat; the residue is dissolved in 10 c.c. of Ether, 5 c.c. of Water added, the mixture well stirred and the Ether evaporated. When cool the aqueous solution is filtered into a small separator, the insoluble matter being kept as much as possible in the beaker or dish. The residue is redissolved in Ether, 5 c.c. of Water added, the Ether evaporated as previously. The beaker or dish and the filter are washed with a little Water, and the combined aqueous solutions are well shaken with 15 c.c. of Chloroform. After separation of the chloroformic liquid, the aqueous portion is shaken with three successive portions of 10 c.c. each of Chloroform, the chloroformic layer being separated in each case, mixed with the first Chloroform shaking, and the mixed chloroformic liquids evaporated to dryness. The residue is dissolved in a little Alcohol (94·9 p.c.), the Alcohol evaporated, the residue dissolved in 5 c.c. of Ether, 5 c.c. of Water added, and the mixture stirred for a few seconds. The Ether is evaporated, the aqueous liquid filtered through a wet filter paper into a separator, the vessel and filter washed with 5 c.c. of Water, the washings being added to the contents of the separator. The aqueous liquid is shaken out with 15 c.c. of Chloroform, the Chloroform transferred after complete separation to a tared flask, the aqueous portion extracted with three successive portions each of 10 c.c. of Chloroform, which are separated as previously and transferred to the tared flask containing the first shaking. The Chloroform is completely removed by evaporation, the residue is dissolved in Alcohol (94·9 p.c.), which is in turn evaporated, and the residue is dried at 100° C. (212° F.) until constant. If this weight be multiplied by 20 it indicates the p.c. of Colchicine present in the Corms.

Preparations.

EXTRACTUM COLCHICI. Extract of Colchicum.

A soft extract prepared from the juice of fresh Colchicum Corms which have been deprived of their coats. The clarified juice is heated to 100° C. (212° F.) to coagulate Albumen, and the strained liquid is evaporated to a soft extract at a temperature not exceeding 71·1° C. (160° F.).

100 lb. of Corms yield about 4 lb. of Extract.

The *B.P.* Extract is not a standardised preparation and no process of determination appears in the *Pharmacopœia.* The Extract official in the *U.S.P.* is standardised to contain 1·4 p.c. of Colchicine. The *P.G.* does not contain an Extract of Colchicum Corms.

Dose.—$\frac{1}{4}$ to 1 grain = 0·016 to 0·06 gramme.

Foreign Pharmacopœias.—Official in Belg., Fr., Ital., Mex. and Span. (Alcoholic Extract of Seeds); Mex. (Alcoholic from Corms), also (Fluid Extract of Corms and Seeds); Port. and U.S. Extract from Corms with Acetic Acid. U.S. has Fluid Extract of Seeds. Not in the others.

Tests.—The *U.S.P.* method for the determination of Colchicine in Colchicum Extract is essentially as follows :— A weighed quantity of 4 grammes of the extract is dissolved in 20 c.c. of Water, transferred to a 100 c.c. flask and sufficient Alcohol (94·9 p.c.) added to bring the volume of the liquid to 100 c.c. After the contents of the flask have been well shaken, they are allowed to stand 5 minutes, filtered, and 50 c.c. of the filtrate collected, evaporated to dryness in a porcelain dish, 10 c.c. of Ether and 5 c.c. of Water are added to the residue, and the Ether removed by evaporation. When cool, the aqueous solution is filtered into a separator, the insoluble matter being retained as far as possible in the vessel used for the evaporation. The residue remaining in this vessel is again treated with 10 c.c. of Ether and 5 c.c. of Water, the Ether being removed as previously. The dish and filter are rinsed with a little Water, and the mixed aqueous liquids collected in a separator. After rendering the liquid alkaline by the addition of a sufficiency of Ammonia Solution, the Colchicine is extracted by successive quantities of 20, 15 and 10 c.c. of Chloroform respectively. The separated chloroformic solutions are mixed and evaporated to dryness, and the residue is mixed with two successive small quantities of Alcohol (94·9 p.c.), the latter being removed in each case by evaporation. 5 c.c. of Water and 10 c.c. of Ether are added to the residue, the liquid shaken and the Ether evaporated. When cool, the aqueous liquid is filtered into a separator, the flask and filter being rinsed with Water. The Colchicine is extracted by successive shakings with 20 c.c., 15 c.c. and 10 c.c. of Chloroform. The separated chloroformic liquids are mixed, transferred to a tared flask, evaporated to dryness, the residue dissolved in 2 small successive quantities of Alcohol (94·9 p.c.), the latter removed by evaporation and the residue dried till constant at 100° C. (212° F.). The weight multiplied by 50 shows the p.c. of Colchicine present in the Corm Extract.

VINUM COLCHICI. Colchicum Wine.

4 of Colchicum Corm in No. 20 powder, macerated in 20 of Sherry. (1 in 5)

Dose.—10 to 30 minims = 0·6 to 1·8 c.c.

Diluted Acetic Acid appears to be about as good a solvent as Sherry, but Alcohol (45 p.c.) was better than either.—*P.J.* '97, i. 173. Further notes on the same.—*P.J.* '98, i. 131.

Foreign Pharmacopœias.—Official in Port., 1 and 10 Madeira; Mex., 1 in 10 Sherry. *See* also Vinum Colchici Seminum.

Tests.—Colchicum Wine possesses a specific gravity of about 1·013; contains about 8·5 p.c. w/v of total solids and about 20 p.c. w/v of Absolute Alcohol.

The Wine official in the *U.S.P.* is prepared with a standardised fluid extract made from Colchicum Seeds, and should contain 0·04 p.c. w/v of Colchicine.

COLCHICI SEMINA. Colchicum Seeds.

Fr., Semence de Colchique; Ger., Zeitlosensamen; Ital., Semi di Colchico; Span., Semilla de Colquico.

The dried ripe seeds of *Colchicum autumnale*, L.

The Seeds are official in *B.P.*, *U.S.P.* and *P.G.* They usually contain 0·6 to 1·0 p.c. of Colchicine, but neither the *B.P.* nor the *P.G.* requires them to yield a definite percentage of alkaloid nor includes a method of determination. The *U.S.P.* requires that they shall yield not less than 0·45 p.c. of Colchicine.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Span., Swed., Swiss and U.S.

The *Brussels Conference* recommends only the Colchicum seed.

Descriptive Notes.—Colchicum seeds are pale brown and inodorous when freshly gathered, but become darker in drying and exude a saccharine matter consisting of Glucose. The percentage of this varies, and must be taken into consideration in estimating the extractive of galenical preparations made with them. The seeds are extremely hard and tough and difficult to powder. They have a bitter acrid taste, and are nearly spherical, about $\frac{1}{12}$ to $\frac{1}{8}$ inch (2 to 3 mm.) in diameter, but pointed by a strophiole appendage at the hilum. The diameter given in *B.P.* is 2·5 mm., *U.S.P.* 2 mm., *P.G.* 3 mm. The seeds ripen in June.

Tests.—The method of determination recommended by the *U.S.P.* is essentially as follows :—A weighed quantity of 10 grammes is macerated, with frequent intervals of shaking, for 12 hours (or for 4 if a mechanical agitator is employed), in an Erlenmeyer flask, with 100 c.c. of a mixture of 77 c.c. of Ether, 25 c.c. of Chloroform and 8 c.c. of Alcohol (94·9 p.c.), and 3 c.c. of Ammonia Solution. A measured quantity of 50 c.c. of the filtered liquid is transferred to a beaker or dish and evaporated nearly to dryness. The residue is dissolved in 10 c.c. of Ether, 5 c.c. of Water added, the mixture stirred well, and the Ether evaporated. When cool the aqueous liquid is filtered into a separator, the insoluble matter being retained as largely as possible in the beaker. This residue is redissolved in Ether, and after the addition of 5 c.c. of Water, the previous operation is repeated. The beaker and filter are washed with a little Water and the Colchicine extracted from the mixed aqueous liquids by agitation with 15 c.c. of Chloroform. The agitation is thrice repeated with successive quantities each of 10 c.c. of Chloroform. The chloroformic liquids are separated, transferred to a tared flask, the Chloroform completely removed by evaporation, the residue twice dissolved in small successive quantities of Alcohol (94·9 p.c.), the latter being in each case removed by evaporation, and the residue finally dried at a temperature of 100° C. (212° F.) till constant in weight. This weight multiplied by 20 gives the percentage of Colchicine present in the seeds. The ash of Colchicum Seeds should not exceed 6·0 p.c.

The *U.S.P.* has a 1 in 1 Fluid Extract prepared with Colchicum Seeds and standardised to contain 0·4 p.c. w/v of Colchicine.

Preparation.

TINCTURA COLCHICI SEMINUM. TINCTURE OF COLCHICUM SEEDS.

1 of Colchicum Seeds, in No. 30 powder, percolated with Alcohol (45 p.c.), to yield 5. (1 in 5)

B.P. 1885 was 1 in 8, altered in *B.P.* 1898 to 1 in 5; *see* also Foreign Pharmacopœias given below.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

Ph. Ger. maximum single dose, 2·0 grammes; maximum daily dose, 6·0 grammes.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Jap., Span. and Swiss, 1 in 10; Hung., 1 in 5; Ger., Ital. and Swed., 1 and 10; U.S., 1 in 10; all from Seeds. Mex., 1 in 5 with Corms. Port., 1 in 5 with Seeds and Corms. All by weight except U.S. Not in the others.

The *Brussels Conference* recommended a strength of 10 p.c. of the Seeds with Alcohol (70 p.c.). Belg., Dan., Fr. and Swiss adopt the *B.C.* Standard.

Tests.—Tincture of Colchicum Seeds possesses a specific gravity of from 0·950 to 0·955; contains from 1 to 3 p.c. w/v of total solids and about 43 p.c. w/v of Absolute Alcohol. The Tincture official in the *B.P.* is not a standardised preparation, and consequently no process is given for the quantitative determination of the Colchicine.

The *U.S.P.* Tincture is required to contain 0·04 p.c. w/v of Colchicine. A measured quantity of 100 c.c. is evaporated on a water-bath to about a tenth of its volume. Sufficient Alcohol (94·9 p.c.) is added to redissolve any separated matter, 1 c.c. of Ammonia Solution added, and the Colchicine removed by shaking three times in succession with separate portions of 15 c.c., 15 c.c. and 10 c.c. of Chloroform. The Chloroform solutions are separated, mixed and evaporated nearly to dryness. The residue is dissolved in 10 c.c. of Ether, and 5 c.c. of Water added, the mixture well stirred, and the Ether removed by evaporation. When cool the aqueous solution is filtered into a small separator, the insoluble matter being retained as far as possible in the beaker. This residue is redissolved in a little Ether, 5 c.c. of Water added, the process repeated as previously. The beaker and filter are washed with a little Water, and the alkaloid is extracted from the aqueous solution by agitation, first with 15 c.c., and thrice subsequently with successive quantities of 10 c.c. each of Chloroform. The chloroformic liquids are separated in each case, transferred to a tared flask, the Chloroform removed completely by evaporation, the residue twice dissolved in a little Alcohol (94·9 p.c.), the latter being in each instance removed by evaporation, and the residue ultimately dried at a temperature of 100° C. (212° F.) till constant in weight. This weight will represent the percentage w/v of Colchicine present in the Tincture.

Not Official.

EXTRACTUM COLCHICI ACETICUM (*B.P.* 1885).—Crushed fresh Corms, previously peeled, 112; Acetic Acid, 6; stir together, press, and after subsidence heat the clear liquor to 212° F. (100° C.), strain through flannel, and evaporate at 160° F. (71·1° C.) to a soft extract.

100 lb. of Corms yield about 5 lb. of Extract.

Dose.—½ to 2 grains, in pill, with an equal weight of Liquorice Powder.

EXTRACTUM COLCHICI CORMI (*U.S.*).—1000 grammes of Colchicum Corms in No. 60 powder is percolated with 350 c.c. of Acetic Acid (36 p.c.) mixed with 1500 c.c. of Water, and the percolation completed with Water; the liquor is evaporated at a temperature not exceeding 80° C. (176° F.) in a porcelain vessel to a pilular consistence. It is adjusted to a strength of 1·4 p.c. of Colchicine by means of Sugar of Milk.

FLUIDEXTRACTUM COLCHICI SEMINIS.—About a 1 in 1 Fluid Extract prepared from Colchicum Seeds, and a mixture of Alcohol (95 p.c.) 2 parts and Water 1 part. It is standardised to contain 0·4 p.c. of Colchicine.—*U.S.P.*

MISTURA COLCHICI.—Colchicum Wine, 15 minims; Potassium Bicarbonate, 20 grains; Magnesium Sulphate, 15 grains; Peppermint Water, to 1 fl. oz. —*St. Thomas's.*

The *B.P.C.* formula is the same, except in using Magnesium Carbonate, 10 grains, in place of Potassium Bicarbonate, 20 grains.

Colchicum Wine, 15 minims; Carbonate of Magnesia, 10 grains; Bicarbonate of Potassium, 15 grains; Peppermint Water, to 1 fl. oz.—*Royal Free.*

PILULÆ COLCHICI ET HYDRARGYRI.—Acetic Extract of Colchicum, ⅙ grain; Mercury Pill Mass, ⅓ grain; Compound Extract of Colocynth, ½ grain; to make one pill.—*B.P.C.*

Sir Benjamin Brodie's Gout Pills.—Compound Extract of Colocynth, 16 grains; Extract of Rhubarb, 16 grains; Mercury Pill, 16 grains; Acetic Extract of Colchicum, 6 grains; divided in 12 pills.—*Pharm. Form.*

This has been incorporated in the *B.P.C.* under the title Pilulæ Colchici et Hydrargyri Compositæ.

TINCTURA COLCHICI COMPOSITA (*Ph. Lond.*).—1 of bruised Colchicum Seeds, macerated with 8 of Aromatic Spirit of Ammonia.

Dose.—15 to 30 minims = 0·9 to 1·8 c.c.

This has been incorporated in the *B.P.C.*

TINCTURA COLCHICI FLORUM (*Squire*).—Fresh Flowers, 2; Alcohol (90 p.c.), by weight, 1; after seven days, filter.

B.P.C. has incorporated this preparation, but employs Alcohol (70 p.c.) by volume in place of Alcohol (90 p.c.) by weight.

Dose.—10 to 30 minims = 0·6 to 1·8 c.c. This preparation closely resembles the Eau Médicinale.

Tests.—Tincture of Colchicum Flowers possesses a specific gravity of about 0·970; contains about 4 p.c. w/v of total solids and about 39 p.c. w/v of Absolute Alcohol. It is standardised to contain 0·06 p.c. of Colchicine.

VINUM COLCHICI SEMINUM.—1 of Colchicum Seeds, in fine powder, macerated with 10 of Sherry.

Dose.—10 to 30 minims = 0·6 to 1·8 c.c.

Ph. Ger. maximum single dose, 2 grammes; maximum daily dose, 6 grammes.

B.P.C. same strength as above, but with Detannated Sherry.

Foreign Pharmacopœias.—Official in Dutch, 1 and 10 Malaga and Spirit; Hung., 1 in 5 Malaga; Ger., Jap. and Norw., 1 and 10 Sherry; Ital., 1 and 10 Marsala; Port., 1 and 10 Madeira; U.S., Fluid Extract, 1 in 10, with White Wine and Alcohol. All by weight except U.S.

COLCHICINA. Colchicine $C_{22}H_{25}NO_6$, eq. 396·24.—A yellowish powder, soluble in Water and Alcohol (90 p.c.).

Dose.—$\frac{1}{120}$ to $\frac{1}{32}$ grain = 0·00054 to 0·002 gramme.

Colchicein is Tri-methyl-acetyl-colchicinic Acid, and crystallises in shining white needles. **Colchicine** is the Methyl Ester of Colchicein.

Colchicine has been shown (*B.M.J.* '04, ii. 1697; *L.* '04, ii. 1784) to be a slow poison, acting on the medulla, which it paralyses.

A solution of $\frac{1}{250}$ grain in Methyl Salicylate enclosed in Gelatin **capsule** is known under the name of '**Colchisal.**'

Foreign Pharmacopœias.—Official in Fr., Hung., Mex. and U.S.

Tests.—Colchicine melts at 143° to 147° C. (289·4° to 296·6° F.). *Fr. Codex* gives 145° C. (293° F.). It is neutral in reaction towards Litmus. Its aqueous solution is lævogyrate. Its solution in dilute mineral acid or alkali gradually becomes intensely yellow. Concentrated Nitric Acid produces a violet-blue, the colour changing to yellow, and ultimately to green; on dilution with Water the violet solution changes to yellow, and on the addition of Sodium Hydroxide Solution in excess, to a fine orange or red colour; with very minute quantities of Colchicine the colour produced is rose-red. In concentrated Sulphuric Acid the alkaloid dissolves with the production of an intense yellow colour, which changes to a greenish-blue on the addition of Nitric Acid, then to red, and finally to yellow. An aqueous solution gives no immediate coloration with Ferric Chloride Test Solution, but on warming a greenish coloration is produced; an alcoholic solution gives a garnet-red coloration. Colchicine is stated to form a compound with Chloroform which is readily decomposed by Water. *Fr. Codex* gives the formula of this compound as $C_{22}H_{25}NO_6 \cdot 2CHCl_3$. The absence of Chloroform may be ensured by mixing 0·1 gramme of the alkaloid with 0·3 gramme of Calcium Carbonate (free from Chlorides), moistening with Water, evaporating to dryness, and igniting. The residue is dissolved in dilute Nitric Acid, filtered, and Silver Nitrate Solution added; no turbidity or precipitate should be produced.

0·1 gramme of Colchicine should leave no weighable residue when ignited with free access of air.

COLCHICINÆ SALICYLAS.—Yellow, amorphous powder, soluble in Water, in Alcohol (90 p.c.), and in Ether. It dissolves 1 in 100 of Methyl Salicylate. It should be preserved in well-closed bottles of a dark amber tint. Has been recommended in the treatment of gout and rheumatism as combining the properties of its two constituents.

Dose.—$\frac{1}{120}$ to $\frac{1}{32}$ grain = 0·00054 to 0·002 gramme.

Tests.—Colchicine Salicylate yields the reactions distinctive of Colchicine given under that heading.

An aqueous solution of the salt yields a violet coloration with Ferric Chloride Test Solution. The salt should leave no weighable residue when ignited with free access of air.

Not Official.

COLLINSONIA.

The Root of *Collinsonia Canadensis*, *L.* (Stone Root).

Various preparations of this have been recommended in acute cystitis, and in the treatment of renal calculi.—*B.M.J.* '87, ii. 712; *L.* '88, i. 868.

Dose.—15 to 60 grains = 1 to 4 grammes.

TINCTURA COLLINSONIÆ.—Collinsonia Root, 1; Alcohol (60 p.c.), 10.

Dose.—30 to 120 minims = 1·8 to 7·1 c.c.

This has been incorporated in the *B.P.C.*

A 1 in 1 **Fluid Extract** is also made.

Dose.—15 to 60 minims = 0·9 to 3·6 c.c.

COLOCYNTHIDIS PULPA.

COLOCYNTH PULP.

Fr., Coloquinte; Ger., Koloquinthen; Ital., Coloquintide;
Span., Coloquintida.

The dried pulp of the Fruit of *Citrullus Colocynthis*, Schrader, freed from Seeds. The fruit is imported chiefly from Smyrna, Trieste, France and Spain.

Medicinal Properties.—It is a powerful drastic, hydragogue cathartic, dangerous in large doses. It should not be prescribed alone; but in combination it is very commonly prescribed as an aperient in the form of Compound Extract or Pill, and combined with Henbane, which prevents griping. It is not to be given in pregnancy, nor when gastric or intestinal inflammation is suspected. The Tincture is ordered in Mixtures.

Dose.—2 to 8 grains = 0·13 to 0·52 gramme.

Ph. Ger. maximum single dose, 0·3 gramme; maximum daily dose, 1 gramme.

Official Preparations.—Extractum Colocynthidis Compositum and Pilula Colocynthidis Composita; Pilula Colocynthidis Composita is used in the preparation of Pilula Colocynthidis et Hyoscyami.

Not Official.—Pilulæ Catharticæ Compositæ, Pilulæ Catharticæ Vegetabiles, Pilulæ Colocynthidis et Hydrargyri, Tinctura Colocynthidis.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr. (Coloquinte), Ger., Hung., Ital. (Coloquintide), Jap., Norw., Port. (Coloquintidas), Russ, Mex. (Coloquintida), Swed., Swiss and U.S.

Descriptive Notes.—Colocynth fruits are imported from Asia Minor, Smyrna, Almeria in Spain, Mogador, Egypt and Cyprus, also from Persia, and more rarely from Marseilles and Trieste.

The kinds most frequently met with in commerce are the Turkish and Spanish, both of which have been peeled after drying, the Spanish less carefully, and shows more traces of the brown rind. The Mogador fruit is larger and unpeeled, it is brown externally when dry, though marbled with green and white when fresh; the Persian is peeled before drying, and consequently presents a shrunken appearance. It yields, however, the same proportion of pulp in relation to the seeds as the other varieties. Two forms of powdered Colocynth are sold, the one containing the seeds and the other freed from them as nearly as possible. The former is cheaper and is excluded by the Pharmacopœia direction 'freed from seeds,' and is used for keeping away moths from furs. The peeled fruit is alone official, occurring in more or less broken balls, about 2 in. (5 cm.) or less in diameter, *B.P.*; about 5 to 10 cm. in diameter, *U.S.P.* The Mogador variety exceeds the diameter given in *B.P.*, and is unpeeled and therefore excluded, whilst the Persian variety is not.

Tests.—The boiled and cooled aqueous decoction of the pulp should yield no distinctive blue coloration with Starch Solution. The official test also adds that 'only traces of fixed oil should be removed by Ether.' The author has pointed out in the *Companion* (17th Edition) that the removal of the Seeds commercially is carried out very imperfectly, and as the Seeds contain about 15 p.c. of Oil it is doubtful whether a single trade sample could be found which would pass the official Ether Test, even on the supposition that the Pulp itself was free from Ether-soluble constituents. The Pulp, however, perfectly free from Seeds yields to Ether about 3 p.c. of extractive of an oily nature, so that the official test should be completely modified. Confirmation of the above results appears (*Analyst*, xxvi. 31). Not merely Oil but also some gummy matter is extracted by Ether, both from the Seeds and the Pulp, and the use of a different solvent is therefore suggested. A limit for fixed Oil, as shown by extraction with Petroleum Spirit has been recommended; it should amount to from 1 to 2 p.c. The *B.P.* mentions that it yields, when dried at 100° C. (212° F.) and incinerated, at least 9·0 p.c. of ash. The author has found the ash of the Pulp to vary between 8·6 and 14 p.c., and that of the Seeds between 2·2 and 4·0 p.c.; on these figures Colocynth Pulp with an allowable 10 p.c. of Seeds would yield not less than 8 p.c. of ash. It should also be noted that the ash both of Pulp and Seed is very deliquescent. The figures given (*Analyst*, xxvi. 31) for the Pulp are from 7·8 to 12·1 p.c., for the Seeds 1·7 to 3·2 p.c. The hygroscopic nature of the ash is commented on and a determination of the sulphated ash suggested. A limit of 9·0 to 12·0 p.c. of ash has been recommended. No ash limit is suggested in either the *U.S.P.* or *P.G.*

Preparations.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM. Compound Extract of Colocynth.

Colocynth Pulp, 6; Extract of Barbados Aloes, 12; Scammony Resin, 4; Curd Soap, in shavings, 4; Cardamom Seeds, in the finest powder, 1; Alcohol (60 p.c.), 160.

B.P. directs the Colocynth to be macerated in the Alcohol for four days; press out the Tincture; remove the Alcohol by distillation, and add the Extract of Aloes, Scammony Resin and Soap; evaporate to a firm extract, adding the Cardamoms towards the end of the process; but it is better to evaporate the Colocynth Extract to dryness, powder it, and mix with the other ingredients to form Pulv. Ext. Coloc. Co.; the product weighs about 24.

6 of Compound Extract is about equal to 1½ of Pulp (Simple Extract ½), Extract of Aloes 3, Resin of Scammony 1, Curd Soap 1, Cardamoms ¼, Water ½.

Dose.—2 to 8 grains = 0·13 to 0·52 gramme.

Ph. Ger. maximum single dose of the Simple Extract, 0·05 gramme; maximum daily dose, 0·15 gramme.

Commonly prescribed with Extract of Hyoscyamus, to prevent griping.

Foreign Pharmacopœias.—Official in Port., Colocynth 30, Aloes 55, Scammony 22, Hard Soap 15, Cardamoms 3; Swed., Colocynth 5, Aloes 10, Resin of Jalap 3, Cardamoms 1, Soap 2; Russ., Extract Colocynth 3, Aloes 10, Scammony 8, Extract of Rhubarb 5; U.S., Extract Colocynth 16, Purified Aloes 50, Resin Scammony 14, Cardamoms 6, Soap 14; all alcoholic. Not in the others. Austr., Belg., Dan., Dutch, Ger., Hung., Ital., Jap., Mex., Port., Russ., Swiss and U.S. have a Simple Extract made with Alcohol.

PILULA COLOCYNTHIDIS COMPOSITA. Compound Pill of Colocynth.

Colocynth Pulp, 1; Barbados Aloes, 2; Scammony Resin, 2; Potassium Sulphate, ¼; Oil of Cloves, ¼; Distilled Water, *q.s.* (about ¼). (about 1 in 6)

B.P. Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

The *minimum* dose is somewhat high, as it is frequently prescribed in smaller doses. The same may be said of the next pill, which is only two-thirds of the strength.

For dispensing, keep the powders and oil ready mixed, and make up the mass as required with Water, or better still with Alcohol (60 p.c.).

This mass, when made with Scammony instead of Scammony Resin and divided into 5-grain pills, forms Gregory's pill.

Foreign Pharmacopœias.—Official in Norw., Colocynth 2, Aloes 4, Resin of Scammony 4, Oil of Cloves ⅔, Suet 3, Glycerin 3; Swed., Compound Extract of Colocynth 7, Cloves 1, Resin of Jalap 2, Extract of Wormwood *q.s.* Not in the others.

PILULA COLOCYNTHIDIS ET HYOSCYAMI. Pill of Colocynth and Hyoscyamus.

Compound Pill of Colocynth, 2; Extract of Hyoscyamus, 1.

B.P. Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Christison's Pill is 2 grains of Pilula Colocynthidis et Hyoscyami (*B.P.* 1867).

Hamilton's Pill.—For some years past it has been the general practice to supply 4 or 5 grains of the *B.P.* pill mass, but some few houses in Edinburgh still supply the pills of the late Dr. Hamilton, Jun., the formula for which was

Compound Extract of Colocynth, 2; Extract of Hyoscyamus, 1; mix and make into 3¾ grain pills.

Foreign Pharmacopœias.—Official in Jap., Colocynth 10, Aloes 20, Root of Jalap 20, Extract of Hyoscyamus 25, Potassium Sulphate 3, Oil of Cloves 1. Not in the others.

Not Official.

PILULÆ CATHARTICÆ COMPOSITÆ.—Compound Extract of Colocynth, 16 grains; Mild Mercurous Chloride, 12 grains; Resin of Jalap, 4 grains; Gamboge, 3 grains; made into a mass with Diluted Alcohol (49 per cent.) and divided into 12 pills.—*U.S.P.*

B.P.C. gives the same formula as above except that the *B.P.* Compound Extract of Colocynth is used in place of that of *U.S.P.*, which is different.

PILULÆ CATHARTICÆ VEGETABILES.—Compound Extract of Colocynth, 12 grains; Extract of Hyoscyamus, 6 grains; Resin of Jalap, 4 grains; Extract of Leptandra, 3 grains; Resin of Podophyllum, 3 grains; Oil of Peppermint, 2 minims, made into a mass with Diluted Alcohol (49 p.c.), and divide into 12 pills.—*U.S.P.*

PILULÆ COLOCYNTHIDIS ET HYDRARGYRI. *Syn.* Abernethy's Pills.—Mercury Pill, 3 grains; Compound Extract of Colocynth, 2 grains; in one pill.—*Pharm. Form.*

This appears also in *B.P.C.*, but the proportions are reversed.

TINCTURA COLOCYNTHIDIS.—1 of Colocynth Pulp, in coarse powder, macerated with 10 of Alcohol (90 p.c.). (1 in 10)

Dose.—10 to 15 minims = 0·6 to 0·9 c.c. three times a day.

Ph. Ger. maximum single dose, 1 gramme; maximum daily dose, 3·0 grammes.

This has been incorporated in the *B.P.C.*

Foreign Pharmacopœias.—Official in Hung. and Mex., 1 in 5; Belg., Jap. and Swiss, 1 in 10; Ger. and Ital., Fruits 1, Alcohol 10; Swed., 1 in 10 with Anise Fruits $\frac{1}{10}$. Not in the others.

Not Official.

CONDURANGO CORTEX.

The Bark obtained from *Gonolobus condurango.*

Medicinal Properties.—It was introduced as a remedy for cancer, but it has not fulfilled the expectations formed of it. It relieves catarrh and hyperæsthesia of the stomach, and has been used with benefit in ulcer and cancer of the stomach, relieving the vomiting, pain and hæmatemesis, and improving the appetite.—*L.M.R.* '88, 337; *L.* '95, i. 1004.

Descriptive Notes.—Formerly this bark was referred to *Gonolobus Condurango*, Triana, but in the *P.G.* it is now referred to *Marsdenia Condurango*, Reich. an Asclepiadaceous plant of Equatorial South America. It occurs in short quilled pieces, about 2 to 3 inches (50 to 75 mm.) long or more, ½ to ¾ inch (12 to 20 mm.) broad, and ⅛ inch (3 mm.) thick. Externally the bark is yellowish-grey, and the surface is uneven with slightly raised protuberances. The transverse fracture is yellowish-grey, and exhibits numerous small granular masses of stone cells, but towards the outer surface a few projecting fibres are noticeable. The distinctive features under the microscope are the single prismatic crystals in the phelloderm cells, the abundance of sphæraphides in the parenchyma, the very variable sclerenchymatous cells, and the abundance of starch. The medullary rays consist of a single row of cells as seen in transverse section, and laticiferous vessels are present.

A cold infusion of the bark (1–5) becomes cloudy when heated, but becomes clear again when cold (*P.G.*).

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Jap., Mex., Norw., Russ., Span., Swed. and Swiss. Not in the others.

EXTRACTUM CONDURANGO LIQUIDUM.—A 1 in 1 fluid extract of Condurango bark prepared by percolation, with Alcohol (60 p.c.). The residue obtained after distilling the Alcohol from the latter portions of the percolate being dissolved in the reserved portion.—*B.P.C. Formulary* 1901, incorporated in the *B.P.C.*

Dose.—10 to 60 minims = 0·6 to 3·6 c.c.

100 of Condurango Bark is moistened with a mixture containing Alcohol (90 p.c.), 15; Distilled Water, 25; Glycerin, 10; and percolated with a mixture of Alcohol, 1; Distilled Water, 3; proceed as directed for fluid extracts, so as to produce 100.—*Dan.*, *Ger.* and *Jap.*

Austrian, Swedish, and Russian are similar; Dutch, Fluid extract, the bark is moistened with a mixture of Alcohol (90 p.c.) 60, Water 30, and Glycerin 10, and percolated with Alcohol (90 p.c.) 35 and Water 65; Belg., Fluid extract with Alcohol (30 p.c.); Solid extract with Alcohol (60 p.c); Fr., Fluid Extract with Alcohol (45 p.c.); Swiss, Fluid extract with a mixture of Alcohol (90 p.c.) 1 and Water 3; Spanish has an extract with Alcohol (70 p.c.).

VINUM CONDURANGO.—Fluid Extract of Condurango, 1; Malaga Wine, 9.—*Austr.* and *Swiss.*

Condurango Bark, 1; Malaga, 10.—*Dutch.*

Condurango Bark, 1; Sherry, 10.—*Ger.* and *Jap.*

Condurango Bark, 3; Alcohol (60 p.c), 3; Carinena or Alicante Wine, *q.s.* to yield 100.—*Span.*

All by weight.

Fluid Extract of Condurango, 1; Detannated Sherry, *q.s.* to make 10.—*B.P.C.*

Dose.—2 to 8 fl. drm. =7·1 to 28·4 c.c.

CONIUM.

CONIUM.

Fr., Ciguë; Ger., Schierling; Ital., Cicuta; Span., Cicuta.

The fresh Leaves and young Branches of *Conium maculatum*, L., as well as the dried unripe Fruits, are official in the *B.P.*; the full-grown but unripe Fruit, carefully dried and preserved, is official in the *U.S.P.*; the dried Leaves and flowering Stem Tops are official in the *P.G.* The *U.S.P.* requires the Fruit to yield not less than 0·5 p.c. of Coniine.

Medicinal Properties.—Sedative and antispasmodic; allays the cough in bronchitic affections, pertussis, and phthisis. Has been recommended in chorea and other spasmodic affections; also in visceral neuralgias and gastric pains. Applied externally in the form of **ointment** to ease pain of anal fissure or of hæmorrhoids, and cancer.

Dose.—Of the Succus 1 to 2 fl. drm. = 3·6 to 7·1 c.c. Of the Tincture 30 to 60 minims = 1·8 to 3·6 c.c.

Ph. Ger. maximum single dose, 0·2 gramme; maximum daily dose, 0·6 gramme.

Prescribing Notes.—*In consequence of the great variation in strength of Conium preparations, the standardised Fluid Extract or Coniinæ Hydrobromidum should be prescribed. 1 fl. drm. of the Fluid Extract is about equal to 1 fl. oz. of Succus Conii (average strength).*

Incompatibles.—Caustic Alkalis, and vegetable Astringents.

Official Preparations.—Succus Conii from the **Folia.** Unguentum Conii from the **Succus.** Tinctura Conii from the **Fructus.**

Not Official.—Extractum Conii, Extractum Conii Liquidum, Pessus Coniinæ, Pilulæ Conii Compositæ, Vapor Coniinæ, Coniina, Coniinæ Hydrobromidum, and Coniinæ Hydrochloridum.

Antidotes.—In case of poisoning by Hemlock, stomach-tube or emetics, followed by stimulants, Strychnine hypodermically, artificial respiration.

CONII FOLIA. CONIUM LEAVES.

The fresh Leaves and younger Branches of *Conium maculatum*, collected when the fruit begins to form.

Foreign Pharmacopœias.—Official in Austr., Ger., Mex., Port. and Span. Not in Belg., Dan., Dutch, Fr., Hung., Ital., Jap., Norw., Russ., Swed., Swiss or U.S.

Descriptive Notes.—Conium has pinnately decompound leaves and is distinguished from other British umbelliferous plants having similar leaves by the purplish spots on the stem and petioles of the leaves, by the mouse-like odour evolved when rubbed with Liquor Potassæ, and by the leaves being quite free from hairs. The extreme points of the leaf segments are white or colourless, whilst in *Æthusa Cynapium*, L., which has also hairless leaves, the tips are brown, and it has no general involucre to the umbels as in Conium, but only a partial one of three long bracts. The fresh leaves of Conium only are official and are in best condition at the end of June and beginning of July. Such of the British species of the genus *Chærophyllum* as resemble Conium in appearance, have hairy leaves and cylindrical fruits. Under the microscope it is distinguished by striated epidermal cells, by the parenchymatous cells containing minute, usually single, crystals of Calcium Oxalate, the absence of hairs, and the presence of annular as well as spiral vessels.

Tests.—Conium leaves when bruised possess a strong and peculiar odour, somewhat resembling that of mice; and when the leaves are rubbed with Potassium or Sodium Hydroxide Solution the odour is intensified.

Preparations.

SUCCUS CONII. JUICE OF CONIUM.

3 of Juice, obtained from the fresh Leaves and young Branches, preserved by the addition of 1 of Alcohol (90 p.c.).

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c.

Much larger doses are also given.

UNGUENTUM CONII. CONIUM OINTMENT.

Evaporate 8 of the Juice of Conium on a water-bath to 1, at a temperature not exceeding 140° F. (60° C.), and mix with 3 of Hydrous Wool Fat.

Contrary to what might have been expected, the alkaloidal strength of the juice is not affected by the evaporation, but it is better to evaporate the juice to 2 and to use Anhydrous Wool Fat, also to add 2 p.c. of Boric Acid.

Becomes mouldy on keeping.—*P.J.* '98, ii. 165, 232.

Not Official.

EXTRACTUM CONII.—Made from the fresh leaves and young branches of Hemlock.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

PILULÆ CONII COMPOSITÆ.—Extract of Hemlock, 5; Ipecacuanha, in powder, 1; Treacle *q.s.*—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

VAPOR CONIINÆ.—Juice of Hemlock, ½ fl. oz.; Solution of Potash, 1 fl. dr.; Distilled Water, 1 fl. oz.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

CONII FRUCTUS. Conium Fruit.

The dried, full-grown, unripe Fruits of *Conium maculatum*.

Conium Fruits are not officially required to yield any definite percentage of Coniine. The *U.S.P.* states that they shall yield not less than 0·5 p.c. of Coniine. The standard adopted by the *U.S.P.* has been criticised as being too low, but the standard is justified (*Y.B.P.* '05, 398).

Foreign Pharmacopœias.—Official in Fr., Mex., Port., Span. and U.S.

Descriptive Notes.—Conium fruits are ovoid, greyish-green, slightly compressed laterally, and, as met with in commerce, consist of the separate mericarps. The size is given in *B.P.* as ⅛ inch (3 mm.) long, and nearly as broad; in *U.S.P.* as 3 mm. long, and about 1·5 mm. in diameter. The five dorsal ridges are more or less wavy and irregularly crenate, this feature being most conspicuous before the fruits are fully ripe. The surface between the ridges is glabrous but minutely wrinkled. The flat surface shows a narrow deep depression which gives a reniform outline to a transverse section of the mericarp. The *U.S.P.* states that Conium fruit after being kept for more than two years is unfit for use. Although vittæ are present in the very young fruit they subsequently disappear and are absent in the fruit when mature. Conium Fruits are characterised under the microscope by thin-walled nearly cubical cells, which form a layer outside the endosperm. The Coniine and an essential oil are contained in the cells of the endocarp, so that a finely powdered fruit is not necessary for its extraction.

Tests.—The percentage of Coniine present in Conium Fruits may be determined by extraction with suitable solvents, and weighing the alkaloid as a Hydrochloride. A weighed quantity of 5 grammes of the finely-powdered fruit is extracted with 50 c.c. of a saturated solution of dry Hydrochloric Acid gas in Chloroform. The extraction with a further quantity of a similar mixture is continued until 6 drops of the chloroformic mixture evaporated on a watch-glass, and the residue acidified with Diluted Sulphuric Acid, gives no precipitate with Mayer's reagent. The mixed chloroformic liquids after separation from the marc are shaken with two separate quantities of 25 c.c. each of Water. The mixed aqueous shakings are in turn separated, shaken twice with 10 c.c. of Chloroform, and the Chloroform separated. The aqueous portion is made alkaline by the addition of Sodium Hydroxide Solution, and the liberated alkaloid extracted by shaking with three successive portions each of 10 c.c. of Chloroform. The chloroformic liquids are separated in each case, mixed, run into 10 c.c. of the saturated solution of dry Hydrochloric Acid gas in Chloroform, evaporated to dryness on a water-bath, the residue dried at a temperature not exceeding 90° C. (194° F.), and weighed; 162·41 parts of anhydrous Coniine Hydrochloride represent 126·22 parts of Coniine.

The method of determination adopted by the *U.S.P.* is essentially as follows:—A weighed quantity of 10 grammes of the Fruit in No. 60 powder is shaken at intervals during four hours in an Erlenmeyer flask, with 100 c.c. of a mixture of 98 parts of Ether, 8 parts of Alcohol (94·9 p.c.), and 3 parts by volume of Ammonia Water. A measured quantity of 50 c.c. of the clear liquid is decanted into a beaker, and mixed with sufficient Normal Volumetric Sulphuric Acid Solution to produce an acid reaction. The Ether is evaporated on a water-bath, 15 c.c. of Alcohol (94·9 p.c.) added, and the mixture set aside for two hours to permit of the Ammonium Sulphate depositing, the Tincture filtered, the residue and filter washed with a little Alcohol (94·9 p.c.), and the washings mixed with the filtrate. The excess of acid is neutralised by Sodium Carbonate, a slight acidity being carefully maintained. The liquid is now carefully concentrated on a water-bath to a volume of 3 c.c., mixed with an equal volume of Water and 2 drops of Normal Volumetric Sulphuric Acid Solution. The liquid is washed with two successive quantities each of 15 c.c. of Ether, the ethereal liquids separated, the acid liquid transferred to a separator, sufficient Sodium Carbonate Test-solution added to render the liquid distinctly alkaline to red Litmus paper, and the liberated alkaloid shaken out with successive portions of 15 c.c., 15 c.c., and 10 c.c. of Ether. The ethereal solutions are in each case separated, transferred to a tared beaker, and sufficient 5 p.c. Hydrochloric Acid solution added to the mixed ethereal solutions to render them distinctly acid. The Ether is removed by evaporation at a gentle heat on a water-bath, and the excess of Hydrochloric Acid by adding two separate quantities of 3 c.c. each of Alcohol (94·9 p.c.), and removing them in each case by evaporation. The residue is dried at a temperature not exceeding 60° C. (140° F.). This weight, multiplied by 0·777 and the product by 20, gives the percentage of Coniine present in the Fruit.

Coniine may be titrated with Normal or Deci-normal Volumetric Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator of neutrality; 1 c.c. of the Normal Acid represents 0·012622 gramme of Coniine.

Preparation.

TINCTURA CONII. TINCTURE OF CONIUM.

1 of Conium Fruit, recently reduced to No. 40 powder, percolated with Alcohol (70 p.c.), *q.s.* to yield 5.

Now 1 in 5 instead of 1 in 8.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Port., Tinct. Cicutæ, 1 in 5, also Fresh Herb 1, Spirit 1; Mex., Leaves, 1 in 5. Not in the others.

Tests.—Tincture of Conium possesses a specific gravity of from 0·895 to 0·900; contains about 1·75 p.c. of total solids and about 68 p.c. w/v of Absolute Alcohol. The *B.P.* Tincture is not a standardised preparation, and no process for the quantitative determination of the Coniine is given.

Not Official.

EXTRACTUM CONII LIQUIDUM.—A standardised Liquid Extract prepared by treating 100 of Conium Fruit (in No. 40 powder) with a mixture of 100 of Alcohol (60 p.c.) and 1½ of Acetic Acid; the exhaustion is completed with Alcohol (60 p.c.); finally the liquid is adjusted to contain 1 p.c. w/v alkaloidal hydrochlorides.—*B.P.C. Formulary* 1901, incorporated in the *B.P.C.*

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

The *U.S.P.* has also a Fluidextractum Conii, about 1 in 1, which is standardised to contain 0·45 p.c. w/v of Coniine. It is prepared by treating 100 of Conium Fruit in No. 40 powder with a mixture of 98 of Alcohol (60 p.c.) and 2 of Acetic Acid (*U.S.P.*); the exhaustion is completed with Alcohol (60 p.c.).

Tests.—The *U.S.P.* mixes a measured quantity of 10 c.c. of the Fluid Extract with a little clean sand and evaporates to dryness on a water-bath. After the Extract and the sand are uniformly mixed they are transferred to an Erlenmeyer flask and shaken at intervals during one hour with 100 c.c. of a mixture of 100 c.c. of Ether, 7 c.c. of Alcohol (94·9), and 3 c.c. of Ammonia Solution, the dish being washed out with the mixture, and the mixture added in portions. A measured quantity of 50 c.c. of the clear liquid is decanted into a beaker, and sufficient Normal Volumetric Sulphuric Acid Solution added to produce a distinctly acid reaction. The Ether is removed by evaporation, 15 c.c. of Absolute Alcohol added, and the Ammonium Sulphate allowed to deposit during two hours. The liquid is filtered, the residue and filter washed with a little Absolute Alcohol, the washings being added to the filtrate. The excess of acid is neutralised by the careful addition of Sodium Carbonate Test Solution, a slight acidity being maintained. The liquid is concentrated by evaporation on a water-bath, to a volume of 3 c.c., mixed with an equal volume of Water and 2 drops of Normal Volumetric Sulphuric Acid Solution. The acid liquid is washed with two successive portions each of 15 c.c. of Ether, the acid liquid separated in each instance, it is transferred to a separator, sufficient Sodium Carbonate Test Solution added to render the liquid distinctly alkaline to red Litmus paper, and the liberated alkaloid removed by extraction with successive portions of 15 c.c., 10 c.c., and 10 c.c. of Ether. The ethereal solutions are separated in each case, transferred to a tared beaker, mixed, and sufficient of a 5 p.c. Hydrochloric Acid Solution added drop by drop to ensure an excess of acid. The Ether is then removed by distillation, the excess of Hydrochloric Acid by evaporating twice with successive portions of 3 c.c. of Alcohol (94·9 p.c.), the residue dried at a temperature not exceeding 60° C. (140° F.), till constant in weight, and weighed after cooling in a desiccator. The weight multiplied by 0·777 and the product by 20 gives the p.c. w/v of Coniine present in the sample of Fluid extract.

The *B.P.C.* states, 'determine the proportion of alkaloids in the strong liquid extract, and adjust the finished product so that it shall contain alkaloids equivalent to 1·0 p.c. of alkaloidal hydrochlorides,' but does not give the details of any process by which they may be determined.

PESSUS CONIINÆ.—Coniine, ½ minim; Gelatin Basis, 20 grains.—*Women.*

Coniine Hydrobromide, ½ grain; Oil of Theobroma, 120 grains.—*B.P.C.*

CONIINA. *Syn.* Cicutine. $\mathbf{C_8H_{17}N}$, eq. 126·22.—A colourless, or pale yellow, volatile oily liquid, with a characteristic penetrating mousy odour. Obtained from *Conium maculatum.* It unites with acids to form crystalline salts, which are much more stable than the alkaloid.

Solubility.—1 in 100 of Water. It mixes in all proportions with Alcohol (90 p.c.) and with Ether.

Causes a very great increase in the blood pressure when injected (*L.* '05, i. 851); the effect, however, is transient, and prolonged administration causes paralysis.

Dose.—It has been given in doses of $\frac{1}{12}$ grain to 1 grain = 0·0054 to 0·06 gramme; but the Foreign Pharmacopœias give much smaller doses, 1 to 4 milligrammes = $\frac{1}{64}$ to $\frac{1}{16}$ grain.

Foreign Pharmacopœias.—Official in Mex. Not in the others.

Tests.—Coniine has a specific gravity of 0·886 (Schorm), 0·844 (Ladenburg). It boils at about 169° C. (336·2° F.). It is dextrogyrate, its specific rotation being +13·8° for the Sodium ray.

The aqueous solution of Coniine is powerfully alkaline in reaction. When a glass rod moistened with concentrated Hydrochloric Acid is held closely over a small quantity of Coniine contained in a watch-glass, white fumes are produced, and if sufficient of the fumes be passed over the surface of the alkaloid, it is wholly converted into a crystalline Hydrochloride; Nicotine Hydrochloride is amorphous.

On the addition of a large excess of concentrated Hydrochloric Acid to Coniine a pale red tint is produced, gradually deepening in colour; Sulphuric Acid gives no immediate change with pure Coniine, but the mixture gradually becomes purple-red and then olive-green. It may be distinguished from Nicotine by producing with Mercuric Chloride Solution a white amorphous, instead of a crystalline precipitate; by its non-precipitation with Platinic Chloride Solution; and by its alkalinity to Phenolphthalein Solution, an aqueous solution of Coniine being coloured red immediately on the addition of 1 or 2 drops of Phenolphthalein Solution; Nicotine is neutral to Phenolphthalein Solution. When heated slowly with free access of air it is completely volatilised, leaving no weighable residue.

CONIINÆ HYDROBROMIDUM. Coniine Hydrobromide $C_8H_{17}N,HBr$, eq. 206·57.—Transparent, colourless, rhombic crystals, or a white, crystalline powder. The usual form for prescribing Coniine, of which it contains about 60 p.c.

It should be protected as far as possible from the light in well-closed glass bottles of a dark amber tint.

Solubility.—1 in 2 of Water; 1 in 3 of Alcohol (90 p.c.).

Dose.—$\frac{1}{6}$ to 2 grains = 0·01 to 0·13 gramme.
For **hypodermic** use, $\frac{1}{12}$ grain in 5 minims of Water.

Official in Fr. (1908) and Mex.

Tests.—Coniine Hydrobromide melts according to *Fr. Codex* (1908) at 211° C. (411·8° F.) The Coniine obtained from the Hydrobromide answers the tests distinctive of the alkaloid given under that heading. When a small quantity of salt is moistened with a few drops of Potassium or Sodium Hydroxide Solution the peculiar mousy odour of Coniine is evolved. The aqueous solution acidified with diluted Nitric Acid gives on the addition of Silver Nitrate Solution a yellowish-white curdy precipitate, practically insoluble in Ammonia Solution and in Nitric Acid. The salt should leave no weighable residue when ignited with free access of air.

CONIINÆ HYDROCHLORIDUM.—Colourless crystals, readily soluble in Water and in Alcohol (90 p.c.).

Tests.—The Coniine isolated from Coniine Hydrochloride responds to the test for the alkaloid given under that heading. When moistened with 1 or 2 drops of Potassium or Sodium Hydroxide Solution, the peculiar mousy odour of Coniine is evolved. The aqueous solution acidified with Nitric Acid yields with Silver Nitrate Solution a white curdy precipitate insoluble in Nitric Acid, soluble in Ammonia Solution. The salt when incinerated with free access of air leaves no weighable residue.

Not Official.

CONVALLARIA.

The entire Plant of *Convallaria Majalis*, L. (Lily of the Valley), gathered when the flowers commence to open, and dried.

Medicinal Properties.—A cardiac tonic; diuretic. Not cumulative like Digitalis, but according to Mitchell Bruce it is a very uncertain remedy. It has been long employed by the Russian peasantry as a remedy for dropsy. The late Professor Sée considered that it may be used in all forms of heart failure, for it has none of the nauseating effects of Digitalis, nor does it exhaust the contractility of the heart and arteries.

The juice of fresh plant stated (*P.J.* '04, ii. 967) to contain 0·225 p.c. Convallamarin, and 0·12 p.c. Convallarin.

Foreign Pharmacopœias.—Official in Austr., Fr. (Muguet), Ital. (Mughetto), Mex., Span. (Lirio de los Valles) and U.S. Not in the others.

Convallaria contains 2 glucosides—**Convallarin**, a purgative, and **Convallamarin**, allied to Digitalin in its action on the heart; the dose of the latter is $\frac{1}{8}$ to 2 grains = 0·008 to 0·13 gramme.

EXTRACTUM CONVALLARIÆ (*Fr.*, *Ital.* and *Span.*).—An aqueous extract of the Stalks and flowers of Convallaria freshly gathered and dried. Mex., from roots.

Dose.—2 to 5 grains = 0·13 to 0·32 gramme three times a day.

Ital. maximum single dose, 0·20 gramme; maximum daily dose, 1·0 gramme.

FLUIDEXTRACTUM CONVALLARIÆ (*U.S.*).—1 in 1, from the rhizome and roots of Convallaria, with a mixture of Alcohol (95 p.c.) 650, and Water 350 = about Alcohol (60 p.c.).

Average Dose.—8 minims = 0·5 c.c.

Russ. has a Tincture from fresh Flowers.

B.P.C. has 1 in 1 Fluid Extract, dose 5 to 10 minims, and a Tincture 1 in 8, dose 5 to 20 minims; both are made from the dried Flowers with Alcohol (60 p.c.).

COPAIBA.

COPAIBA.

B.P.Syn.—Copaiva.

Fr., Copahu; Ger., Copaivabalsam; Ital., Balsamo di Copaive; Span., Oleo Resina de Copaiba.

An Oleo-Resin, obtained from the trunk of *Copaifera Lansdorfii*, Desf., as well as from other species of Copaifera.

Obtained from the northern part of South America. The commercial varieties Para, Maranham, Maracaibo, and Angostura are named from the various ports of shipment.

Solubility.—(Nearly clear) 1 in 1 (*or less*) of Alcohol (90 p.c.), but if more Alcohol be added it becomes cloudy; in all proportions of Absolute Alcohol, Ether, Benzol, and the fixed and volatile Oils; also in four times (*or less*) its bulk of Petroleum Spirit, the solution only yielding a filmy deposit on standing; also 1 in 2 (*or less*) of Glacial Acetic Acid.

Medicinal Properties.—Stimulant, antiseptic, and diuretic. Acts more particularly upon the mucous membrane of the genito-urinary tract. Used in gonorrhœa, after the acute stage has passed, and in gleet. Sometimes combined with Buchu and Cubebs.

Useful in chronic bronchitis and bronchiectasis, when a disinfectant expectorant is indicated. The **resin** is used as a diuretic in cardiac and hepatic dropsy, but not in renal, as it is liable to irritate the kidneys.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Prescribing Notes.—*Can be given in the form of* **pills** *or* **paste** (*see below*), *also in* **capsules.** *It may be suspended in Water by means of Mucilage of Gum Acacia* (*see p.* 3), *or Liquor Potassæ, which saponifies it. Cinnamon Water, Peppermint Water, the Tinctures of Orange and Ginger have been used as flavouring agents. The* **Oil** *of Copaiba can be suspended by means of Mucilage, as can also the* **Resin** *of Copaiba.*

When Copaiba is boiled with Solution of Potassium Hydroxide the Oil is emulsified, and the Resin separates on standing. The liquid portion is consequently miscible with Water.

Official Preparation.—Oleum Copaibæ.

Not Official.—Electuaire de Copahu Composé, Liquor Copaibæ Solubilis, Liquor Copaibæ, Buchu et Cubebæ, Liquor Copaibæ cum Santalo, Liquor Copaibæ et Buchu, et Cubebæ cum Santalo, Haustus Copaibæ, Mistura Copaibæ, Mistura Copaibæ Acida, Mistura Copaibæ Alkalina, Pasta Copaibæ, Pilula Copaibæ, Resina Copaibæ.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port. (Terebinthina Copahiba), Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—The oleo-resin, incorrectly designated in commerce Balsam of Copaiba, varies considerably in consistence, according to the species of Copaifera from which it is derived. These, besides the species mentioned in the *B.P.*, viz., *C. Lansdorfii* (the source of Maranham Copaiba), are believed to be *C. officinalis*, L. (Maracaibo and Cartagena Copaiba), *C. Guianensis*, Desf. (Surinam Copaiba and B. Guiana Copaiba), *C. coriacea*, Mart. (Bahia Copaiba); *C. confertiflora*, Benth., *C. oblongifolia*, Mart., and *C. rigida*, Benth., are also believed to yield some of the Copaiba of commerce. The *B.P.* lays no restriction upon the species from which it may be derived. The Para kind (*C. multijuga*, Hayne), which is the most fluid and the palest in colour, almost resembling Olive oil in colour and consistence, yields 60 to 90 p.c. of volatile oil, and is therefore chiefly used for distilling the oil. The Maracaibo, which is thicker and of a brownish colour, like that of Maranham, and with a greenish fluorescence, yields only about 40 p.c., and that from Bahia about 50 p.c.; the Maranham kind is preferred in Germany.

When a Copaiba containing much oil is desired, the Para, Surinam, and British Guiana kinds are most suitable, and when one containing much resin is required, the Maranham and Maracaibo and Cartagena are preferable. Gurjun balsam resembles the darker varieties of Copaiba in colour and consistence, but if heated to 130° C. (266° F.) it is transformed into a jelly.

Tests.—Copaiba has a specific gravity of from 0·985 to 0·994; *B.P.* gives 0·916 to 0·993; the *U.S.P.* 0·950 to 0·995 at 25° C. (77° F.); the *P.G.* 0·980 to 0·990. It should contain at least 40 p.c. of volatile oil, which should possess an optical rotation of from −14° to −17°, and a boiling point of 245° to 275° C.

(473° to 527° F.); *B.P.*, not under 250° C. (482° F.). This volatile oil should not possess an odour of Turpentine, and if after its volatilisation the Balsam be heated until the volatile constituents are removed a hard readily friable residue should remain. The Acid and Ester value afford a useful criterion of the quality of the Balsam, but a method for their determination is not included in the *B.P.* The *U.S.P.* and the *P.G.* include a determination of the Acid value, the *U.S.P.* requiring from 64·10 to 89·18; the *P.G.* 75·8 to 84·24. The *P.G.* includes a determination of the Ester value, which should be not less than 8·2, but no ester value is included in the *U.S.P.* The methods of determination given in the *P.G.* have been severely criticised, and are considered to be of little value, the only variety of Balsam which at all approximates the figures given being the Maranham variety. The figures for the optical rotation of Copaiba given in the *B.P.* require to be halved (*C.D.* '00, ii. 166; '03, i. 18; *P.J.* '00, i. 54; '00, ii. 98), as they represent the rotation of the plane of a ray of polarised light in a tube of 200 mm., and not in a tube of 100 mm. as adopted in other cases. It is probable that even when halved the limits may be too narrow, as some genuine samples of Copaiba yield an oil having a rotation as low as − 9°, and Gildemeister and Hoffmann quote −7° to −35° as the rotation of Copaiba Oil from Para or Maracaibo Balsam. It has been suggested (*C.D.* '00, ii. 166; *P.J.* '00, ii. 99) that the *B.P.* might with advantage include a method of determining the percentage of volatile oil in the Balsam, such as by heating a weighed quantity of the Balsam on a water-bath, and finally in a water-oven at a temperature of just below 100° C. (212° F.), until constant in weight. Determinations of the Acid and Ester values of ten samples of the Balsam showed them, with one exception, to vary between 10·64 and 19·60 for the Ester, and 78·96 and 93·52 for the Acid value.

It has also been pointed out (*C.D.* '01, i. 436; *P.J.* '01, i. 326) that it would be useful to include monographs for the Resin as well as the Volatile Oil. The Volatile Oil might be required to possess a specific gravity of 0·903 to 0·908, an optical rotation in a 100 mm. tube of − 7° to − 21°, a boiling point of 245° to 275° C. (473° to 527° F.), and a solubility in Absolute Alcohol of 1 in 1. The Resin should be soluble in Alcohol (90 p.c.), Ether, and Carbon Bisulphide, and should possess an Acid value of at least 119·7. The specific gravity suggested for the Balsam is 0·97 to 0·995, and the Acid Value for the Balsam of at least 75·20.

The Acid value of Maracaibo Copaiba Balsam should be between 76·52 and 94·90, the Ester value from 0·47 to 8·75; the Acid value of Para Balsam should be from 65·8 to 72·0, and the Ester value from 1·9 to 2·9.

The more generally occurring adulterants of Copaiba Balsam are Turpentine oil, fixed oils, *e.g.*, Olive and Castor Oils, Paraffin Oils, Gurjun Balsam, Colophony, and African Copaiba Balsam. Turpentine Oil may be readily detected by the odour on evaporation and the boiling point and rotation of the volatile Oil. Fixed oils are indicated by the character of the Resin remaining after the volatilisation of the ethereal Oil, and by the solubility of the Balsam in Alcohol (90 p.c.), and in Petroleum Ether; the *U.S.P.* includes a test with 20 drops of the Balsam and 1 c.c. of a 1 in 10 alcoholic Potassium Hydroxide Solution, mixing when cool with twice the volume of Ether, no gelatinisation should occur. Paraffin Oils are also readily detected by the solubility of the sample in Alcohol (90 p.c.); when a measured quantity of 5 c.c. of the Balsam is shaken with 15 c.c. Alcohol (94·9 p.c.), the mixture boiled for one minute, allowed to cool and to stand for one hour, no drops of oil should separate. Gurjun Balsam may be detected by the Nitric and Sulphuric Acid, and Acetic and Nitric Acid tests; the *B.P.* employs a cooled mixture of equal parts of Nitric and Sulphuric Acids, and Glacial Acetic Acid containing a small quantity of Nitric Acid, as tests for the absence of Gurjun Balsam, no transient violet coloration should be produced when 1 drop of the former mixture is added to 2 drops of the Balsam dissolved in 20 parts of Carbon Bisulphide, nor should a reddish or purple colour be yielded when 4 drops of the Balsam are carefully added to ½ oz. of Glacial Acetic Acid, to which has been added 4 drops of Nitric Acid. The *U.S.P.* uses Glacial Acetic Acid mixed with a few drops of Nitric Acid in performing this test, but gives more explicit directions for its application. No reddish zone should be produced, nor should the fluid assume a red or purple colour when 4 drops of Copaiba are carefully poured on top of a mixture of 1 drop of Nitric Acid (sp. gr. 1·40) and 3 c.c. of Glacial Acetic Acid. Colophony may be detected by shaking 1 gramme of Copaiba, in a stoppered vial, with 10 c.c. of Ammonia Solution, when allowed to stand 24 hours it should not gelatinise, nor should a firm mass be produced, but the liquid will become turbid. African Copaiba yields on distillation a volatile oil which is dextrogyrate, and its presence may be ascertained by its effect on the optical rotation of the distilled oil.

Volumetric Determination.—1 gramme of Copaiba, dissolved in 50 c.c. of Alcohol, should require not less than 2·3 c.c. and not more than 3·2 c.c. (2·7 c.c. to 3 c.c., *P.G.*) of the Semi-normal Volumetric Alcoholic Solution of Potassium Hydroxide for neutralisation, using 1 c.c. Phenolphthalein Solution (10 drops, *P.G.*) as indicator, *P.G.* and *U.S.P.* If a further addition of 20 c.c. of Semi-normal Volumetric Alcoholic solution of Potassium Hydroxide be made, and the mixture warmed for 15 minutes on a water-bath, and titrated with Semi-normal Volumetric Solution of Hydrochloric Acid, it should require for the neutralisation of the excess of Potassium Hydroxide at least 19·7 c.c. of the Acid Solution, *P.G.*

OLEUM COPAIBÆ. OIL OF COPAIBA.

A yellow, or yellowish-brown, oily liquid, distilled from Copaiba. It has a distinctive Copaiba odour and a bitter, persistent taste.

It should be kept in well-closed glass bottles of a dark amber tint in a cool atmosphere, and protected as far as possible from the air and light.

Copaiba Oil contains, according to Gildemeister and Hoffmann, a sesquiterpene Caryophyllene, yielding Caryophyllene Hydrate in crystals, melting at 96° C. (204·8° F.) on treatment with Glacial

Acetic Acid and Sulphuric Acid. A crystalline acid melting at 140° C. (284° F.), which has been identified as a symmetric Dimethyl-succinic Acid, has also been noted, but doubt is expressed as to whether the acid owes its origin to Caryophyllene or some other minor constituent of the oil.

Solubility.—1 in 20 of Alcohol (90 p.c.); nearly insoluble in Alcohol (60 p.c.); mixes in all proportions with Absolute Alcohol.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

Tests.—Copaiba Oil has a specific gravity of 0·903 to 0·908, the gravity varying considerably with the age of the oil and its exposure to the air—the official figures are 0·900 to 0·910; it is laevogyrate, the optical rotation being from − 7° to − 21° in a 100 mm. tube. It boils between 245° and 275° C. (473° and 527° F.). It is neutral in reaction, and is soluble in its own volume of Absolute Alcohol. The more generally occurring adulterants are African Copaiba Oil and Gurjun Balsam Oil: the former is dextrogyrate, and may be detected by its effect on the optical rotation of the oil; the latter is recognised by its higher specific gravity and greater optical activity, which amounts generally to about − 35° to − 130° in a 100 mm. tube, though dextrogyrate oils are also known to exist. The presence of Gurjun Balsam Oil may also be detected by the test with Acetic and Nitric Acids given under Copaiba.

Not Official.

ELECTUAIRE DE COPAHU COMPOSÉ.—Copaiba, 100; Cubebs in powder, 150; Catechu in powder, 50; Oil of Peppermint, 3.—*Fr.*

LIQUOR COPAIBÆ SOLUBILIS.—Boil 20 of Copaiba with 30 of Solution of Potash for an hour, add 10 of Water, and mix thoroughly. Set aside until cold and well separated, draw off the clear liquor from the upper oily portion and the sediment, and evaporate it to 38; to this add 2 of Solution of Potash.—*Pharm. Form.* and the *Australian Pharmaceutical Formulary.*

This has been incorporated in the *B.P.C.*

LIQUOR COPAIBÆ, BUCHU ET CUBEBÆ.—Liquid Extract of Buchu, 1; Liquid Extract of Cubebs, 1; Solution of Copaiba, 8.—*Pharm. Form.*

This has been incorporated in the *B.P.C.*

LIQUOR COPAIBÆ CUM SANTALO.—Oil of Santal, 1; Alcohol (90 p.c.), 1; Solution of Copaiba, 8. The liquor is sometimes flavoured with Cinnamon or other essential oil, 5 to 10 minims to the ounce. Oil of Sandal Wood can also be combined with Solution of Copaiba, Buchu et Cubebæ in the same manner as above.—*Pharm. Form.*

Solution of Copaiba, 80; Oil of Sandal Wood, 10; Oil of Cassia, ½; Alcohol (90 p.c.), *q.s.* to make 100.—*B.P.C.*

Liquor Copaibæ et Buchu et Cubebæ cum Santalo.—Solution of Copaiba, Buchu, and Cubebs, 80; Oil of Sandal Wood, 10; Oil of Cassia, ½; Alcohol (90 p.c.), *q.s.* to produce 100.—*B.P.C.*

HAUSTUS COPAIBÆ.—Copaiba, 15 minims; Solution of Potassium Hydroxide, 5 minims; Spirit of Nitrous Ether, 15 minims; Mucilage of Gum Acacia, 60 minims; Camphor Water, to 1 fl. oz.—*St. Bartholomew's.*

MISTURA COPAIBÆ (*Lafayette*).—Copaiba, 4; Spirit of Nitrous Ether, 4; Compound Tincture of Lavender, 4; Solution of Potassium Hydroxide, 1; Syrup, 10; Mucilage of Acacia, *q.s.* to make 32. Mix the Copaiba with the

Solution of Potassium Hydroxide and the Spirit of Nitrous Ether, then add the Compound Tincture of Lavender, and lastly the Syrup and Mucilage of Acacia. Well mix by shaking.—*U.S.N.F.*

MISTURA COPAIBÆ (*Chapman*).—Copaiba, 8; Spirit of Nitrous Ether, 8; Compound Tincture of Lavender, 2; Tincture of Opium, 1; Mucilage of Acacia, 4; Water, *q.s.* to make 32.—*U.S.N.F.*

MISTURA COPAIBÆ.—Copaiba, 15 minims; Mucilage of Acacia, 60 minims; Magnesium Sulphate, 30 grains; Cinnamon Water, to 1 fl. oz.—*St. Mary's.*

Copaiba, 20 minims; Tincture of Quillaia, 20 minims; Spirit of Nitrous Ether, 30 minims; Camphor Water, to 1 fl. oz.—*Charing Cross.*

Copaiba, 15 minims; Mucilage of Gum Acacia, 30 minims; Water, to 1 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

MISTURA COPAIBÆ ACIDA.—Copaiba, 20 minims; Dilute Sulphuric Acid, 10 minims; Mucilage of Acacia, $\frac{1}{2}$ fl. oz.; Water, to 1 fl. oz.—*King's.*

MISTURA COPAIBÆ ALKALINA.—Copaiba, 20 minims; Solution of Potash, 10 minims; Mucilage of Acacia, 2 fl. dr.; Water, to 1 fl. oz.—*King's.*

PASTA COPAIBÆ.—Copaiba, 8; Powdered Cubebs, 24; Extract of Hyoscyamus, 1; Camphor, 1; Treacle, *q.s.*

Dose.—A piece the size of a filbert nut three or four times a day in gonorrhœa. —*L.* '88, i. 1019.

PILULA COPAIBÆ.—Copaiba, 94; Magnesia, 6; mix intimately and set aside to concrete. Should the mixture not concrete in eight or ten hours, the Copaiba before use should be shaken with $\frac{1}{20}$ of its weight of Water, then the uncombined Water allowed to subside and the Copaiba poured off.

Foreign Pharmacopœias.—Official in Span. (Pildoras de Copaiba).

RESINA COPAIBÆ.—Prepared from the Oleo-resin by distilling off the Volatile Oil.

A yellowish, or brownish-yellow, brittle resin, with an acid reaction. Soluble in Alcohol.

Tests.—Copaiba Resin is soluble in Alcohol (90 p.c.), Ether, and Carbon Bisulphide. It possesses an Acid value of not less than 119·77.

CORIANDRI FRUCTUS.

CORIANDER FRUIT.

FR., CORIANDRE; GER., KORIANDER; ITAL., CORIANDRO; SPAN., CILANTRO.

The dried, ripe Fruit of *Coriandrum sativum*, L.

Medicinal Properties.—Stimulant, aromatic, and carminative.

Dose.—20 to 60 grains = 1·3 to 4 grammes.

Official Preparation.—Oleum Coriandri. Contained in Confectio Sennæ, Syrupus Rhei, Tinctura Rhei Composita, and Tinctura Sennæ Composita. The **Oil** is contained in Syrupus Sennæ.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Hung., Mex. (Culantro) Norw., Port. (Coentro), Span. and U.S. Not in Ger., Ital., Jap., Russ., Swed. or Swiss.

Descriptive Notes.—The Coriander Fruit of commerce has the two mericarps united, and is globular, about $\frac{1}{5}$ inch (5 mm.) in diameter, of a buff or light brown colour (brownish yellow, *B.P.*), glabrous, crowned with minute calycine teeth, and the conical base of the two slender divergent styles. There are four prominent secondary ridges, and five inconspicuous wavy primary ridges alternate with them on each mericarp, but there are no vittæ between them, there being only two vittæ on the concave commissural surface of each mericarp. The taste and odour of the dried fruit are agreeably aromatic and characteristic, but in the unripe fruit the odour is disagreeable. The fruits are imported from Russia, Germany, Holland, Morocco, and occasionally from Bombay, the last being oval and nearly twice as large as European Coriander, and pointed at the ends. A little is also cultivated in Essex. The English is rather paler and larger than the Dutch kind, which is small. The Russian is smaller than the other kinds. For distillation the fruits need to be previously crushed so as to expose the vittæ, which are found only on the inner surface of the mericarps. The powder of the fruits as seen under the microscope is characterised by the obliquely arranged linear cells of the endosperm, longer than those of Fennel, the sharply defined six-sided cells of the inner coat of the vittæ, and by the thick pitted walls of the large sclerenchymatous cells of the mesocarp. *J. Moeller Leitfaden Mikr. Pharm. Übungen*, 1901, p. 182.

Tests.—Coriander Fruits yield from 5 to 6 p.c. of ash. Five samples examined in the author's laboratory showed 4·69, 5·28, 5·74, 5·15 and 5·8 p.c.; four samples of powdered Coriander gave 5·64, 5·7, 7·09, and 7·79. An ash limit of 6·0 p.c. for the fruits has been suggested.

Preparation.

OLEUM CORIANDRI. Oil of Coriander.

A colourless or pale yellow oily liquid, possessing a strong distinctive aromatic odour and taste.

It should be kept in well-closed glass bottles of a dark amber tint, and protected as far as possible from contact with air and light, and in a cool atmosphere.

Consists to the extent of 90 p.c. of dextrorotatory Linalool, $\mathbf{C_{10}H_{18}O}$; sp. gr. 0·868; boiling point 194° to 198° C. (381·2° to 388·4° F.).

Yield of Volatile oil from Coriandri Fructus.—Moravian, Thuringian and Russian fruits yield, according to Gildemeister and Hoffmann, from 0·8 to 1·0 p.c. of oil; French, 0·4 p.c.; Dutch, 0·6 p.c.; Italian, 0·5 p.c.; Moroccan, 0·2 to 0·3 p.c.; whilst the East Indian fruit yields only 0·15 to 0·2 p.c.

Solubility.—2 in 1 of Alcohol (90 p.c.); 1 in 75 of Alcohol (60 p.c.).

Used to render medicines more palatable, and prevent griping.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

Tests.—Coriander Oil has a specific gravity of from 0·870 to 0·885, is optically dextrogyrate, the rotation amounting to + 8° to + 14° in a 100 mm. tube. It yields a clear solution with three times its volume of Alcohol (70 p.c.).

The more generally occurring sophistications are sweet Orange Oil or Turpentine Oil, which are recognised by their influence on the specific gravity and the optical rotation, the solubility test affording additional evidence of the absence of Oil of Turpentine and added terpenes.

Not Official.

COTO.

A Bark from Bolivia, origin unknown.

Medicinal Properties.—Aromatic stimulant and intestinal astringent. Has been used in chronic diarrhœa.

A precipitate may form when the Tincture or Fluid Extract is diluted with Water, but it diffuses readily, on being shaken, without the aid of Mucilage.

It contains a bitter principle, **Cotoin,** sparingly soluble in Water, soluble in Alcohol; dose, ½ to 2 grains = 0·03 to 0·13 gramme.

Cotoin is recommended as checking the night sweats of phthisis.—*L.* '96, i. 255.

Paracotoin is obtained from an allied bark, which has similar properties sparingly soluble in Water, soluble in Alcohol.

Dose.—2 to 3 grains = 0·13 to 0·2 gramme.

Descriptive Notes.—Coto bark as originally introduced into commerce is at present not obtainable, its place being taken by Paracoto bark. Both these barks come from Bolivia, the former from the banks of the Magdalena, and the latter from those of the Mapiri River, and are probably derived from trees belonging to the natural order Lauraceæ, so far as can be judged from their structure. Both are hard, heavy, reddish-brown barks occurring in quilled pieces about 6 to 8 inches (15 to 20 cm.) long or more, 2 to 2½ inches (5 to 6 cm.) broad, and about ½ inch (12·5 mm.) thick, with a fracture granular outwardly and coarsely fibrous toward the inner surface. The chief difference between the two is that the inner surface in the true Coto bark is nearly smooth and the bark is thinner, that of Paracoto often being 15 mm. or more thick and having the inner surface rough with projecting longitudinal ridges formed of sclerenchymatous fibres. Both have a pungent aromatic taste and exhibit a minute crystalline efflorescence on the broken surface. The taste of true Coto is rather more peppery than that of Paracoto. The distinctive microscopical characters are the large elongated sclerenchymatous cells, some of which contain granular matter, large parenchymatous cells containing yellow resin, and small simple starch granules. True Coto bark also contains granular reddish-brown oily bodies in some of the parenchymatous cells. The two barks may also be distinguished by the use of concentrated Nitric Acid, which turns Paracoto powder yellowish, changing gradually into a green tint, whilst that of Coto becomes deep red. This reaction is due to the Paracotoin and Cotoin.

TINCTURA COTO.—1 of bruised Coto Bark macerated with Alcohol (90 p.c.) to make 10.—*B.P.C. Formulary* 1894. Incorporated in the *B.P.C.*

Dose.—10 to 30 minims = 0·6 to 1·8 c.c.

Fluid extract (1 in 1); dose, 5 to 20 minims.

Fortoin (Methylene-Dicotoin).—Yellow, crystalline needles, or a light yellow powder. Insoluble in Water, soluble in Chloroform and Acetone. Decomposed by Alkalis. Introduced as an intestinal antiseptic. Has been found useful in infantile diarrhœa.—*P.J.* '99, ii. 168; '01, i. 702.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

CREOSOTUM.

CREOSOTE.

FR., CRÉOSOTE OFFICINALE; GER., KREOSOT; ITAL., CREOSOTO; SPAN., CREOSOTA.

A colourless or more generally a pale yellowish, highly refractive, oily liquid, possessing a strong distinctive odour and a burning, caustic taste. It is a mixture of Guaiacol, Creosol, and other Phenols obtained in the distillation of Wood Tar.

The *B.P.* states that Creosote is 'obtained in the distillation of Wood Tar'; the *U.S.P.*, 'obtained during the distillation of Wood Tar, preferably that derived from the Birch.'

It preserves animal substances from decay, from which property its name is derived. It is to the presence of this substance that the process of smoking hams owes its efficacy.

The two chief constituents of Creosote are **Guaiacol** and **Creosol,** the first of which predominates in some specimens, and the second in others. Beechwood Creosote contains most Guaiacol; formerly it was stated to contain more than 60 p.c., but when the demand for Guaiacol and its salts arose, the proportion in commercial Creosote dropped to 20 p.c. It can now be obtained containing 50 p.c.

Guaiacol is soluble 1 in 80 of Water, and mixes with Glycerin in all proportions. Creosol is soluble 1 in 150 of Water, and will not form a clear mixture with Glycerin in any proportion.

Solubility.—Beechwood Creosote is soluble about 1 in 110 of Water and mixes in all proportions with Alcohol (90 p.c.), Absolute Alcohol, Ether sp. gr. 0·735 and 0·720, Glacial Acetic Acid, Chloroform, Benzol, and Petroleum Spirit; it also mixes with Glycerin in all proportions up to nearly 3 of Glycerin to 1 of Creosote, but on the further addition of Glycerin the mixture is turbid.

'English Creosote' differs from Beechwood Creosote in that it is not nearly so soluble in Water, and does not mix readily with Glycerin. It dissolves about 1 in 350 of Water, and forms a turbid mixture with an equal volume of Glycerin.

Medicinal Properties.—Disinfectant and antiseptic. It resembles Carbolic Acid in action, but it is less poisonous. Given internally in gastric fermentation, in putrefactive diarrhœa, and with considerable success in phthisis with abundant fetid sputum (*see* below); for arresting nausea in hysteria, for obstinate sea-sickness, and the vomiting of pregnancy and phthisis. A lotion (8 minims to 1 oz.) and the **ointment** are used for eruptions of a scaly character, for venereal ulcers, and in parasitic skin diseases; it relieves the itching in eczema; toothache, when depending on caries, is relieved by its application. As an **inhalation** in fetid bronchitis, phthisis, and pulmonary gangrene.

Employed by internal administration with considerable success in phthisis, commencing with 5 minims in 2 fl. drm. of Cod-liver Oil three times daily after meals and gradually increasing till at the end of three or four weeks 30 to 60 minims or even 80 minims are being taken three times daily. It is said to have no tendency to bad effects even in such large doses. Should a patient be unable to take Cod-liver Oil, the Creosote may then be prescribed in spirituous solution. If the best Beechwood Creosote be used and due care exercised in increasing the dose gradually, it will be found to produce good results without unpleasantness or risk.—*B.M.J.* '98, i. 144, 299, 1383.

One drop of Creosote at bedtime every night for juvenile incontinence of urine.—*B.M.J.* '87, i. 809. In diabetes 4 drops daily increased to 10 drops.—*L.* '89, i. 702. Intratracheal injection of Creosoted Oil (1 in 20) to aid the expulsion of false membrane after tracheotomy.—*B.M.J.* '98, i. 1381.

Successful in cases of tuberculosis in children by pills and drops.—*T.G.* '93, 766.

Hypodermic injection of Creosote and Guaiacol dissolved in sterilised Almond Oil, 1 in 5 or 1 in 15.—*L.* '96, ii. 371; *B.M.J.* '95, ii. 1488. Small doses in gastric affections.—*L.* '97, ii. 404. In habitual constipation.—*L.* '97, ii. 932. Enemata containing 8 minims of Creosote in 4 oz. of Cod-liver Oil in pleuro-peritoneal tuberculosis in children.—*L.* '97, i. 159. In malarial intermittent fever 15 minims rubbed into the axilla and covered up with Cotton-Wool produced free perspiration and lowered the temperature.—*B.M.J.* '96, i. 18; '97, i. 1332; *I.M.G.* '96, 11; *T.G.* '96, 325.

Subcutaneous injection the best means of administering large quantities.—*B.M.J.* '01, ii. 219.

Creosote, Guaiacol, and their congeners are stated (*L.* '04, ii. 1827) to be much less used now in the treatment of pulmonary phthisis than a few years ago. An interesting item on Creosote is that each Japanese soldier is expected to carry and take Creosote pills as a prophylactic against dysentery.—*B.M.J.* '04, ii. 1327.

It is of distinct value in the antiseptic treatment of pulmonary tuberculosis (*Edin. Med. Jour.* '05, 463). It often relieves gastric catarrh and stimulates the appetite. It should be given immediately after or before food in 2 or 3 minim doses, beginning with two or three times a day and gradually increasing to three times that amount, in capsules, or dissolved in Cod-liver Oil.

Twenty minims of a mixture of equal parts of a 20 p.c. Alcoholic solution of Creosote and Spirits of Chloroform, used for an hour or so on the sponge of an inhaler, relieves the troublesome cough of pulmonary phthisis.—*Edin. Med. Jour.* '05, 465.

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

Prescribing Notes.—*Given in* **capsules** *or in* **pills** *made with Soap and Liquorice Powder* (*see p.* 454). *When given as a draught or mixture it is best emulsified with Mucilage of Gum Acacia and given in Milk, or dissolved in Almond Oil; see 'Guttæ Creosoti' and 'Mistura Creosoti'* (*Squire*). *For hypodermic injection, alone or dissolved in Almond Oil. When mixed with Magnesia it forms a tasteless compound insoluble in Water. Orange, Juniper, and Fluid Extract of Liquorice have been used as flavouring agents.*

Incompatibles.—When prescribed in pills with Silver Oxide it explodes, unless previously diluted with some inert powder.

Official Preparations.—Mistura Creosoti, Unguentum Creosoti.

Not Official.—Aqua Creosoti, Elixir Créosoté, Guttæ Creosoti, Mistura Creosoti (*Squire*), Pilula Creosoti, Solutio Creosoti Composita, Vapor Creosoti, Vasolimentum Kreosoti, Parogenum Creosoti, Vin Créosoté, Creosoti Carbonas, Creosoti Oleas, Creosoti Phosphas, Creosoti Tannas, Creosoti Valerianas, Salocreol, Taphosote, Phosphotal, and Pneumin. The preparations of Guaiacol will be found under that name.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Creosote has a specific gravity of 1·080 to 1·086, and should not be below 1·080; the *B.P.* states not below 1·079. The *U.S.P.* gives not below 1·078 at 25° C. (77° F.); the *P.G.* not below 1·08. Its boiling point is between 200° to 220° C. (392° to 428° F.), between which temperatures the greater portion of it distils. It is either optically inactive or but slightly dextrogyrate. It is neutral or only feebly acid towards Litmus paper. A 1 in 100 solution in Alcohol (90 p.c.) or a 1 in 200 aqueous solution yields with Ferric Chloride Test-solution a green coloration rapidly changing to reddish-brown. Mixed with 10 times its volume of a 1 in 5 Solution of Potassium Hydroxide in Absolute Alcohol it forms a solid crystalline mass.

The more generally occurring impurities are Phenol, Coal Tar Creosote, neutral oils, Cœrulignol, and higher boilingpoint constituents of Wood Tar. The *B.P.* includes tests for Phenol and less volatile constituents. The Ammonia test is that officially adopted for its distinction from Phenol, it being required to suffer no material diminution in volume when shaken with 5 times its volume of Ammonia Solution. The absence of less volatile liquids is officially ensured by the absence of a translucent stain when dropped on to filtering paper and exposed to a temperature of 100° C. (212° F.). The Ammonia test has been stated (*C.D.* '00, ii. 156; *P.J.* '00, ii. 150) not to be of special value, inasmuch as the purest Creosote shows the greatest diminution of volume. The author has found the best differentiating test between Creosote and Phenols to be the insolubility of the former in diluted Glycerin; three measures of Glycerin (sp. gr. 1·260) is diluted with 1 measure of Water and 1 volume of the Creosote sample is shaken with 3 volumes of the diluted Glycerin; after complete separation, the volume of the Creosote layer is read off, the diminution roughly indicating the amount of soluble impurity. If the Glycerin layer be separated and diluted with Water, the Coal Tar acids may be extracted by agitation with Chloroform, thus permitting their further examination. The *U.S.P.* mixes equal volumes of the Creosote and 95 p.c. Glycerin Solution, stating that a clear mixture will result, from which, on the addition of one-fourth volume of Water, a layer of Creosote equal to, or greater than, the volume originally employed will separate. The *U.S.P.* and the *P.G.* use Sodium Hydroxide Solution as a test for the presence of neutral oils; the *U.S.P.* mixing the Creosote with not less than 5 nor more than 9 times its volume of Normal Volumetric Sodium Hydroxide Solution, the *P.G.* mixing it with 2½ times the volume of Sodium Hydroxide Solution (15 p.c.); in each case a clear liquid is required to result, which remains clear on dilution with 50 c.c. of Water. Coal Tar Creosote may be detected by the solubility of the Creosote in hot Water, its subsequent behaviour on cooling, and the behaviour of the filtrate with Bromine Water, the Collodion test, and the Alcoholic Potassium Hydroxide test. The Ferric Chloride test is stated to give an indication, but its usefulness is by no means fully conceded. The behaviour of the sample with Petroleum Ether and freshly prepared Barium Hydroxide Solution forms a useful means of readily detecting the presence of Cœrulignol and some other high boiling point constituents of Wood Tar. The test is described in the small type below.

Fractionation.—When distilled most of it comes over between 392° F. (200° C.) and 428° F. (220° C.), *U.S.P.* and *P.G.* The *B.P.* states that it distils between these temperatures. When cooled to −20° C. (−4° F.) it becomes gelatinous but does not solidify, *U.S.P.* and *P.G.*

Bromine.—The saturated aqueous solution of Creosote separated from the oily globules yields a reddish-brown precipitate with T.S. of Bromine, *P.G.* and *U.S.P.*

Collodion.—If 1 volume of Creosote be shaken with 1 volume of Collodion no gelatinous mass should be formed, *B.P.* and *P.G.*; no permanent coagulum should form when equal volumes of the liquid are stirred together, *U.S.P.*

Potassium Hydroxide.—If 1 c.c. of Creosote be mixed with 10 c.c. of a solution (1-5) of Potassium Hydroxide in Absolute Alcohol, a solid crystalline mass will form, *U.S.P.* and *P.G.*

Benzin and Barium Hydroxide.—If 1 c.c. of Creosote be shaken with 2 c.c. of Petroleum Benzin and 2 c.c. of Baryta Water, the Petroleum Benzin solution should not assume a blue colour or be muddy, and the aqueous liquid should not be coloured red, *P.G.*

If 1 c.c. of Creosote be cautiously and gently shaken with 2 c.c. of Petroleum Benzin and 2 c.c. of a freshly prepared Barium Hydroxide T.S. until of uniform consistence, on complete separation three distinct layers are visible, the middle one of which contains the Creosote unaltered in appearance, while the Petroleum Benzin should not be blue or muddy, and the aqueous layer should not have acquired a red tint, indicating the absence of Cœrulignol and some other high boiling constituents of Wood Tar, *U.S.P.*

Preparations.

MISTURA CREOSOTI. Creosote Mixture.

Shake 16 minims of Creosote with 14 fl. oz. of Distilled Water; add 1 fl. oz. of Syrup and 16 minims of Spirit of Juniper, and Distilled Water, *q.s.* to yield 16 fl. oz. (1 in 480)

It was pointed out in the *Companion* that Glacial Acetic Acid was quite unnecessary, and it is now omitted.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

UNGUENTUM CREOSOTI.—Creosote Ointment.

Creosote (by weight), 1; Hard Paraffin, 4; Soft Paraffin, white, 5; add the Creosote to the melted Paraffins, and stir until cold. (1 in 10)

Now made with Hard and Soft Paraffins in place of Simple Ointment.

Not Official.

AQUA CREOSOTI.—Creosote, 10; Distilled Water, 990. Agitate the Creosote vigorously with the Distilled Water, and filter through a well-wetted filter. Creosote Water should be freshly prepared when dispensed.—*U.S.P.*

This has been incorporated in the *B.P.C.* under the title **Liquor Creosoti** with *syn.* Aqua Creosoti.

ELIXIR CRÉOSOTÉ.—Creosote, 1; Rum, 66; mix and filter.

Spiritus Creosoti.—Creosote, 1; Alcohol (90 p.c.), 40. Dose.—1 drm. —*Martindale.*

This has been incorporated in the *B.P.C.*

GUTTÆ CREOSOTI (*Squire*).—Creosote, 16 minims; Mucilage of Gum Acacia, 60 minims; Syrup of Orange, 1 fl. oz.; Water, to 2 fl. oz.; mix the Creosote with the Mucilage and add the other ingredients. One or two teaspoonfuls for a dose in an oz. of Milk.

MISTURA CREOSOTI (*Squire*).—Creosote, 16 minims; Almond Oil, ½ fl. oz.; Syrup of Orange, 1 fl. oz.; Powdered Gum Acacia, 1½ drm.; Water, to 8 fl. oz. Dissolve the Creosote in the Oil, mix it with the Powdered Gum Acacia in a mortar; add all at once 3 fl. drm. of Water, and triturate until an emulsion is formed, then add the remainder of the Water and the Syrup of Orange.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

PILULA CREOSOTI.—Creosote, 12 minims; Curd Soap, in powder, 6 grains; Liquorice, in powder, 30 grains; mix, and divide into 12 pills.

This has been incorporated by the *B.P.C.*

Foreign Pharmacopœias.—Official in Austr., Creosote 5, Yellow Wax 2·5, Liquorice 6, Extract of Liquorice 6, Mucilage of Acacia *q.s.*; Belg., Creosote 10, Water 2, Liquorice Root *q.s.*; Ger. and Jap., Creosote 10, Liquorice 19, Glycerin 1; Swiss, Creosote 5, Liquorice 9·5, Glycerin 0·5. Fr., Creosote with

Medicinal Soap *q.s.* Each pill contains 10 centigrammes of Creosote, 0·1 gramme (1½ grains).

SOLUTIO CREOSOTI COMPOSITA.—Creosote, 1; Spirit of Menthol (20 p.c.), 1; and Spirit of Chloroform, 1.—*Brompton.* Useful in an **oro-nasal inhaler.**

VAPOR CREOSOTI (*B.P.* 1885).—Creosote, 12 minims; Boiling Water, 8 fl. oz. Mix the Creosote and Water in a suitable apparatus, for inhalation.

This has been incorporated in the *B.P.C.*

Creosote, 80 minims; French Chalk, 30 grains; Water, to 1 oz. A teaspoonful in 20 oz. of Water at 140° F. for each inhalation.—*Throat.*

VASOLIMENTUM KREOSOTI.—Creosote, 5; Liquid Vasoliment, 95.—*Hager.*

Parogenum Creosoti.—Creosote, 5; Parogen, 95.—*B.P.C.*

VIN CRÉOSOTÉ.—Creosote 1, Alcohol (90 p.c.) 9, Simple Syrup 10, Malaga Wine 80.—*Fr.*

CREOSOTI CARBONAS (Creosotal).—A viscid, amber-coloured liquid, nearly odourless and tasteless; insoluble in Water. Not only useful in chronic diseases of the lung, but in acute diseases of the respiratory organs. It is stated to contain 90 p.c. of Creosote, and to be free from the irritating effects of that substance.—*B.M.J.E.* '96, i. 15; *L.* '97, ii. 1472.

One teaspoonful doses for adults, smaller doses for children.—*L.* '98, i. 222; this dose has been criticised, and 5 drops three times daily recommended.—*L.* '98, i. 960.

Is preferable to the Phosphate, though both are better than pure Creosote.—*B.M.J.* '01, ii. 219.

Teaspoonful doses morning and night, taken in a cup of hot sugared Milk in the treatment of acute broncho-pulmonary affections. The dosage for children is proportionately smaller. Has remarkable power of reducing temperature in bronchitis and pneumonia, and is beneficial even in advanced pneumonia. Administration best stopped gradually.—*L.* '99, ii. 710; *B.M.J.E.* '02, i. 4.

Foreign Pharmacopœias.—Official in Austr., Belg., Jap. and Swiss.

CREOSOTI OLEAS (Oleocreosote).—A light yellow, oily liquid, having a faint odour and taste of Creosote. Insoluble in Water, soluble in Absolute Alcohol and in Ether.

Dose.—15 to 30 grains = 1 to 2 grammes.

CREOSOTI PHOSPHAS (Phosphote).—A dense, oily substance, insoluble in Water.

Dose.—5 to 15 grains in capsules = 0·32 to 1 gramme.

CREOSOTI TANNAS (Tannosal).—A brown, hygroscopic powder, soluble in Water, in Alcohol (90 p.c.) and in Glycerin.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

CREOSOTI VALERIANAS (Eosote).—A yellow, oily liquid, distilling at 240° C. (464° F.), insoluble in Water, soluble in Alcohol (90 p.c.) and in Ether. Has been recommended as a substitute for Creosote on account of its freedom from corrosive and toxic properties. Commencing dose 3 grains, increasing to 6 or 9 grains three times a day, given in capsules.—*B.M.J.E* '96, ii. 59.

SALOCREOL (Creosote Salicylic Ester).—A brown, oily, neutral liquid, insoluble in Water, readily soluble in Alcohol (90 p.c.), in Ether and in Chloroform. It has been used in the treatment of rheumatic swelling of the joints.—*B.M.J.E.* '03, ii. 52.

Dose.—6 to 20 grammes rubbed into the skin.

Taphosote, the Tannophosphoric Ester, and **Phosphotal,** the Phosphite, are combinations of Phosphoric Acid and Creosote.

Pneumin, a compound of Creosote and Formaldehyde, is a yellow, tasteless, odourless powder. Insoluble in Water. Stated to have a beneficial effect in tuberculosis.

Dose.—7½ to 30 grains = 0·5 to 2 grammes.

CRETA PRÆPARATA.

PREPARED CHALK.

A purified native Calcium Carbonate, most of the impurities having been removed by elutriation.

Solubility.—Insoluble in Water, readily dissolved by weak acids.

Medicinal Properties.—It is astringent and antacid. Combined with other astringents and aromatics, it is used in infantile diarrhœa and in diarrhœa accompanied with acidity. One of the best antidotes for Oxalic Acid, the mineral acids, and Zinc Chloride. Used as a dusting powder in burns, ulcers, and moist eczema; it is protective and desiccant.

Dose.—10 to 60 grains = 0·65 to 4 grammes.

Prescribing Notes.—*Generally given in the form of Mistura Cretæ with astringent Tinctures and Opium.*

The Pulvis Cretæ Aromaticus is useful for administration to children, either in powder or in mixture with Mucilage.

Incompatibles.—All Acids and Sulphates.

Official Preparations.—Mistura Cretæ, Pulvis Cretæ Aromaticus and Pulvis Cretæ Aromaticus cum Opio. Contained in Hydrargyrum cum Cretâ.

Not Official.—Cholera Mixture, Pulvis Cretæ Compositus and Unguentum Cretæ.

Foreign Pharmacopœias.—Official in Hung., Jap., Port., Span. and U.S. Not in the others.

Tests.—Prepared Chalk is dissolved readily by dilute acids, effervescence occurring, with the evolution of a colourless and odourless gas, which affords a white precipitate when passed into Lime Water. A solution prepared by dissolving a portion of the sample in just sufficient Hydrochloric or Nitric Acid to effect solution, boiled and cooled, answers the tests distinctive of Calcium given under Precipitated Calcium Carbonate.

The more generally occurring impurities are siliceous material, Iron, Aluminium, Magnesium, Phosphates, Sulphates and Barium Carbonate. Siliceous material may be detected by the residue remaining insoluble in Hydrochloric Acid, preferably after evaporation of the acid solution to dryness and re-solution in diluted Hydrochloric Acid, and which should be relatively minute. Iron, Aluminium, Magnesium, Phosphates and Sulphates may be examined for by the tests given under Calcii Carbonas Præcipitatus, and should be present in but slight traces. Barium Carbonate, if present may be detected by dissolving a portion of the sample in Diluted Acetic Acid and adding Potassium Chromate Solution; a yellow precipitate insoluble in Acetic Acid, soluble in diluted mineral acids, indicates the presence of Barium.

Preparations.

MISTURA CRETÆ. CHALK MIXTURE.

Prepared Chalk, ¼ oz.; Tragacanth, in powder, 15 grains; Refined Sugar, ½ oz.; Cinnamon Water, *q.s.* to make 8 fl. oz. (about 1 in 32)

Tragacanth is now used in place of Gum Acacia, and Sugar in place of Syrup.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official in Port., Carbonate of Lime 3, Gum Arabic 3, Syrup of Cinnamon 10, Water 84; U.S., Prepared Chalk 6, Acacia 4, Sugar 10, Cinnamon Water 40, Water, to measure 100. Not in the others.

PULVIS CRETÆ AROMATICUS. Aromatic Powder of Chalk.

Prepared Chalk, 11; Cinnamon, 4; Nutmeg, 3; Cloves, 1½; Cardamom Seeds, 1; Refined Sugar, 25; all in powder.

(about 1 Chalk in 4⅐)

Saffron is now omitted.

Dose.—10 to 60 grains = 0·65 to 4 grammes.

PULVIS CRETÆ AROMATICUS CUM OPIO. Aromatic Powder of Chalk with Opium.

Aromatic Powder of Chalk, 39; Opium, in powder, 1.

(1 Opium in 40)

Dose.—10 to 40 grains = 0·65 to 2·6 grammes.

Not Official.

CHOLERA MIXTURE.—Aromatic Powder (*B.P.* '64), 3 drm.; Spirit of Sal Volatile, 3 fl. drm.; Tincture of Catechu, 10 fl. drm.; Compound Tincture of Cardamoms, 6 fl. drm.; Tincture of Opium, 1 fl. drm.; Chalk Mixture, to make 20 fl. oz.

Dose.—1 fl. oz. = 28·4 c.c. for an adult, ½ fl. oz. = 14·2 c.c. for a child 12 years old, ¼ fl. oz. = 7·1 c.c. for seven years old, after each liquid motion.

This mixture was proposed by the Board of Health during the prevalence of cholera, and is useful in cases of diarrhœa.

A mixture much like this has been introduced into the *B.P.C.* under the title **Mistura Cretæ Composita** with the *synonym* **Board of Health Cholera Mixture** as follows:—

Compound Aromatic Powder, 2; Aromatic Spirit of Ammonia, 1·875; Tincture of Catechu, 6·25; Compound Tincture of Cardamoms, 3·75; Tincture of Opium, 0·625; Chalk Mixture, *q.s.* to produce 100.

PULVIS CRETÆ COMPOSITUS.—Prepared Chalk, 30; Acacia, in fine powder, 20; Sugar, in fine powder, 50.—*U.S.P.*

This has been incorporated in the *B.P.C.*

UNGUENTUM CRETÆ.—Prepared Chalk, 1; Spermaceti Ointment, 4; mix.

CROCUS.

SAFFRON.

Fr., Safran; Ger., Safran; Ital., Zafferano; Span., Azafran.

The dried Stigmas and tops of the Styles of *Crocus sativus*.

Imported from Spain, France, and Italy.

The important ingredient of Saffron is Crocin or Polycroit, a body of a glucosidal nature stated by Hilger and Schuler to be identical with Carotin. It also contains a small percentage from 0·75 to 1·0 p.c. of Volatile Oil and Picrocrocin, in addition to Wax, Gum, Albumen, saline matter, Water, and Lignin.

Medicinal Properties.—Useful for giving colour and flavour to preparations.

Official Preparation.—Tinctura Croci. Used in the preparation of Decoctum Aloes Compositum and Tinctura Cinchonæ Composita.

Not Official.—Glycerinum Croci and Syrupus Croci.

Foreign Pharmacopœias.—Official in all except U.S.; Dutch, Stigmata Croci; Mex., Azafran; Port., Açafrao; Dan., Norw. and Swed., Stigma Croci.

Descriptive Notes.—Saffron consists of the upper part of the trifid style, and stigmas of *Crocus sativus*, L. It is of an orange-red colour and is usually about one inch or more in length, the stigmatic portion being slightly dilated, nearly tubular above, slit on the under side, and toothed at the apex. In commerce it is frequently adulterated; no drug more so. The best and purest commercial variety is that from Valencia; the Saffron of Alicante, and particularly of Barcelona, being often adulterated. The stamens of the flower are sometimes present in more than accidental amount, and are even sometimes offered separately in the drug market as 'yellow saffron.' They are linear and arrow-shaped at the base, inserted on a short filament. The florets of *Calendula officinalis*, L., are seen to be flat and pale in colour, and the roots of *Carex* thread-like. Saffron normally retains about 12½ p.c. of moisture (12 p.c., *P.G.*), and should therefore be kept in a tin, or loss of weight may ensue. The fresh crop is usually obtainable in commerce in November and December.

The florets of *Carthamus tinctorius*, L. (nat. ord. *Compositæ*), sold in small flat cakes, are sometimes offered as 'Cake Saffron.' The florets are saffron-coloured, tubular, and contain syngenesious anthers.

Under the name of Cape Saffron the flowers of *Lyperia crocea*, Eckl. (nat. ord. *Scrophulariaceæ*), are at rare intervals offered in the drug market. It is a native of the Cape of Good Hope.

Tests.—Saffron yields an intensely yellow solution when treated with Water, and when rubbed on the wet finger leaves an orange-yellow stain. The *P.G.* states that 100,000 parts of Water shaken with 1 part of Saffron assume a pure and distinct yellow colour. When brought into contact with a drop of Sulphuric Acid it yields a deep indigo-blue coloration.

The more generally occurring adulterations of Saffron are excess of moisture, mineral matter, *e.g.*, Barium Sulphate, Sand, etc., fixed oils, stamens artificially dyed so as to resemble stigmata, Safflower, Nitrates, due to the presence of artificial colouring matter derived from Nitrophenols or Nitrocresols, principally the latter. The limit of moisture is fixed by the *B.P.* at not more than 12·5 p.c., by the *P.G.* at not more than 12 p.c. Mineral matter may be detected by the residue left on ignition, or by a deposit of white or coloured powder settling out when the sample is floated on the surface of some warm Water. The finest Saffron yields, when ignited with free access of air, from 4·4 to 5·5 p.c. of ash. The *B.P.* limit is about 7·0 p.c., that of the *P.G.* calculated on dried sample 6·5 p.c., which is equivalent to 7·4 p.c. on the undried Saffron. The ash should be examined for Barium.

The ash is considered (*C.D.* '02, i. 148) to be of little use to the buyer of Saffron unless he has experience as well to help him; a poor, thin, semi-wild variety of Saffron may give an excellent ash, possibly not over 4 p.c., whilst a fine bold quality which has been dressed to a very moderate extent will be outclassed by yielding over the *B.P.* maximum.

Fixed oils may be detected by the greasy spot produced when the sample is pressed between folds of white bibulous paper; artificially dyed products by the Sulphuric Acid test after extraction with Petroleum Ether, which extracts the colour derived from Coal Tar products but not that of genuine Saffron. Safflower yields an Infusion which is coloured greyish-green by Ammonia Solution and a bright red by Nitric Acid. Colouring matters derived from Nitrophenols or Nitrocresols may be detected by deflagration occurring during incineration, or by dissolving the ash in Water and applying the Ferrous Sulphate test for Nitrates. The colouring powers of different specimens of Saffron may be judged by comparison with a standardised Potassium Bichromate Solution.

Preparation.

TINCTURA CROCI. TINCTURE OF SAFFRON.

1 of Saffron, macerated with 20 of Alcohol (60 p.c.). (1 in 20)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

Foreign Pharmacopœias.—Official in Span., 1 in 5; Belg., Jap. and Swiss, 1 in 10; all by weight. Not in the others.

Tests.—Tincture of Saffron has a specific gravity of 0·920 to 0·925; contains from 2·0 to 3·0 p.c. w/v of total solids and from 57 to 58 p.c. w/v of Absolute Alcohol. A few drops of the Tincture evaporated to dryness in a white porcelain dish on a water-bath leave a residue which when cooled yields an indigo-blue coloration with a drop of concentrated Sulphuric Acid.

Not Official.

GLYCERINUM CROCI (*Squire*).—Saffron, 1; Glycerin, 20; Alcohol (60 p.c.), 20; mix the Glycerin and the Alcohol, and digest in it the Saffron for an hour at a gentle heat, and filter. This is introduced as a substitute for **Syrupus Croci**, which deposits and loses its colour.

This has been incorporated in the *B.P.C.*

SYRUPUS CROCI (*Squire*).—Glycerin of Saffron, 1; Syrup, 7.

This has been incorporated in the *B.P.C.*

CROTONIS OLEUM.

CROTON OIL.

FR., HUILE DE CROTON; GER., KROTONOL; ITAL., OLIO DI CROTONTIGLIO; SPAN., ACEITE DE CROTON TIGLIO.

A yellow, brownish-yellow, or reddish-brown, somewhat viscid, slightly fluorescent, oily liquid, possessing an unpleasant odour and an acid and burning taste. It is the Oil expressed from the seeds of *Croton Tiglium*, L.

It consists chiefly of the Glycerides of Stearic, Palmitic, Myristic, Lauric, and Oleic Acids. It also contains the Glycerin Esters of Formic, Acetic, Isobutyric, and Isovalerianic Acids, together with Tiglic Acid, Crotonoleic Acid, a toxic albuminoid, Crotin, and Croton-resin, the latter lactone possessing powerful vesicant properties.

A native of Hindostan, Ceylon, and the Moluccas.

100 of seed yield about 50 of Oil.

Solubility.—Soluble in Ether, Oil of Turpentine, and Olive Oil; partially soluble in Alcohol (90 p.c.).

B.P. 1898 still retains the sentence, 'entirely soluble in Absolute Alcohol,' although it has been repeatedly pointed out that this is not strictly the case. An oil recently expressed will dissolve the Absolute Alcohol up to equal parts, but when more than one volume of Alcohol is added to one of Oil the mixture becomes turbid, and with two volumes of Alcohol the mixture separates into two layers on standing. With a sample of oil two or three years old rather more Alcohol can be added without the mixture becoming turbid, but it is only a question of degree.

The solubility of Croton Oil in Absolute Alcohol appears to depend in great measure on the age of the Oil, and the greater or less freshness of the seeds from which it is expressed, as oxidised or resinified Oil dissolves more readily.

The solubility of the Oil as a whole depends upon the proportion of free Acid, which is very soluble in Alcohol, and also carries the difficultly-soluble neutral Glyceride into solution along with it.

Croton Oil can be separated by Alcohol into two parts. The non-vesicating portion insoluble in Alcohol possesses the full purgative properties of the Oil in a less irritating form; the alcohol-soluble or vesicating portion had no purgative action in the same doses, but caused irritation and nausea.

Medicinal Properties.—A powerful drastic cathartic, acting with great rapidity. Given in cases of obstinate constipation, in dropsy, in apoplexy, in maniacal and unconscious patients, and in eclampsia, its small dose being an advantage. Applied externally as a powerful counter-irritant in rheumatism, gout, neuralgia, and in acute laryngeal and pulmonary diseases in the form of **liniment**. Its external application is painful, and is often followed by an inflammatory eruption which becomes pustular, and leaves unsightly scars. It is therefore not often used externally, unless well diluted.

Croton Oil must be given with great care, and is inadmissible in feeble subjects, in organic obstruction, and in inflammatory states of the stomach and intestines.—*Mitchell Bruce.*

It should never be given to children, to pregnant women, to those with hæmorrhoids, nor to those suffering from peritonitis.—*Hale White.*

5 minims to 1 fl. oz. of Olive Oil are used to promote the growth of hair.

Dose.—½ to 1 minim = 0·03 to 0·06 c.c.

Ph. Ger. maximum single dose, 0·05 gramme; maximum daily dose, 0·15 gramme.

Prescribing Note.—*In pill with Soap and Liquorice Powder* (*see p.* 897), *or in combination with Compound Extract of Colocynth.*

Official Preparation.—Linimentum Crotonis.

Not Official.—Croton Oil Pencils and Collodium Tiglii.

Antidotes.—In case of an overdose an emetic should be at once administered, the stomach should be washed out with Olive Oil or Milk, 4 fl. oz. to pint of Water; mucilaginous fluids and Opium or Morphine should then be given to check the pain and enteritis.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Aceite de Croton Tiglio), Norw., Port., Russ., Span., Swed., Swiss and U.S. (Oleum Tiglii). Swed. has also an Oleum Crotonis Extractum.

Tests.—Croton Oil has a specific gravity of 0·940 to 0·960, which limits are given by both the *B.P.* and the *P.G.*; the *U.S.P.* gives 0·935 to 0·950 at 25° C. (77° F.). It should be slightly dextrogyrate. It possesses an Acid value of 21 to 22, a Saponification value of 203 to 215, and an Iodine absorption of not less than 105·0 p.c. A sample of the fresh oil examined in the author's laboratory had an Acid value of 24·36, an Ester value of 176·4, a Saponification value of 200·76; a sample dated 1906 had an Acid value of 20·9, an Ester value of 179·2, a Saponification value of 200·1, and an Iodine value of 106·68; a sample dated 1900 had an Acid value of 48·72, an Ester value of 149·8, and a Saponification value of 198·52. The solidifying point of the fatty acids ranges from 16·5° to 16·8° C. (61·7° to 62·24° F.). The *B.P.* refers to the specific gravity, and states that the alcoholic solution should not redden blue Litmus paper, but makes no reference to the other physical and chemical characteristics of the oil.

Croton Oil may be detected in mixtures by shaking with an Alcoholic Potassium Hydroxide solution, separating the alcoholic layer, acidifying with dilute acid and removing the spirit by distillation. The residue is shaken with Ether, the ethereal solution separated, the Ether distilled and the residue tested on the skin. A characteristic pustular eruption should be produced if Croton Oil be present.

The more generally occurring impurities are 'other non-drying oils.' These are detected by vigorously shaking a measured quantity of 2 c.c. of the oil with a mixture of 1 c.c. of fuming Nitric Acid and 1 c.c. of Water, after standing for one or two days the mixture should neither partially nor completely solidify. The test is common to the *B.P.*, *U.S.P.* and *P.G.*

Saponification.—The *U.S.P.* requires that Croton Oil should show a Saponification value of from 203 to 215 when saponified by Alcoholic T.S. of Potassium Hydroxide.

Iodine Absorption.—If 0·3 gramme of Croton Oil be dissolved in 10 c.c. of Chloroform in a 250 c.c. bottle or flask, and 25 c.c. of a mixture of equal volumes of Alcoholic Iodine T.S. and Alcoholic Mercuric Chloride T.S. added, and if after standing for 4 hours protected from light 20 c.c. of Potassium Iodide T.S. be added and the mixture diluted with 50 c.c. of Water, on titrating the excess of Iodine with Tenth-normal V.S. of Sodium Thiosulphate, an Iodine value of not less than 103 nor more than 109 should be obtained, *U.S.P.*

Preparation.

LINIMENTUM CROTONIS. LINIMENT OF CROTON OIL.

Croton Oil, 1; Oil of Cajuput, 3½; Alcohol (90 p.c.), 3½. (1 in 8)

Brompton and *St. Mary's* have a diluted liniment made with equal parts of the Official Preparation and Liniment of Soap.

Not Official.

CROTON OIL PENCILS.—Croton Oil, 2; Cacao Butter, 1; White Beeswax, 1; melt together the last two in a water-bath, add the Oil, and when nearly cold pour into moulds.

COLLODIUM TIGLII.—Croton Oil, 1; Flexile Collodion, 9.—*U.S.N.F.*

CUBEBÆ FRUCTUS.

CUBEBS.

Fr., Cubèbe; Ger., Kubeben; Ital., Pepe Cubebe; Span., Cubeba.

The dried, full-grown, unripe Fruits of *Piper Cubeba*.

Medicinal Properties.—Stimulant and antiseptic diuretic, expectorant. Acts specially on the genito-urinary mucous membrane. Given in all stages of gonorrhœa, gleet, cystitis, pyelitis, and sometimes in chronic bronchitis. Frequently combined with Copaiba.

Dose.—30 to 60 grains = 2 to 4 grammes.

Prescribing Notes.—*The Powder is given in the above doses wrapped in moistened wafer-paper, or in smaller doses in* **cachets.** *In* **mixture** *well rubbed down with Mucilage. A popular form of administration is the* **paste,** *made with an equal quantity of Copaiba, which may be taken in wafer-paper. It is also made into a paste with Glycerin and various Syrups. For throat affections, Lozenges, Compressed Tablets, and Cigarettes are made. It is also given in the form of Vapour.*

The **Oil** *is given in Capsules or suspended in Water with Mucilage.*

For Inhalation the Oil may be used with or without the vapour of Water.

Official Preparations.—Oleum Cubebæ and Tinctura Cubebæ.

Not Official.—Extrait de Cubèbe, Fluidextractum Cubebæ, Oleo-resina Cubebæ, Trochiscus Cubebæ, Vapor Cubebæ and Vapor Cubebæ cum Limone.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Cubebs vary much in quality, and when scarce and dear are often adulterated, or other species are substituted for them. The official kind should be about $\frac{1}{6}$ inch (4 mm.) in diameter and vary from nearly black to greyish-brown in colour, the pericarp being wrinkled, and furnished with a slender rounded pedicel about $1\frac{1}{2}$ times as long as the fruit and continuous with it (4 to 10 mm., *P.G.*). The pericarp contains a single seed attached to the base of the ovary. The taste is warm and aromatic and slightly bitter. These characters are, however, not sufficient to distinguish the genuine from the false fruits frequently offered in commerce. The most reliable characters, adopted in the *B.P.* are: (1) the crimson colour developed when a crushed Fruit is covered with a drop or two of Sulphuric Acid, since the spurious Cubebs hitherto met with apparently do not contain Cubebin and Cubebic Acid, to which the reaction is due; (2) in the Powdered Fruit, the radially elongated cells of the inner surface of the pericarp. Three varieties of the plant are cultivated in Java. The Fruit of two of them give the crimson reaction with Sulphuric Acid, but the Fruit Stalk of one is longer than that of the other; the third kind has an odour recalling that of Nutmegs, it does not give the crimson reaction, and has caused symptoms of poisoning when administered, *see P.J.* (3), xxv. pp. 314, 757, 797.

When Cubebs are scarce they are adulterated with Fruits similar in form, such as *Rhamnus* species, which is a 3- to 4-celled Fruit; *Briedelia montana*, Willd., and *Litsea citrata*, Bl., which have a large exalbuminous embryo, whilst that of *Piper Cubeba* is minute and embedded in the apex of a large oily albuminous perisperm.

Other species of Piper Fruits are sometimes substituted for Cubebs, *e.g.*, *Piper ribesoides*, Wall., *P. crassipes*, Korth., and *P. Lowong*, Bl., but these are either larger than Cubebs or are different in flavour, and do not give the crimson reaction with Sulphuric Acid.

The quality of genuine Cubebs depends upon freedom from stalks, and from immature hollow Fruits, which are concave at the base, since the stalks or rachis contain less Oil, and the Seed contains more, than the pericarp. Usually the stalks are sold separately, and employed for the distillation of Oil of Cubebs.

Tests.—Cubebs when crushed and tested with Sulphuric Acid impart a crimson colour to the Acid. No limit of ash is given in the *B.P.*; it should not exceed 7·0 p.c.

An Oleo-resin extractable by Ether and by Alcohol (90 p.c.) is present in the Fruits, to the extent of from 17 to 25 p.c. A limit of 22·0 p.c. has been suggested (*C.D.* '02, ii. 826) as a standard for inclusion in the official monograph, dry chemically pure Ether being suggested as a solvent. Ether was employed as a solvent in the 1890 Edition of the *U.S.P.*, but was altered to Alcohol (94·9 p.c.) in the 8th Decennial Revision. A standard of not less than 17·0 p.c. has also been suggested.

Preparations.

OLEUM CUBEBÆ. Oil of Cubebs.

A viscid, oily liquid, possessing a characteristic odour and a warm camphoraceous taste.

B.P. describes it as colourless, pale green, or greenish-yellow; Schimmel, as light green, or bluish-green; it is colourless only when the last portions of the distillation, which are blue, have not been added to the product.

It is distilled from Cubebs, the yield being from 10 to 18 p.c.

It consists almost entirely of Terpenes or Sesquiterpenes. It contains a lævogyrate Terpene, Pinene, Dipentene; a lævogyrate Sesquiterpene, Cadinene; and a lævogyrate Sesquiterpene Alcohol, Cubeb-camphor, which is found only in old Oil.

Solubility.—1 in 18 of Alcohol (90 p.c.), in all proportions of Absolute Alcohol.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Foreign Pharmacopœias.—Official in Port., sp. gr. 0·929; U.S., sp. gr. 0·905 to 0·925 at 25° C. (77° F.). Not in the others.

Tests.—Oil of Cubebs has a specific gravity of from 0·915 to 0·930; the *U.S.P.* gives 0·905 to 0·925 at 25° C. (77° F.); the *B.P.* 0·910 to 0·930. It has an optical rotation of −25° to −40° in a 100 mm. tube. The greater portion of the Oil distils between 250° and 280° C. (482° and 536° F.), about 10 p.c. passing over below 250° C. (482° F.). The Oil is stated to be soluble in from 1 to 3 volumes of Alcohol (90 p.c.), and to afford a solution which is neutral to Litmus paper. The solubility in Alcohol (90 p.c.) varies greatly according to the age of the sample, old Oils being apparently more soluble than new Oils. The Oil is not often adulterated. Turpentine Oil if present would be detected by the behaviour of the Oil on fractionation.

TINCTURA CUBEBÆ. TINCTURE OF CUBEBS.

4 of Cubebs, percolated with Alcohol (90 p.c.), to yield 20. (1 in 5)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Mex., 1 in 5, by weight. Not in the others.

Tests.—Tincture of Cubebs has a specific gravity of about 0·840; contains about 2·0 p.c. w/v of total solids and about 86·0 p.c. w/v of Absolute Alcohol.

Not Official.

EXTRAIT DE CUBÈBE.—1 of Cubebs, in No. 22 powder, percolated first with 2 of Ether, and subsequently with 2 of Alcohol (95 p.c.); evaporate the two liquids separately and mix the resulting extracts.—*Fr.*

FLUIDEXTRACTUM CUBEBÆ.—Cubebs, in No. 40 powder, 100 grammes, percolated with Alcohol (95 p.c. by vol.) until the Cubebs are exhausted, reserve the first 90 c.c. of percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion, and add sufficient Alcohol to make 100 c.c. —*U.S.P.*

This has been incorporated in the *B.P.C.*

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

OLEO-RESINA CUBEBÆ. *Syn.* EXTRACTUM CUBEBÆ.—Percolate Cubebs in coarse powder with Ether, slowly, until the liquor passes colourless. Let the Ether evaporate from the liquor, at first spontaneously and then over a water-bath, or recover it by distillation; and transfer the residue to a closed vessel, letting it stand until waxy or crystalline matter ceases to be deposited. Decant the Oleo-resin and preserve it in a well-stoppered bottle.

This was official in *B.P.* 1885, and has been incorporated in the *B.P.C.*

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

Foreign Pharmacopœias.—Official in Fr., Ger., Hung., Jap., Mex. (Extracto Alcoholico de Cubebas), Swiss and U.S. Not in the others.

TROCHISCUS CUBEBÆ.—Each lozenge contains about ½ grain of Cubebs with Fruit Paste.—*Throat.*

This has been incorporated in the *B.P.C.*

Official in U.S., about ½ grain of Oleo-resin in each.

VAPOR CUBEBÆ.—Oil of Cubebs, 40 minims; Light Magnesium Carbonate, 20 grains; Water, to 1 fl. oz. Mix. A teaspoonful in a pint of Water at 140° F. for each inhalation.—*Throat.*

This has been incorporated in the *B.P.C.*

VAPOR CUBEBÆ CUM LIMONE.—Oil of Cubebs, 30 minims; Oil of Lemons, 10 minims; Light Magnesium Carbonate, 20 grains; Water, to 1 oz.—*Throat.*

Not Official.

CUCURBITÆ SEMINA PRÆPARATA.

MELON PUMPKIN SEEDS.

The prepared fresh ripe Seed of *Cucurbita maxima*, from cultivated plants are official in the *Ind.* and *Col. Add.* for the Mediterranean Colonies.

Dose.—3 to 4 oz. = 85·2 to 113·6 grammes.

Not Official.

CUPRI SUBACETAS.

Syn.—ÆRUGO. VERDIGRIS.

Pale green powder, or partly crystalline masses.

According to Von Hager two varieties are recognised commercially: the blue or French Verdigris, consisting chiefly of monobasic Copper Acetate, $Cu(C_2H_3O_2)_2 + Cu(OH)_2 + 5H_2O$, and the green, or English, German, or Swedish variety, consisting chiefly of semi-basic Copper Acetate $[Cu(C_2H_3O_2)_2] + Cu(HO)_2 + 5H_2O$, as well as some bibasic Copper Acetate $Cu(C_2H_3O_2)_2 + 2Cu(HO)_2 + H_2O$.

Solubility.—When treated with Water about 50 p.c. dissolves as Copper Acetate, leaving an insoluble Acetate; insoluble in Alcohol (90 p.c.); soluble in diluted mineral acids and in Acetic Acid; also soluble in Ammonia.

Medicinal Properties.—Used as a stimulant to foul and indolent ulcers, also as an escharotic.

Foreign Pharmacopœias.—Official in Belg., Mex. (Acetato de Cobre bibasico), Port. (Verdete), and Span. (Cardenillo). Not in the others.

Tests.—Copper Subacetate answers the tests for Copper appearing under Copper Sulphate. When warmed with Sulphuric Acid and a little Alcohol (90 p.c.), the distinctive odour of Ethyl Acetate is evolved; when warmed with a minute amount of Arsenious Anhydride, the characteristic and highly-poisonous odour of Cacodyl Oxide is evolved. It should dissolve almost completely in Ammonia Solution.

The more generally occurring impurities are Arsenic, metallic Copper, Aluminium, and Chalk. Arsenic may be detected by Bettendorf's test; metallic Copper and Aluminium from the residue insoluble in Ammonia Solution; and Chalk by the effervescence on the addition of Hydrochloric Acid. Copper Sulphate, if present, may be detected by the addition of Barium Chloride solution.

LINIMENTUM ÆRUGINIS (*Ph. Lond.*).—Made by dissolving Verdigris 1, in Vinegar 7, adding Honey 14, and boiling down to a proper consistence. This has been incorporated in the *B.P.C.*

MELLITE CUIVREUX (Onguent Ægyptiac) (*Fr.*).—Copper Acetate, 1; Water, 1; Honey, 2. Boil until it assumes a red colour, and is the consistence of honey.

OXYMEL DE VERDETE (*Port.*).—Verdigris, 2; Vinegar, 3; Honey, 5. Boil down to a proper consistence.

TOPIQUE À L'ACÉTATE DE CUIVRE (VET.).—Copper Acetate, 4; Treacle, 1; Vinegar, 1; mix.—*Fr.*

CUPRI ACETAS.—Deep green or bluish-green, prismatic crystals.

Solubility.—1 in 15 of Water, 1 in 300 of Alcohol (90 p.c.), 1 in 112 of Glycerin.

Medicinal Properties.—Similar to the Subacetate, but more definite when required for solution in Water.

Foreign Pharmacopœias.—Official in Fr.

Tests.—Copper Acetate yields a bluish-green coloured solution which changes to a deep blue on the addition of Ammonia Solution in excess. It should respond to the tests for Copper given under Copper Sulphate. A small portion of the salt warmed with Sulphuric Acid evolves a characteristic acetous odour. When warmed with Sulphuric Acid and a little Alcohol (90 p.c.) the odour of Ethyl Acetate is given off.

The more generally occurring impurities are Arsenic, Iron, Lead and Zinc, alkalis and alkali earths. Arsenic may be detected by Bettendorf's test; Lead and Zinc by boiling an aqueous solution with an excess of Sodium Hydroxide Solution, cooling, filtering, and passing Hydrogen Sulphide into the filtrate, no cloudiness or precipitate should be produced; Iron, alkalis and alkali earths by removing the Copper as Sulphide with Hydrogen Sulphide, filtering and evaporating the filtrate to dryness, no residue should remain.

CUPRI SULPHAS.

COPPER SULPHATE.

B.P.Syn.—Cupric Sulphate.

$CuSO_4,5H_2O$, eq. 247·86.

Fr., Sulfate de Cuivre; Ger., Kupfersulfat; Ital., Solfato di Rame; Span., Sulfato Cuprico.

Large, translucent, blue, triclinic crystals, possessing a metallic and astringent taste. It slowly effloresces in dry air.

It may be obtained by the action of Water and Sulphuric Acid on Copper or by dissolving Copper Oxide in Sulphuric Acid.

When rendered anhydrous by heating the powder is white.

Solubility.—1 in $3\frac{1}{2}$ of Water, 2 in 1 of Water (at 212° F.); insoluble in Alcohol (90 p.c.); 1 in $2\frac{1}{2}$ of Glycerin.

Will not dissolve 1 in 2·75, as stated by some authorities.—*P.J.* '02, i. 553.

Medicinal Properties.—Astringent, prompt emetic, escharotic. Recommended in chronic diarrhœa, especially that of phthisis. Externally, as a styptic for bleeding surfaces and a local stimulant to ulcers, as an escharotic for warts, etc. For **lotions,** in proportions from 2 to 4 grains to 1 oz.; also 8 grains to 1 oz. for prurigo. As an astringent, **injection** to diminish excessive secretion from mucous membranes, especially in leucorrhœa and gonorrhœa. For urethral **injections,** 1 to 4 grains in an oz. of Water. It is also used 1 to 2 grains to 1 oz., in granular conjunctivitis and various affections of the eyes when astringent applications are required.

An antidote in Phosphorus poisoning—3 grains every few minutes till vomiting is produced.—*Mitchell Bruce.*

Copper Sulphate 10 grains, Tincture of Opium 60 minims, Water 4 fl. oz. This was used as a rectal injection in a bad case of dysentery.—*L.* '89, ii. 739.

Recommendation of the Departmental Committee appointed to inquire into the use of preservatives and colouring matter in food. That the use of Copper salts in the so-called greening of preserved food be prohibited.—*L.* '01, ii. 1683; *J.S.C.I.* '01, 1228.

Dose.—As an astringent, $\frac{1}{4}$ to 2 grains = 0·016 to 0·13 gramme; as an emetic, 5 to 10 grains = 0·32 to 0·64 gramme.

Ph. Ger. maximum single dose, 1·0 gramme.

Prescribing Notes.—*Best given in form of pill. A good pill is prepared by adding $\frac{1}{3}$ part of Pulvis Tragacanthæ Compositus, and Dispensing Syrup, q.s.; varnish if required.*

Incompatibles.—Alkalis and their Carbonates, Lime Water, Iodides, and most vegetable astringents.

Not Official.—Guttæ Cupri Sulphatis, Cupri Oleas, Unguentum Cupri Oleatis, Lapis Divinus (Cuprum Aluminatum), Fehling's Solution, Pavy's Solution, Cuprargol, and Cupri Sulphocarbolas.

Antidotes.—In case of poisoning by Copper Sulphate, Albumen or White of Egg is the best antidote; the stomach should then be washed out, demulcent drinks given, followed by Laudanum internally or Morphine hypodermically, and Linseed Meal poultices applied to the abdomen.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital. (Solfato di Rame), Jap., Mex. (Sulfato de Cobre), Norw., Port., Russ., Span., Swed., Swiss and U.S.

Ger. and Swiss have also a **crude sulphate.**

Tests.—Copper Sulphate dissolves in Water, yielding a solution which has an acid reaction towards Litmus paper, and which with Hydrogen Sulphide produces a brownish-black precipitate insoluble in Diluted Hydrochloric Acid and in Ammonium Hydrosulphide or Potassium or Sodium Hydroxide Solution, but soluble in Nitric Acid. A similar precipitate is yielded by Ammonium Hydrosulphide Solution. Ammonia Solution added drop by drop to an aqueous solution produces at first a pale blue precipitate which dissolves in an excess of the reagent yielding an intensely blue-coloured solution; Potassium or Sodium Hydroxide Solution gives a somewhat similar precipitate, which becomes brownish-black on boiling. The light blue precipitate is soluble in a very large excess of concentrated Potassium or Sodium Hydroxide Solution, but the presence of a soluble Tartrate prevents the precipitation, a deep blue liquid being produced which readily undergoes reduction to red Cuprous Oxide on boiling with Glucose and some Sugars. Potassium Hydroxide Solution produces no precipitate, but only a deep blue-coloured solution, when a fixed organic acid is present. Ammonium Carbonate Solution yields a greenish-blue precipitate soluble to a deep blue solution in an excess of Ammonia Solution. Potassium Ferrocyanide Solution yields a reddish-brown precipitate insoluble in dilute mineral acids, but decomposed by Potassium or Sodium Hydroxide Solution. A strip of bright metallic Iron immersed in a solution acquires a reddish coating of metallic Copper. A solution of Copper Sulphate acidified with diluted Hydrochloric Acid yields on the addition of Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid.

The more generally occurring impurities are Arsenic, Aluminium, Iron, Lead, and Zinc. Arsenic may be detected by the Bettendorf's test; Iron, Aluminium, and Zinc by removing the Copper from an acidified solution with Hydrogen Sulphide, adding Ammonia Solution to one portion and evaporating the other to dryness, in the former case no turbidity should be produced, in the latter no residue should remain. Their presence may also be ascertained by removing the Copper as oxide by boiling with Potassium or Sodium Hydroxide Solution and examining the filtrate (after acidification with Acetic Acid) by the time-limit test for heavy metals.

Heat.—When heated, Copper Sulphate loses its Water of crystallisation; two molecules are lost at 30° C. (86° F.) with the formation of a pale blue amorphous powder, another two are lost at 100° C. (212° F.), and the last molecule is given up at a temperature of 200° C. (392° F.), leaving an anhydrous powder weighing 63·9 p.c. of its original weight. At a still higher temperature Sulphur Dioxide and Oxygen are given off, leaving a residue of Cupric Oxide, *U.S.P.*

Hydrogen Sulphide.—If to an aqueous solution of 0·5 gramme of Copper Sulphate an excess of Hydrogen Sulphide T.S. be added and the precipitate produced filtered off, the colourless filtrate after the addition of T.S. of Ammonia should remain colourless, and after evaporation should not leave a weighable residue, *P.G.*

If Hydrogen Sulphide gas be passed through **10** c.c. of an aqueous solution (1–20) of the salt, to which 1 c.c. of diluted Hydrochloric Acid has been previously added, until precipitation of Copper Sulphide is complete, one half of the colourless filtrate should not be coloured or rendered turbid on the addition of T.S. of Ammonia, nor should the other half yield a weighable residue when evaporated and ignited, *U.S.P.*

Time-limit Test.—An aqueous solution of the salt (1-20) when boiled with excess of T.S. of Sodium Hydroxide until the Copper Oxide is completely precipitated, and then filtered, a colourless filtrate should be obtained which, acidulated with Acetic Acid, should not respond to the time-limit test for heavy metals, *U.S.P.*

Not Official.

GUTTÆ CUPRI SULPHATIS.—Copper Sulphate, 2 grains; Water, 1 fl. oz.—*London Ophthalmic.* The strength in use at the principal hospitals.

CUPRI OLEAS.—Green, oleaginous solid, insoluble in Water, soluble in Ether. An excellent antiseptic and antiparasitic agent. When diluted it is especially useful in ringworm.

UNGUENTUM CUPRI OLEATIS.—Copper Oleate, 1; Lard, 4; melt together, and stir till cold. Useful in ringworm, hard and horny warts, corns and bunions.—*B.M.J.* '84, ii. 752.

1 to 7 of Soft Paraffin (*London*); 1 to 7 of Lard (*University*); 1 to 9 of Lard (*B.P.C.*).

LAPIS DIVINUS. CUPRUM ALUMINATUM.—Copper Sulphate, Potassium Nitrate, and Alum, of each equal parts, in powder, fused in a glazed earthen crucible, powdered Camphor, to the extent of $\frac{1}{50}$th part of the whole, being added near the end of the process. When cold, break in pieces and keep in a closely stoppered bottle. An **eye-wash** may be made by dissolving 2 grains in 1 oz. of Distilled Water.

Foreign Pharmacopœias.—Official in Fr. (Pierre Divine), Ger., Hung., Jap., Russ. and Swiss. Not in the others.

FEHLING'S SOLUTION.—*See* Appendix.

PAVY'S SOLUTION.—Crystallised Copper Sulphate, 34·65 grammes; Rochelle Salt, 170 grammes; Potassium Hydroxide, 170 grammes; Water, to 1000 c.c.

When 120 c.c. of this Solution are mixed with 400 c.c. of Ammonia (sp. gr. 0·880) and diluted to 1000 c.c., then 10 c.c. may be taken as equivalent to 0·005 gramme of Glucose.

The method is well adapted for the examination of Diabetic Urine and Milk, also mixtures of Milk and Cane Sugars, and certainly has the advantage over the ordinary Fehling method by its definite end reaction.

CUPRARGOL (Copper and Silver Albuminate).—A greyish-white powder, soluble in Water. Has been used in 1 to 5 p.c. solution in conjunctivitis.

CUPRI SULPHOCARBOLAS (Copper Aseptol).—Green rhombic prisms or light green needle-shaped crystals. Soluble in Water and in Alcohol (90 p.c.). Hæmostatic. As an antiseptic, ½ to 1 p.c. solution. As an injection in gonorrhœa, ¼ to 1½ p.c. solution.

Not Official.

CURARA—WOORARA.

A powerful poison, stated to be obtained from various species of *Strychnos* and other plants, and used by the Indians in the northern part of South America for arming the points of their arrows. A brownish-black, shining, brittle, resinous mass, almost wholly soluble in Water, sparingly soluble in Absolute Alcohol. Different samples may vary very much in strength, and no doubt also in general composition, so that the dose of every parcel has to be arrived at by experiment. It is only used **hypodermically,** and the **solution** has generally been of the strength of 1 grain in 12 minims.

An alkaloid **Curarine** has been obtained from Curara, and although commercial, is somewhat difficult to obtain.

Arrow Poisons: Their history, sources, and constituents.—(*Stockman*) *P.J.* '98, ii. 548, 585.

Medicinal Properties.—It has been used in the treatment of Strychnine poisoning, hydrophobia, chorea, and tetanus.

In the convulsions of chorea, and to prevent painful spasms in moving wounded persons (*B.M.J.* '04, ii. 1642). Has an influence in diminishing the severity of the tonic and clonic tetanic spasms (*L.* '05, i. 991), and should be injected hypodermically morning and evening, commencing with $\frac{1}{6}$ grain and gradually increasing the dose according to the severity of the spasms to 1 grain; also 20 to 30 c.c. of antitetanic serum injected under the skin of the abdomen and repeated daily for a week or ten days.

Dose.—$\frac{1}{12}$ to $\frac{1}{2}$ grain = 0·005 to 0·032 gramme, but should be used with great care.

Foreign Pharmacopœias.—Official in Mex. (Curaro). Not in the others.

Descriptive Notes.—Curare is usually imported from Venezuela in the form of a blackish extract contained in small gourds about $2\frac{1}{2}$ inches in diameter. A fragment of the extract placed in a drop of Alcohol on a microscopic slide shows a brownish fluid copiously studded with quadrilateral prisms (supposed to be Curarine, which forms four-sided prisms) and an abundance of minute particles of a yellowish tint which consist of Calcium Oxalate. The principal ingredient in Curare is the bark of *Strychnos toxifera*, but that of other species is also used in different districts, thus in British Guiana the bark of *S. toxifera*, Schomb., *S. Schomburgkii*, Kl., and *S. cogens*, Benth., are used in the Curare of the Macusi, Orecuna and Wapisiana tribes, that of *S. Gubleri*, Planch., by the Moquitari and Puaroa Indians, between the Orinoco and Rio Negro, and that of *S. Castelnoeana*, Wedd., by the Ticuna, Peba Yagua and Oregona Indians in the districts of the Upper Amazon; that of *S. Crevaunii*, Planch., by the Trio and Roucouyenne Indians of French Guiana. It is obvious, therefore, that Curare is an extract of uncertain composition as regards the species of *Strychnos* employed, and the more so that different ingredients are added to the extract by different tribes. A preparation made in this country from the bark of *S. toxifera* imported from British Guiana would, therefore, be far more reliable. Curare is said to have been used successfully in hydrophobia.

INJECTIO CURARÆ HYPODERMICA.—Curare, 1; make it into a paste with Distilled Water recently boiled and cooled; transfer to a funnel plugged with absorbent Wool, and gradually pour upon it Distilled Water until 10 is obtained.—*B.P.C.*

B.P.C. Formulary 1894 gave the strength as 1 grain in 12 minims.

Dose.—1 to 6 minims = 0·06 to 0·36 c.c.

CUSPARIÆ CORTEX.

CUSPARIA BARK.

FR., ANGUSTURE VRAIE; GER., ANGOSTURARINDE; ITAL., CORTECCIA DE ANGUSTURA; SPAN., CORTEZA DE ANGOSTURA.

The dried Bark of *Cusparia febrifuga*, DC.

The alkaloids, **Cusparine, Cusparadine, Galipeine,** and **Galipidine** have been extracted from Cusparia Bark. The bitter principle **Angosturin,** to which the bitterness of the bark has been assumed to be due has also been isolated, and a small quantity of a volatile Oil. **Cusparine Sulphate** and **Hydrochloride** are slightly soluble in Water, the Acetate and Tartrate much more so.—*P.J.* (3) xiv. 423.

Contains about 1·5 p.c. of ethereal oil.—*J.C.S. Abs.* '98, i. 37.

Medicinal Properties.—An aromatic bitter tonic. In South America it is given as an antiperiodic for malarial fever.

Prescribing Notes.—*Given in the form of the Infusion or the Concentrated Liquor, generally combined with Aromatics to prevent nausea.*

Official Preparations.—Infusum Cuspariæ and Liquor Cuspariæ Concentratus.

Foreign Pharmacopœias.—Official in Mex. (Angostura Verdadera) and Port. Not in the others.

Descriptive Notes.—The bark of *Cusparia febrifuga* varies somewhat in appearance and size, the outer surface being in some pieces smooth and hard, and in others soft and spongy. The pieces are usually curved, 2 to 4 or more inches long (4 to 5, *B.P.*); about $\frac{1}{12}$ inch in thickness and 1 inch or more in diameter. Its distinctive characters are the short, resinous, brown fracture, laminated inner surface, characteristic odour and flavour, in addition to its bitterness.

The character mentioned in the *B.P.* of numerous white points on the transverse fracture is also found in Nux Vomica bark, which was at one time substituted for it in commerce. The latter, however, has a paler fracture with a definite paler line separating the corky portion, is not laminated, and is purely bitter without any special flavour. In powder Cusparia Bark may be recognised by the presence of numerous oil cells, by the acicular as well as single, oblique prismatic crystals of Calcium Oxalate, and by having very thick-walled bast fibres, which are coloured canary-yellow by Caustic Potash.

Tests.—Cusparia Bark yields about 8 p.c. of ash, and 10 p.c. is rarely exceeded.

Preparations.

INFUSUM CUSPARIÆ. INFUSION OF CUSPARIA.

Cusparia Bark, in No. 20 powder, 1; Distilled Water, boiling, 20; infuse for fifteen minutes; strain. (1 in 20)

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c.

Incompatibles.—Mineral Acids, Ferric Chloride, and other metallic salts.

LIQUOR CUSPARIÆ CONCENTRATUS. CONCENTRATED SOLUTION OF CUSPARIA.

10 of Cusparia Bark, in No. 40 powder, percolated with Alcohol (20 p.c.), to yield 20. (1 in 2)

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Liquor Cuspariæ Concentratus has a specific gravity of 1·010 to 1·020; contains about 10·0 p.c. w/v of total solids and about 20·0 p.c. w/v of Absolute Alcohol.

Infusum Cuspariæ Concentratum.—Cusparia Bark, in No. 40 powder, 40; Alcohol (90 p.c.), 25; Dilute Chloroform Water (1 in 1000), *q.s.* to make 100. Prepare by macero-expression.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.*, 1907, 249.

This appears in the *B.P.C.*

CUSSO.

KOUSSO.

Fr., Cousso; Ger., Kosoblüthen; Ital., Kousso; Span., Flor de Couso.

The dried panicles of pistillate Flowers of *Brayera anthelmintica*, Kunth. (of *Hagenia abyssinica* (Bruce) Gmelin, *U.S.P.*).

Obtained from Abyssinia.

Medicinal Properties.—Anthelmintic. Especially useful for the different kinds of tapeworm. Should be followed by a purgative to expel the dead worm.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ oz. = 7·1 to 14·2 grammes.

Prescribing Notes.—*The Flowers, in coarse powder, are mixed with half a pint of warm Water, allowed to stand for fifteen minutes, stirred up (not strained), and taken in 2 or 3 draughts at short intervals. It should be taken in the morning on an empty stomach, the bowels having previously acted. After three or four hours a brisk purgative should be administered. On account of its liability to produce nausea a little Lemonade may be taken afterwards.*

Foreign Pharmacopœias.—Official in Austr. (Koso); Belg., Fr. and Port. (Cousso); Ital. (Kousso); Ger., Jap. and Swiss (Flores Koso); Hung. (Kusso); Mex. (Cuso); Norw. and Swed.; Russ. (Flores Kusso); Span. (Couso); U.S. (Cusso).

The Infusion is official in Belg. 2 in 15; Fr. (Apozème de Cousso) about 1 in 8; Span. (Inf. de Couso), 1 in about 16$\frac{1}{2}$, *B.P.C.* 6 in 100.

Descriptive Notes.—Cusso is generally imported in rolls about 1$\frac{1}{2}$ to 2 feet long (3 to 6 dcm.) and 2$\frac{1}{2}$ to 3 inches in diameter, each consisting of the large panicled inflorescence of female flowers. The flowers are shortly stalked, pubescent, and consist of the two rounded bracts, a calyx of 5 outer, rigid, purple-veined sepals, and 5 inner, smaller, incurved, shrivelled segments. The 5 caducous white petals as well as the abortive stamens are usually absent in the drug, there are two carpels, and the style with two broad hairy stigmas is exserted. The large stems should be rejected (*U.S.P.*), and also samples which have lost their reddish tint and become brownish, indicating age and deterioration. The male flowers, which are excluded by the *B.P.*, *U.S.P.* and *P.G.*, have a greenish tint, and the outer sepals are not enlarged. The powder is characterised by the thick-walled unicellular hairs, the numerous rosette crystals, as well as simple and segmented capitulate short-stalked glands (*Koch*). It should not contain pollen grains, nor fragments of vessels more than 0·002 mm. in diameter (*P.G.*), but Koch states that pollen grains do not occur in it.

Not Official.

CYDONIUM.

QUINCE SEED.

The Seeds of *Pyrus Cydonia*.

Their coriaceous envelope abounds in Mucilage.

Medicinal Properties.—Demulcent. The **decoction** is used externally for cracks in the skin. A nice adjunct to eye-lotions in cases of irritation and inflammation.

Foreign Pharmacopœias.—Official in Belg., Port. (Marmelo), Mex. (Membrillo), and Swiss. Not in the others. The fruit is official in Fr. (Coing).

DECOCTUM CYDONII.—Quince Seed, 1; Distilled Water, 80. Boil for ten minutes, and strain.

This has been incorporated in the *B.P.C.*

MUCILAGO CYDONII.—1 of Quince Seed and 25 of Water; by cold maceration. Was official in Austrian Ph. (1889), and is the strength now incorporated in the *B.P.C.*

Fr., 1 in 10; Port., 1 in 100.

Not Official.

CYLLIN.

Jeyes' Cyllin (medical) is a non-toxic antiseptic; it contains 50 p.c. of a new series of oxidised Hydrocarbons, free from Phenol and its homologues, emulsified with neutral Tar Oil. Its Carbolic Acid coefficient for *Bacillus Typhosus* is 20.—*L.* '07, i. 33.

Preparations for internal administration are Cyllin Capsules, Cyllin Pastilles and Cyllin Syrup.

The dressings, Cyllin Lint, Gauze and Wool, each contain 10 p.c. of Cyllin.

Two Gelatin plates were inoculated with Staphylococcus pyogenes aureus, one was medicated with Cyllin inhalant, and the other was unmedicated. The former showed no sign of growth, the latter a copious and normal growth.—*L.* '05, i. 988. A new use of the inhalant is thus indicated in combating the symbiotic action of the pus microbe in pulmonary tuberculosis.

3-minim doses given (*L.* '05, ii. 1148), in the form of a keratin-coated capsule, every second hour if necessary in the treatment of sprue, but rarely more than 8 a day are required. Best time to administer it is after food.

Attention has been called (*B.M.J.* '04, ii. 1119) to its value as a tubercle bactericide, it being claimed to be non-toxic and about twenty times as powerful as Carbolic Acid, and hence its trial in cases of tuberculosis.—*L.* '05, i. 377.

Not Official.

CYNOGLOSSUM.

The Root of *Cynoglossum officinale*, L. It contains an amorphous alkaloid **Cynoglossine.**

Medicinal Properties.—Has been used as a demulcent and sedative.

Foreign Pharmacopœias.—Official in Dan., Fr., Mex., Norw., Port. and Span. Not in the others.

Pulvis Cynoglossi Compositus is official in Dan., Fr. and Norw.; Pilulas Cynoglossi in Dan.; Pildoras de Cinoglosa in Mex., and Span.

Fr., Pilules de Cynoglosse Opiacées, each pill contains 0·02 gramme (⅓ grain) of Extract of Opium, and 0·02 gramme of Powdered Henbane Seeds.

Not Official.

CYPRIPEDIUM.

The Rhizome and Roots of *Cypripedium hirsutum*, Mill., and of *Cypripedium parviflorum*, Salisb., are official in U.S. Commonly known as Lady's Slipper.

Cypripedin is the dried extractive of the above, and has been recommended in hypochondriasis, chorea and epilepsy.

The eclectic remedy 'Cypripedin,' which is stated to be prepared by precipitating a concentrated tincture of the root with Water, is complex in composition and stated to have no claim to the name given it.

It may be used in doses of 1 to 5 grains = 0·065 to 0·32 gramme.

A 1 in 1 **Fluid Extract** (Alcohol 48·9 p.c.) is official in the U.S., average dose 15 minims = 0·9 c.c.

Not Official.

DAMIANA.

The Leaves of one or more species of *Turnera*, from Mexico and California. Contains a bitter substance, resius, and a volatile oil.

Medicinal Properties.—Tonic, diuretic, and aphrodisiac.

Prescribing Notes.—*Frequently given in the form of* **pill**; *the Hard Extract makes a good pill with a small quantity of Alcohol* (90 *p.c.*); *the Soft Extract is best hardened with the powdered Leaves. The Liquid Extract is given in* **capsules.**

Foreign Pharmacopœias.—Official in Mex.

Descriptive Notes.—Damiana occurs in commerce in two or three different varieties. The kind which is considered the best is known as Helmiclis Damiana, and is derived from *Turnera aphrodisiaca*, L. Ward (nat. ord. *Turneraceæ*) and is a native of California and Mexico. The leaves, of a light green colour, are wedge-shaped, usually less than an inch in length (10 to 25 mm.) and about ¼ inch (5 to 10 mm.) in diameter in the broadest part, with about 3 to 6 coarsely crenate teeth on either side besides the terminal one. The taste recalls that of figs, but is aromatic and slightly bitter. The plant is considered by some botanists to be a variety of *T. diffusa*, Willd. It has reddish stems and thinner, smoother and less hairy, greener leaves, not greyish-green as in the type. The leaves of another species, possibly *T. microphylla*, Desv., are sometimes substituted for it. They are smaller, more hairy, with hairy stems which are not reddish. The leaves of *Aplopappus discoideus*, DC., nat. ord. *Compositæ*, are occasionally offered as Damiana. They have fewer, more distant, seriate teeth, usually three on either side, and composite flowers with hairy pappus, usually mixed with the leaves.

EXTRACTUM DAMIANÆ LIQUIDUM.—Damiana leaves exhausted with Alcohol (60 p.c.); 1 of fluid represents 1 of the drug.

This has been incorporated in the *B.P.C.*

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

EXTRACTUM DAMIANÆ.—The above evaporated to a soft extract.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

This has been incorporated in the *B.P.C.*

MISTURA DAMIANÆ COMPOSITA.—Sodium Hypophosphite, 5 grains; Calcium Hypophosphite, 5 grains; Liquid Extract of Damiana, $\frac{1}{2}$ fl. drm.; Liquid Extract of Nux Vomica, 2 minims; Chloroform Water, to 2 drm.—*Martindale.*

This has been incorporated in the *B.P.C.*

PILULA DAMIANÆ COMPOSITA.—Extract of Damiana, 2 grains; Phosphorus, $\frac{1}{100}$ grain; Extract of Nux Vomica, $\frac{1}{8}$ grain.—*Martindale.*

Extract of Damiana, 2 grains; Extract of Nux Vomica, $\frac{1}{10}$ grain; Phosphorated Suet (10 p.c.), $\frac{1}{10}$ grain; mix quickly these three with about $\frac{1}{4}$ minim of Chloroform and add $\frac{1}{10}$ grain of Compound Tragacanth Powder and Mucilage of Acacia *q.s.*—*B.P.C.*

DIGITALIS FOLIA.

DIGITALIS LEAVES.

Fr., Digitale; Ger., Fingerhutblatter; Ital., Digitale; Span., Hoja de Digital.

The dried leaves of *Digitalis purpurea*, L. Collected from plants commencing to flower. The *U.S.P.* specifies that the leaves should be collected from plants of the second year's growth.